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CONTENT

ACHIEVING COMPETITIVE ADVANTAGE IN TECHNOLOGY BASED INDUSTRY: HOW DEVELOPING INTELLECTUAL CAPITAL MATTERS

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ABSTRACT

The development of high quality human resource leads to an attainment of sustained competitive advantage is a widespread in the management literature and thus, organizations are trying to distinguish themselves on the basis of human resources and intellectual capital as major cause leading to a sustained competitive advantage. In this regard, human resource (HR) systems are acknowledged as the most important mechanism by which companies use to develop their intellectual capital and then, achieve competitive advantage. In this study, a correlation design was utilized to measure the type and the degree of correlation between HR systems, intellectual capital and competitive advantage. The results of the study demonstrate that the practices and systems of human resource management do play a significant role in the development of intellectual capital. In addition, human capital drives an organization's strategic competitive advantage. Additionally, acquisition HR practices were found to be significantly correlated with strategic competitive advantage and thus, the findings partially support that HR systems not only affect competitive advantage through the facilitation of

intellectual capital, but also represent a direct basis for the achievement of competitive advantage.

Key Words: *Intellectual Capital, HR Practices and Competitive Advantage*
JEL Classification: O34

1. INTRODUCTION

The resource based view has recently shifted the focus of strategic management scholarly research to an organization's resource as strong basis of competitive advantage. Thus, the development of high quality innovative workers leads to a sustained competitive advantage is a widespread in the literature (Macmillan, 1984; Ployhart; Coff & Kryscynski, 2011). Particularly, Intellectual capital, especially in its form of human capital, is considered as a promising ground for the achievement of sustained competitive advantage because it contains tacit knowledge and complexity that cannot be easily imitated by organizations (Coff, 1997). As result, a growing number of organizations are trying to differentiate on the basis of intellectual capital in order to gain a competitive advantage (Bowen, 1988). Additionally, HR systems are widely viewed as a key mechanism through which companies develop their intellectual capital (Chen & Huang, 2009; Collins & Clark, 2003) because HR systems, if effectively managed, play a key role in equipping organizations with the best qualified and innovative workers through training and selective staffing (Youndt and Snell, 2004). In turn, high quality innovative workers help organisations achieve competitive advantage (Hatch & Dyre, 2004).

Therefore, the main questions of this paper are how Somalia's telecommunication and commercial banks can be more competitive by applying HR systems directed at developing valuable human capital? How does the application of HR systems relate to development of intellectual capital? And how competitive advantage can be achieved through the development of intellectual capital? In order to answer these questions, the paper undertakes a review of relevant literature about the role of HR systems in developing intellectual capital and how this turns into the achievement of sustainable competitive advantage. In addition, a hypothesised model (figure 1) was built based on this review and then, empirically tested through an application of regressions analysis using data collected from telecommunication companies and commercial banks in Somalia. From theoretical and practical perspectives, this study is significant for a number of

reasons. First, it contributes to the current literature of strategic management by identifying an effective mediation mechanisms through which the relationship between HR systems and competitive advantage is facilitated. Second, this study will inform organizations about mechanisms through which they can enhance their competitive advantage.

2. CONCEPTUAL FRAMEWORK AND RESEARCH QUESTIONS

2.1 Conceptualization of Key Terms

Intellectual capital has different conceptualizations. Youndt and Snell (2004) operationalized it as three dimensional construct, organizational, human and social capital. Human capital is conceptualized as an aggregate of an organization's level of human capital through the combination of competencies, skills, experiences and the knowledge of its employees (Kor & Leblebic, 2005). On the other hand, Barney (1991) defines social capital as the skills and knowledge embedded in the relationship of employees. Although intellectual capital has many types, in this paper, only the human and social capitals are examined. Synthesizing the discussions, human capital refers to the tacit and not codified knowledge, skills, and expertise that only exist through the minds of individual workers and social capital refers to a shared knowledge and skills that exist only as result of interaction between employees. From this viewpoint, this paper is aimed at analysing how HRM systems enhance the level of intellectual capital and how this turns into an attainment of competitive advantage.

The use of human resource (HR) systems in this paper has two meanings, developmental and participative. Developmental HR systems are the policies and programmes that collectively aimed at developing an organization's human capital which can materialize in two different ways. First, through acquisition such as selective staffing HR system, organizations can acquire a ready-made qualified workers (Shaw, Park, & Kim, 2013). Selective staffing can be explained in terms of intensive and extensive hunt of an existing ready-made human resource. Extensive strategies involve the efforts aimed at widening the sources of recruitment and intensive strategies concerns the application of a combined assessment methods (Youndt & Snell, 2004). Second, organizations can develop the capacity of their human capital through intensive and firm specific trainings (Snell and Dean, 1992). On the other hand, participative HR systems are HR

programmes aimed at increasing employee participation and interaction such as teamwork, less hierarchical structure, employee empowerment, group based incentives and reducing status differences. According to Youndt & Snell (2004), participative HR systems can be conceptualized as egalitarian and collaborative practices. Egalitarian HR practices are all strategies directed at reducing status differences and removing hidden walls so that a free interaction of employees is encouraged. On the other side, collaborative HR practices are all employee-engaging mechanisms that push employees to engage in collaborative efforts.

This paper aims to examine how both types of HR systems correlate with competitive advantage directly and through the mediation of intellectual capital. This approach is more holistic and the aim is to study the aggregate impact of multiple HR systems on intellectual capital and competitive advantage. This holistic approach was selected because it is less likely that a single HR practice has enough measurable effect on the variables of interest in this study. (Youndt, Snell, 2004). Finally, according to Barney (1991), competitive advantage materializes whenever organizations implement a strategy that yields additional value and at same time cannot be easily copied by competing organizations. However, in this paper, competitive advantage is defined on the basis of a strategy and organization's relative performance situation in a specific industry. Specifically, competitive advantage is operationalized as a strategic performance and financial performance.
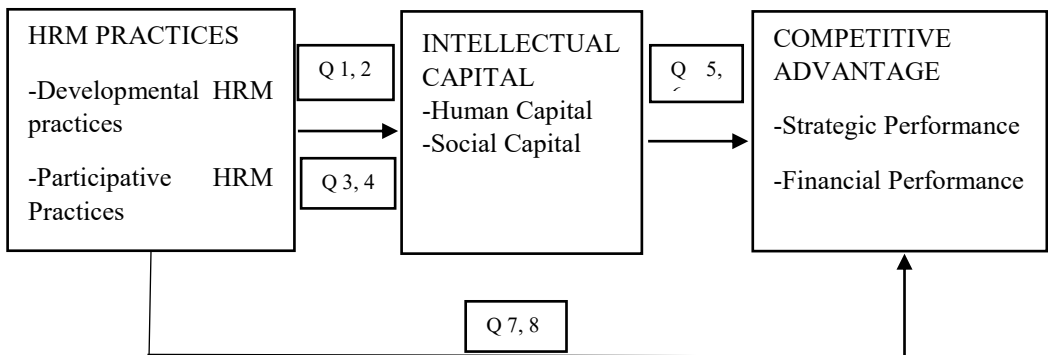
Figure 1: Hypothesised model showing the correlation between HR Practices, Intellectual Capital and Competitive Advantage

3. HUMAN RESOURCE PRACTICES AND INTELLECTUAL CAPITAL

3.2. Human Resource Systems and Intellectual Capital

HR systems such as recruitment, selection, compensation and trainings are extremely crucial to attract and develop a skilled employees (Youndt & Snell, 2004; Swart & Kinnie, 2010). Additionally, these practices can be combined by organizations in a way that cannot be easily imitated by other organizations (Ployhart et al, 2006). Thus, it is widely acknowledged in the literature that HR systems including trainings, recruitment and selection are highly significant for the development of human capital (Lee, 2012; Kong & Thomson, 2009; Collins and Clark 2003). In summary, the HR systems provide organizations a two comprehensive options of either attracting (buying) the existing talents through recruitment and selection strategies or using (making) training and development strategies to develop human capital (Youndt & Snell, 2004). These set of HR systems aimed at developing human capital such as selective recruitment, training and attractive compensation systems are expected to have impact on organization's human capital development. Therefore, the following questions are suggested; Q1: Is there a positive relationship between an organization's acquisition HR system and the level of its human capital? And Q2: Is there a positive relationship between an organization's training HR system and the level of its human capital?

The development of human capital is just one step forward, but it is not a complete picture for intellectual capital to materialize. In this regard, intellectual capital studies suggests that an organization's workers become more valuable when a complex interaction among them is improved through the elimination of communication barriers. In such environment, employees usually share information and knowledge (Coff e tal, 1997). In this regard, there are number of participative HR systems including open communication, teamwork, empowerment and team based-performance compensation which are linked to an attainment of high levels of social capital (Foss, Laursen, and Pedersen, 2011). Social capital-enhancing participative HRM systems create a context where employees and managers can engage in sharing new knowledge and skills and exchange ideas. A significant aspect is an employee empowerment whereby employees are given a certain decision-making ability which leads to higher levels of sharing of knowledge, skill and information among employees (Soo, et al, 2017

and Youndt & Snell, 2004; Shaw, Duffy, Johnson & Lockhart, 2005). Therefore, it is expected the more an organization applies participative HRM systems, the higher its level of social capital will be. As a result, the following questions were generated; **Q3***:* Is there a positive relationship between an organization's collaborative) HR systems and the level of its social capital? And **Q4***:* Is there a positive correlation between an organization's egalitarian HR systems and the level of its social capital?

Intellectual Capital and Competitive Advantage

Organizations with high knowledgeable workers are the best in terms of engaging in creative decisions that lead to a better organizational competitiveness. As a result, the higher an organisation's level of human capital is, the better its competitive advantage is (Romijn & Albaladejo, 2002; Subramaniam & Youndt, 2005). In this regard, a firm's resources including its human capital can be a promising ground for competitive advantage, especially if it cannot be easily imitated by other organizations (Barney, 1991). There are numerous cases where competitive advantage gained by an organization is attributable to the organization's utilization of employee knowledge, skills, and abilities. Human capital, when it is valuable and hardly to imitate, is very significant foundation of achieving competitive advantage (Hatch & Dyer, 2004). Social capital enhancing HR systems are also linked with an organization's competitive advantage (Subramaniam & Youndt, 2005; Morris & Snell, 2011). Therefore, the following questions are suggested; **Q5**: Is there a positive relationship between human capital and an organization's competitive advantage? And **Q6**: Is there a positive relationship between social capital and an organization's competitive advantage?

3.3. Human Resource Systems and Competitive Advantage
The scholars of strategic management and human resource are not in agreement when it comes to how HR systems and an organization's competitive advantage are related. Some of them argue that HR systems only affect an organization's strategic competitive advantage through the mediation of other constructs such intellectual capital, build-up of organizational competencies, employees mobility constraints and innovative capacity of workers (Youndt & Snell, 2004; Lado and Wilson, 1994; Hatch & Dyer, 2004; Subramaniam & Youndt, 2005). On the other hand, there are number of scholars arguing that HR systems represent a direct basis of competitive advantage (Delery and Roumpi, 2017; MacDuffie, 1995;

Becker and Gerhart, 1996). For instance, according to Delery and Roumpi, (2017), HR systems not only affect an organization's competitive advantage through the development of skills and capabilities of workers, but also it can help organizations to achieve competitive advantage by influencing the employees mobility in terms of labour demand and supply. Therefore, the following questions are proposed; **Q7:** Is there a positive relationship between developmental HRM systems and an organization's competitive advantage? And **Q8:** Is there a positive relationship between participative HRM systems and an organization's competitive advantage?

4. METHOD

4.1. Research Design and Sample
An explanatory correlation design was utilised to explain the type and the degree of correlation between HR systems, intellectual capital and competitive advantage. The explanatory research design is usually applied by the researchers when the purpose of undertaking a particular research is to identify how a change in one or more variables predicts changes in other variable (Creswell, 2012).

4.2. Participants and Procedures
The target population of this study was the presidents, general managers and HR managers of Somalia's technology-based service industry, specifically telecommunication companies and commercial banks. A proportionate stratified random sampling is used in the study (Creswell, 2012). A sample of 70 out of 147 persons was planned to participate in the study. A link of questionnaire with a cover latter was mailed to a sampled 70 persons representing different levels of management in each of the companies. 41 managers responded, representing 55 % percent of response rate.

4.3. Measures
Intellectual capital was conceptualized as a two-dimensional-construct, human and social capital. *Human capital* was measured through the use of five items measurement scale. Similarly, *social capital* was measured through the use of five items measurement. All items were taking from the work of Youndt and Snell (2004). They conducted confirmatory factor loading analysis and the resulting two factors, human and social capital, explained 51 % of total variance and showed average commonality of around .67. *HR systems* were conceptualized as

developmental and participative HR practices. *Developmental HR systems* were measured using thirteen scale items originally developed by Snell and Dean (1992) and further revived by Youndt el al. (1996). Likewise, *participative HR systems* were measured through the use of thirteen items taking from Youndt and Snell (2004). Finally, *competitive advantage* was measured using six item scale adapted from Schilke (2014) who developed these items based on the original work of Weerawardena (2003). Finally, all measurement items and its scale were validated through face validity and pre-testing. First, the measurement items were shared with the number of Somali professors who checked its relevance to the local context and culture. Second, the questionnaire was translated from English to Somali language and then was back-translated into English with the help of two bilingual experts. Lastly, all measures and items are combined in to a single questionnaire and five-point Likert scale was adapted measuring participants' level of agreement or disagreement with the measurement item (1 = strongly disagree; 5 = strongly agree).

4.4. Analysis
The correlation analysis was applied to answer all questions using the SPSS packet program. This type of analysis was applied to examine the relationship between HR systems and intellectual capital in one hand and intellectual capital and competitive advantage on the other hand.

5. FINDINGS

The results of the study were reported based on the research questions under three main categories, HR practices and intellectual capital, intellectual capital and competitive advantage and finally, HR practices and competitive advantage. For more details about the correlations between the variables of the study, see (Table 1, Table 2, Table 3 and Table 4).

5.1. HR Systems and Intellectual Capital
To examine whether HR systems positively correlated with intellectual capital, a correlation analysis was utilized and the result is indicated in Table 1. In this regard, question 3 examined whether there is a positive correlation between collaborative HR systems and the level of firm's social capital and as expected, collaborative (r = .335, ρ < .05) HR practices were significantly correlated with a firm's social capital. Similarly, question 4 examined whether there is a positive

correlation between egalitarian HR systems and the level of firm's social capital. However, egalitarian HR systems were found not significantly correlated with a firm's level of social capital and thus, the results did not provide support for question 4. On the other hand, although developmental HR systems, acquisition and training, were all positively correlated with an organization's human capital, it was found the relation between the two as weak rather than significant and thus, there is no strong support for question 1 and 2. Although not hypothesised, developmental HR systems, acquisition ($r = .364$, $\rho < .05$) and training ($r = .319$, $\rho < .05$) were positively and significantly correlated with the level of organization's social capital.

Table 1: Results of HR Practices and Intellectual Capital Correlation Analysis

Variables	Social Capital		Human Capital	
Collaborative HR Practices	.335*	(.032)	.139	(.387)
Acquisition	.364*	(.019)	.234	(.140)
Training	.319*	(.042)	.238	(.124)

*$\rho < .05$
**$\rho < .05$

5.2. Intellectual Capital and Competitive Advantage

To examine the relationship between intellectual capital and an organization's competitive advantage, a correlation analysis was used and result is indicated in the Table 2. In this regard, human capital ($r = .33$, $\rho < .05$) was found to be significantly correlated with an organization's strategic financial performance. This means the higher an organization's human capital is the higher its financial performance is and this is not only statistically significant, but also practically important. On the other hand, social capital were found not significantly correlated with an organization's competitive advantage and thus, no statistically significant support was found for question 6.

Table 2: Results of intellectual capital and competitive advantage correlation analysis

Variables	Strategic Performance		Strategic Financial Performance	
Human Capital	.015	(.920)	.330*	(.035)
Social Capital	.086	(.0592)	.284	(.072)

*$\rho < .05$,   **$\rho < .05$

5.3. Human Resource Systems and Competitive Advantage

Finally, to examine the relationship between HR practices and competitive advantage, once again correlation analysis was applied and the result is shown in Table 3.

Table3: Results of Intellectual Capital and Competitive Advantage Correlation analysis

Variables	Strategic Performance		Strategic Financial Performance	
Acquisition	.636**	(.019)	.457**	(.003)
Trainings	.265	(.094)	.205	(.190)
Collaborative	.199	(.213)	.209	(.190)
Strategic Performance	-		.524**	(.000)

$*\rho < .05,$ $**\rho < .05$

The questions 7 and 8 assumed a positive correlation between developmental and participative HRM systems and an organization's competitive advantage. In this regard, developmental HR system, acquisition (r = .636, $\rho < .05$) was significantly correlated with an organisation's strategic performance. In similar vein, acquisition (r= .457, $\rho < .05$) was significantly correlated with an organization's financial performance and thus, the results provide strong partial support for question 7. However, participative HR systems (egalitarian and collaborative) were found not significantly correlated with an organization's strategic performance and thus, results indicate no support for question 8.

Table 4: Results of all inter-correlation analysis

Variables	1	2	3	4	5	6	7
1. Acquisition	-						
2. Trainings	.447**	-					
3. Collaborative	.326*	.622**	-				
4. Human Capital	.234	.238	.139				
5. Social Capital	.364*	.319*	.335	.587**	-		
6. Strategic Performance	.636**	.265	.199	.016	.086	-	
7. Financial Performance	.457**	.205	.209	.330*	.284	.524*	-

$*\rho < .05, **\rho < .05$

6. DISCUSSION AND CONCLUSION

In general, this study supplies a reliable support that HR systems and practices are essential in the development of intellectual capital. Although developmental HR systems were insignificantly correlated with human capital, moderate correlations

may not misleadingly reach significance due to the small sample size which is the case in this study. Thus, the study provides somehow a consistent support for the previous studies in which acquisition HR systems aimed at attracting best qualified employees and HR efforts aimed at training and developing an organization's workers correspond to the level of an organization's human capital. Therefore, this study is consistent with earlier studies that HR systems are fundamental in developing human capital (Youndt & Snell, 2004; Swart & Kinnie, 2010; Collins and Clark 2003; Lee, 2012; - et al, 2017).

On the other hand, participative HR practices were found to be significantly correlated with an organization's social capital and thus, the study provides a consist support for the findings of previous studies that collaborative HR practices aimed at selecting workers with strong ability to collaborate in teams, promoting teamwork, reducing communication parries and utilising group based incentives were all correlated with an organisation's level of social capital. As such, this study is in line with the findings of a previous studies (Foss, Laursen, and Pedersen; Soo et al., 2017; Youndt and Snell, 2004). For instance, Foss, Laursen, and Pedersen (2011) found that HR systems including open communication, team work, empowerment and team based-performance compensation lead to an attainment of high levels of social capital by encouraging workers to exchange ideas and learn from one another. However, this study found no significant correlation between egalitarian HR systems and an organization's social capital and as such, it is consistent with the findings of a study conducted by Youndt and Snell (2004) who found that egalitarian HR practices were not correlated with the level of an organization's social capital. Although not hypothesised, interestingly and unexpectedly, the study found that acquisition and training HR systems were significantly correlated with an organization's social capital and this, suggests that developmental HR systems not only form strong basis for developing an organization's human capital, but also supports the attainment of social capital.

The analysis of the study did not reveal a significant correlation between social capital and an organization's competitive advantage. The reason that the correlation between these two terms became statistically non-significant might be because of the significant correlation of social capital with human capital and developmental (acquisition and training) HR systems. Thus, it seems a reasonable the acquisition and training HR systems are the key mechanisms through which organizations can develop their human capital and in turn, human capital

establishes strong fundamental base for the achievement of strategic competitive advantage. Therefore, the study found that human capital is significantly correlated with an organization's competitive advantage, particularly an organization's strategic financial performance. This suggests that the investments made by organizations to increase their human capital, in turn, translate into a high level of return on sales (ROS), return on investment (ROI) and market share. Furthermore, the correlation of human capital and competitive advantage are not only statistically strong, but also are practically significant for organizations as it shows a clear connection between an organization's intellectual capital and the achievement of competitive advantage. Thus, the findings of the study reinforce that organizations with the most qualified workers are the best in terms of achieving strategic competitive advantage. Accordingly, the result of the study bears close resemblance to the findings of the previous studies (Subramaniam & Youndt, 2005; Hatch & Dyer, 2004; Barney, 1991). For example, Barney (1991), founded human capital as significant basis of sustainable competitive advantage.

With regard to the relationship between HR systems and strategic competitive advantage, only acquisition HR systems were found to be significantly correlated with an organisation's strategic performance. This suggests that an organization's investment in human capital, to attract the best workers, leads to the achievement of competitive advantage. Therefore, the results partially support the opinion of strategic human resource scholars arguing that HR systems are significant basis for the achievement of competitive advantage (MacDuffie, 1995). However, as the most HR systems, trainings and development, collaborative and egalitarian, were all found not significantly correlated with an organization's competitive advantage, the study also significantly supports the notion that HR systems improve an organization's strategic competitive advantage mainly through the development of employee capabilities and knowledge. This notion is argued by many scholars including Youndt & Snell (2004) who found that HR systems mainly affect organizational performance through the mediation of social and human capital.

In conclusion, the result of regression analysis reported in the Table 1 and Table 2 leads to three fundamental conclusions. First, it provides a clear demonstration that HR systems play a significant role in the development of social and human capital by equipping organizations with the best qualified workers either through selective staffing or through development and training and by increasing transfer

of skills and knowledge sharing among employees through collaborative HR practices. Second, intellectual capital, particularly human capital, not only positively affects an organization's competitive advantage, but also represents a key mechanism through which HR systems can positively affect a firm's strategic performance. Third, the study provides organizations a practically relevant knowledge that they can apply to invest their HR systems in a way that increases the capacity of their workers and then, utilise them to achieve and sustain their competitive advantage.

Finally, like any other study, this study is subject to limitations. First, this paper addresses HR systems as a bundle and this diverted the attention from addressing a single HR practice which may be particularly relevant to the intellectual and competitive advantage. In addition, there may be other organizational activities that affect an organization's social and human capital and competitive advantage, but were not focused in this study. Thus, future research may consider the role of single HR practice or other organizational aspects in the development of human capital and competitive advantage. Second, the sample size was not large. Therefore, future studies should consider a large sample size in order to reach statistical significance. Third, correlation analysis was applied and thus, the mediation of intellectual capital was not effectively addressed. Future studies should consider more appropriate advanced multivariate analysis such as multiple regression analysis and structural equation modelling to examine the mediating role of intellectual capital. Fourth, in the context where there is no regulations that make the disclosure of financial statements mandatory, the data about the financial performance of the companies may not be accessible. Therefore, to measure an organization's return on investment, sales and it is market share and then, to relatively compare these results to other competing companies are extremely difficult. Thus, future studies should consider these difficulties and discover appropriate ways to measure competitive advantage in similar contexts. Fifth, HR managers, finance managers and general managers participated in this study. In some contexts, these people may not have access to an organization's strategic performance and only very few senior managers may have the capacity to access this information. Therefore, it is recommended that future studies focus on top managers such as presidents and CEOs to get the most accurate and reliable data about an organization's strategic performance.

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AN INVESTIGATION INTO SUSTAINABLE SUPPLY CHAIN MANAGEMENT PRACTICES IN A DEVELOPING COUNTRY

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─**Abstract**─

The purpose of this paper is to study current practices on sustainable supply chain management (SSCM) in a developing country. To this end, five research questions that focus on the motivations for implementing SSCM initiatives, the level of awareness on SSCM issues, obstacles to implementing SSCM, best practices in SSCM, and responsibilities in SSCM are proposed. The research questions were investigated through four case studies, including automotive, electronics, white goods, and furniture companies. All four companies were based in Turkey. The findings show that SSCM is still in its embryonic stages in the case companies. The findings also suggest that the case companies are somewhat hesitant to launch an initiative to implement full-fledged SSCM practices due to the costs associated with setting up a SSCM system. In addition to research specific to the Turkish context, the paper provides a needed reference point on the application of SSCM in developing nations.

Key Words: *Sustainable supply chain management, Turkey, Case study.*
JEL Classification: M0

1. INTRODUCTION

Sustainable supply chain management (SSCM) has gradually become a significant subject for many organizations in recent years. Research in SSCM builds on the concepts of both sustainable development and supply chain management (SCM). Increasingly, traditional problem solving techniques in SCM are being modified or replaced by those that incorporate the concept of sustainable development (Wikström, 2010). The incorporation of sustainable development into SCM began with the shipping recyclable secondhand goods from the points of consumption to recycling collection points, evolved with the integration of recovery activities (such as reuse and remanufacturing), and ultimately evolved into the integrated approach that is now known as SSCM. For the purpose of this paper, SSCM is described as the effective and efficient organization of the sequences of events necessary for collecting a product from a consumer and either dispose of it or recover value (Prahinski and Kocabaşoglu, 2006). Many researchers argue that SSCM can be a crucial enabler of corporate sustainability if it is planned and implemented effectively (Seuring and Müller, 2008; Govindan et al., 2015).

Despite its importance, there is a lack of systematic reports on the implementation of SSCM in Turkey. Therefore, the purpose of this paper is to explore some of the current perspectives and practices on SSCM in the country. To achieve this aim, several research questions are proposed. The questions are addressed through a case study approach that focuses on four large Turkish companies. In addition to research specific to the Turkish context, note that this paper may provide a needed reference point on the application of SSCM in developing nations.

2. LITERATURE REVIEW

There is an extensive body of literature review, empirical and case studies focusing on SSCM besides the studies displayed above, such as Van Hoek, 1999; Guide and Van Wassenhove, 2003; Dekker *et al*., 2003, Srivastava, 2007; Guide and Jayaraman, 2000; Rogers and Tibben-Lembke, 2001; Chan and Chan, 2008; Ansari and Kant, 2017; Bastas and Liyanage, 2018.

In addition, some of the existing literature focuses on the application of SSCM in developed countries. For example, Harms (2012) examines two SSCM strategic

methods in Germany's largest companies. The survey-based analysis uncovers that large German stock companies mainly apply risk-oriented, rather than business opportunity-oriented, SSCM strategies. Studies of SSCM focusing on organizations operating in developing countries are less common. Gopalakrishnan et al., (2012) scrutinizes the enablers of Sustainability and associated vital characteristics based on existing literature and a case study. A summary is provided about the British Aerospace (BAe) Systems' sustainability plans and actions. The authors suggest that two resultant frameworks exhibit the interdependence of the triple bottom line and the critical components necessary for a sustainable supply chain.

To the best of our knowledge, existing work on SSCM in developing countries has focused on several countries, such as China, Malaysia, Brazil, India, Tahiland, Pakistan, Mexico, Indonesia, United Arab Emirates.

For example, empirical studies by Zhu and Sarkis (2006) and Zhu *et al*., (2007) have investigated issues related to green SCM in China. Another key study was conducted by Lau and Wang (2009), who adopted a case study approach in a study of four major consumer electronic product manufacturers in China.

As another example, Li and Olorunniwo (2008) report on another case study that focuses the key characteristics of a generic RL process flow as well as the key strategic issues that a firm may use for competitive advantage. Zailani *et al*., (2012) examines the application of sustainable supply chain management practices. The study also scrutinizes the results of these applications on sustainable supply chain performance. Bouzon et al., (2015) identify the drivers that facilitate reverse logistics implementations in a developing economy. Their findings suggest that the government and legislation was not a main influence on the case company. Shaharudin *et al*., (2015) examined five case studies of manufacturers in the automotive, and electrical and electronics industry in Malaysia. Silvestre (2015a) displays a case study of the upstream oil and gas industry supply chain in Brazil to build propositions about supply chains. The author discusses two key outcomes: First, the case indicates that building an optimum sustainable supply chain is not an endpoint, but a never-ending process. Silvestre (2015b) investigates a representative case in a developing economy and constructs on stakeholder and contingency theories. The methodology employed

in this study is then detailed, followed by an exploratory in-depth illustrative case study in the oil and gas supply chain in Brazil. Silvestre et al., (2017) explored the port sustainability management system of a single oil and gas company in Brazil.

Finally, Jia *et al*., (2018) present an analysis of the academic literature addressing SSCM practices in developing countries.   The paper discusses research opportunities in the literature that needs additional study on this subject, mainly for the context of emerging countries. Mathivathanan *et al*., (2018) is aimed at exploring interconnected effects among SSCM practices in the automotive industry.

2. RESEARCH QUESTIONS

Research on SSCM in Turkey is in its infancy. Therefore, it is necessary to conduct exploratory research that will lay the groundwork for future empirical studies. Based on a review of the literature, five key research questions have been identified.

Research Question 1: What are the motivations for pursuing SSCM initiatives in Turkey?

Motivations for pursuing SSCM initiatives, particularly product returns, have been studied by a number of authors in other countries (Rogers and Tibben-Lembke, 2001; Sahay et al., 2006; Lee, 2008; Zhu et al., 2007; Zhu and Sarkis, 2006; Li and Olorunniwo, 2008; Lau and Wang, 2009; Shaharudin, 2015; Bouzon *et al*., 2015). However, there is a need to better understand how the published motivations are similar to those of organizations in a developing country, such as Turkey. Therefore, the first research question focuses on why the companies have an interest in SSCM practices.

Research Question 2: What is the level of awareness among decision makers in Turkey with respect to SSCM-related legislation?

Studying existing level of awareness among decision makers towards policies, legislation and measures of related subjects such as waste prevention, recycling, and product recovery may provide insight into the associated benefits, barriers and

incentives to implementing SSCM strategies (Prahinski and Kocabaşoğlu, 2006; Blumberg, 1999; Lau and Wang, 2009; Shaharudin, 2015; Bouzon et al., 2015). As a result, the positive impact of RL activities is believed to be short-term and temporary (Yacop et al., 2012).

That's being said, the goal of the second research question is to evaluate the level of awareness of companies on SSCM-related regulations and legislation in Turkey.

Research Question 3: What are the obstacles to implementing SSCM initiatives in Turkey?

Investigating the struggles associated with executing forward and reverse supply chain management strategies has also attracted several researchers (Rogers and Tibben-Lembke, 2001; Fawcett et al., 2008; Lau and Wang, 2009; Shaharudin, 2015; Bouzon et al., 2015; Movahedipour et al., 2017).

Therefore, this paper explores the obstacles to implementing SSCM. Particular attention is devoted to exploring the relationship between multiple barriers and how they can collectively inhibit progress towards SSCM.

Research Question 4: What are the current practices of Turkish companies on SSCM?

As Guide and Jayaraman (2000) have explained, SSCM may include a number of activities, such as: Product collection, point(s) of disposition, testing, sorting and disposition to identify the product's condition and the most economically attractive reuse option and refurbishing to enable the most economically optimum choices.

Diverse industries in various countries may have changing levels of initiatives in SSCM and environmental practices (Zhu et al., 2007; Lau and Wang, 2009; Li and Olorunniwo, 2008). However, little is known about the SSCM practices employed by organizations based in Turkey and how these overlap or differ from the practices employed in other nations.

Research Question 5: How should the basic responsibilities for SSCM be assigned in Turkey?

Several authors have argued that logistic activities will be gradually subcontracted in forthcoming years (Efendigil *et al*., 2008). The most important issue is to define whether the firm contemplates RL activities as part of its fundamental functions. When this is not the case, outsourcing might be a decent choice to allow the firm to focus on its core activities (Wu *et al*., 2005). Therefore, this paper analyzes the types of reverse supply chain activities that could be outsourced to third party service providers in Turkey.

3. RESEARCH METHODOLOGY

In this research, we chose a case study approach for multiple reasons based on Yin (2003). First, an investigative case study aims to identify the research questions of a successive study (not necessarily a case study) or to determine the feasibility of the preferred research method. Second, an illustrative case study demonstrates a comprehensive depiction of a phenomenon within its perspective. This is particularly useful when little is known about the phenomenon in that context, as is the case with the application of SSCM practices in Turkey.

Our research methodology consists of five stages: Identifying research questions, developing an instrument, data gathering (semi structured interviews), data analysis and dissemination (follow-up inquiries).

The coding of the companies taken into account is as follows: Company W (Automotive Industry, 500-1000 employees), Company X (White Goods Industry, 1000-1500 employees), Company Y (Electronics Industry, 2000-3000 employees, Company Z (Furniture Industry, more than 3000 employees).

4. FINDINGS

4.1 Motivation

All of the responses focused on the product returns aspect of SSCM. Five main motivations were identified from the interviews. Company X and Z report that customers' eagerness for returning their used products create a suitable

environment to implement SSCM. They also report that the main motivation for customer willingness to return a used product was the promotional effort employed by the companies. For example, Company X promoted these efforts through a campaign called "bring the old one, take the new". By motivating customers to return used products, these campaigns also help the organizations fulfill their sustainability and corporate social responsibility (CSR) strategies. Companies W and Z state that their involvement in product returns is mainly based on "competitive reasons with respect to sustainability and CSR" for promoting their corporate images.

Further, Companies X and W state that the national legal obligations may help Turkish industries to evolve from product return initiatives into organizational and social awareness of product recovery. The final primary motivation cited by the participants was the issue of customer complaints. Company Y noted that this is a driver in their business.

4.2 Awareness of SSCM Regulations:

All four companies were found to be aware of the draft product recovery regulations such as Waste Electrical and Electronic Equipment Directive (WEEE), End of Life Vehicles Directive (ELV) and the Waste Management Directive. However, there was some skepticism expressed as to the future effectiveness of these directives. The responses received indicate the need to accompany any regulatory directives with initiatives that put in place the infrastructure needed to support SSCM.

4.3 Barriers

For Company W, the lack of space and high inventory costs were cited as the two key obstacles. Company X considers legislative issues, the lack of markets, inadequate supplier support and competition the most important barriers. They believe that, currently, dealing with product recovery is not cost effective. The supply chain manager of Company X stressed the need for supplier support in developing any successful sustainability initiative. Without their assistant, the manager emphasized that the sustainability movement is destined to fail. Company Y reports that system inadequacies, inexistence of economic incentives,

company policy and legal issues are its most important barriers to executing a SSCM system.

4.4 Current Practices

Although Company W reports that they currently have SSCM systems based on repair, this system also appears to work ineffectively. Company W's supply chain manager states that repair activities are mostly conducted by their service network.

As Company X states that their SSCM initiatives have been inefficient, Company Y also reports that they have an ineffective SSCM system. As one of the company managers explained, they basically refurbish returned products for the use of the company personnel. Company Z reports that they deal with collecting the old products and selling them to the recyclers. However, their supply chain manager states that delivering the old products from the dealers to the company warehouse sometimes can be a real burden.

4.5 Responsibilities

There is a consensus among the case companies on the fact that the collection process has to be either outsourced or handled by municipalities. They also believe that recycling and third party recyclers should fulfill transportation. Company X states that third parties should fulfill all SSCM activities due to the fact that product recovery activities are specified as a major cost driver and are not their core competencies under the current legislative and economic environment.

Company Y reports that if remanufacturing turns out to be profitable, and then it would be plausible to implement their own remanufacturing system instead of incurring disposing costs (demolishing, consignment). Company W claims that the company itself should perform the repair activities whereas it would be rational for other initiatives to be outsourced to third party companies.

4. DISCUSSION AND IMPLICATIONS

A brief discussion of the overall findings follows: The participants provided a number of motivations for their involvement in product returns.

For example, "competitive reasons based on sustainability and CSR" and the role of this in improving their corporate image were cited by companies X and Z. This is consistent with motivations cited by several authors, including for example, Zhu et al. (2007), Zhu and Sarkis (2006), Li and Olorunniwo (2008), Lau and Wang (2009).

As another example, national and international legal obligations were cited by companies W and X. The rationale provided for these motivations was consistent with Prahinski and Kocabaşoğlu (2006) and Shaharudin *et al*., (2015), who argued that legislation has been used as an incentive for founding reverse supply chain networks to avert used product from the waste stream and lengthen its beneficial lifespan.

The interviews highlighted that all of the participating companies were broadly aware of SSCM-related regulations, particularly directives related to waste management and product recovery. However, there was broad agreement on the fact that Turkey currently has unsatisfactory detection and punishment mechanisms for lack of compliance. These statements are consistent with the findings of Lau and Wang (2009) and Blumberg (1999).

A number of barriers to SSCM in Turkey were identified by the participants, including customer unwillingness to contribute, the lack of legislation, the lack of markets, inexistence of economic incentives, high inventory costs, and an overall lack of awareness among customers with respect to product recovery. Sharma et al., (2011), Rogers and Tibben-Lembke (2001), Fawcett et al., (2008), Wycherley (1999), Lau and Wang (2009), Silvestre, (2015a) and Movahedipour et al., (2016) published similar findings.

Finally, the case companies also shared their preferences on responsibilities for SSCM going forward. The participants reported that they were primarily interested in outsourcing their collection and recycling practices to the third party companies. There is support for this in the literature. For example, Efendigil *et al*., (2008) and Min and Ko (2008) concluded that activities would be increasingly outsourced in upcoming years.

Reflecting on the findings overall, it is clear that SSCM is still in its infancy in Turkey. There is a recognized need for improved enforcement mechanisms of existing legislation, enhanced industrial collaboration and coordination on product recovery, and to improve market incentives for participating in SSCM activities.

5. CONCLUSION

We argue that the findings of this research help lay the groundwork for future empirical studies. However, the key limitation of the paper is based on the fact that it is conducted with only four companies. Therefore, though several of the key lessons may have relevance for others, caution must be exercised in generalizing the results to other developing nations.

Finally, there are also several opportunities for further research. Although this research provides insight into the current perspectives and best practices on SSCM in Turkey, additional empirical research is required to further investigate many of the issues that were raised in the study. This research could provide a basis for enhanced research and practice on SSCM issues in developing countries.

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OCCUPATIONAL HEALTH AND WORK SAFETY SYSTEMS IN COMPLIANCE WITH INDUSTRY 4.0: RESEARCH DIRECTIONS[1]

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─**Abstract**─

Industry 4.0 is the contemporary approach that denotes the transformation process in the global chains of value creation. This approach has a potential to remove restrictions between physical objects, converting them into a comprehensive complex system of interoperable, interconnected and interdependent components. Given Industry 4.0 becoming the eminent concept, occupational health and safety management (OHSM) systems have been facing new challenges. On the other hand, to the best of our knowledge, we argue that current state of the art does not sufficiently take account of whether the "Fourth Industrial Revolution" will impact occupational health and safety in industry 4.0-based supply chains. The main goal of this research, therefore, is to demonstrate several new research opportunities that may advance our knowledge of Industry 4.0 based OHSM. In this regard, the contribution of this study is twofold: first, it investigates the current literature studying how Industry 4.0 may affect OHSM activities in contemporary supply chains and organizations. Secondly, given the analysis of the current state of the art, future research directions and proposals are discussed.

Key Words: *Industry 4.0, Occupational Health and Work Safety; Literature Review, Research Opportunities.*
JEL Classification: J81, M10

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1. INTRODUCTION

Industry 4.0 is not only an real movement in development of the recent overall economy but a mindset shift of its progress in future, which encourage the attainment of its strategic economic objectives (Alekseev *et al*., 2019). In other words, it is an apparatus for the development of knowledge economy, which is a milestone for prevailing value chain networks. We argue that as these disruptive technologies emerged from Industry 4.0 become widespread, it will affect how occupational health and safety (OHS) is managed in organizations. Specifically, we also argue that the three pillars of any OHS, which are standards (OHS management systems), legislation and legislative frameworks and good practices will be affected. It is vital to recognize that the role of people in manufacturing operations will never be unnecessary. Rather, Industry 4.0 considers white and blue-collar workers as essential. Interconnectedness between workers and machines along with the advanced information systems is fundamental to the successful implementations of Industry 4.0. An operational facility running under this new mindset potentially demonstrates very distinct and more complex challenges. For instance, reorganization of manufacturing fields at short notice, requiring urgent set up changes and even the physical movement of equipment can cause a range of OHS threats as these configuration to satisfy potential obligations may call for a separate risk evaluation for each. That's being said, these obligations should not be overlooked if conforming to legislation is to be managed (Minturn, 2017). Note that, at first glance, disruptive technologies emerged from Industry 4.0 bring about risks and drawbacks for working people. However, Reiner (2016) states that we must not ignore that such a technological transformation may also enable modern organizations to make work areas safer, healthier, more flexible and socially more enjoyable. There are various opportunities ranging from smart safety technology, computer-generated tools for timely hazard evaluation and safety, health improvements for analysis and care like health-monitoring wearables to digital apparatus such as e-learning instruments and smart glasses. Despite these potential affects of Industry 4.0 on OHS and challenges, we contend that current state of the art still lacks research with respect to the correlation between the "Fourth Industrial Revolution" and occupational health and safety in industry 4.0-based organizations and value chains.

The main goal of this research, therefore, is to advance our knowledge of the current studies on Industry 4.0 based OHS. To this end, the contribution of this study is twofold: first, it investigates the current literature studying how Industry 4.0 may affect OHSM activities in contemporary supply chains and organizations. Secondly, given the investigation of the current state of the art, it provides future research proposals (RPs) and discusses its implications.

2. OCCUPATIONAL HEALTH AND SAFETY: OVERVIEW

In spite of the constant and rising structured measures to avoid mishaps at work, injuries and work-related illnesses still comprise a worldwide problem in manufacturing and service industries. Thus, losses teach us a great deal of lessons, and often we learn a lot from the emerging social and economic consequences. However, those losses keep taking place although huge improvement has been accomplished in various sectors and jobs (Hakkinen, 2014). Occupational safety and health precautions have been evolving from the early years of industry revolution. The initial actions were taken to reduce the number of accidents in industrial operations by fundamental safety rules and disciplinary measures. Similarly, new safety regulations were enacted in developed countries to compel companies to develop safety and to take measures against risks (Hakkinen, 2014). As the organizational systems evolved, the development of human-machine systems and versatile disciplines such as ergonomics built new possibilities to handle the intricacies of the operations and processes with respect to technological collapses. Further, occupational health and safety and management systems (OHSMSs) were established to handle the hazards of main mishaps and health issues in many industries. The increasing interest in occupational health and safety management has also caused to additional regularization of executive applications in health and safety, e.g. OHSAS 18001 and ANSI Z10. OHSMSs are systematic instruments that enable organizations to cope with their occupational risks and assist managers to maintain health and safety issues in the workplace (Granerud, 2011).

However, despite all this legislation efforts, new standards and procedures and rising administrative interest, there appears to be some misplaced connections and failures and hazards at work have not vanished (Hakkinen, 2014). Moreover, new

technological movements, such as Industry 4.0, created additional complexities besides the existing ones. In the following section, brief introductory information will be presented with respect to Industry 4.0 to comprehend the possible correlation between the components of Industry 4.0 and OHSM at work.

3. INDUSTRY 4.0

Based on the current state of the art, we argue that Industry 4.0 is an aggregate expression for technologies, components and views of value networks. Bartodziej (2017) states that Industry 4.0 should not be considered as a closed system but instead should be approached as one fundamental element out of various key fields. Mainly, Salkin *et al*., (2018) states that Industry 4.0 constitutes the integration of operational processes and value chains to enable the foundation of sustainable networks. The successful applications of Industry 4.0 seem to include three characteristics: (1) horizontal integration through value chains, (2) vertical integration and networking of manufacturing or service systems, and (3) end to-end engineering of the overall value chain (Wang *et al*., 2016). Vertical integration entails smart connections and digital transformation of organizational entities in various hierarchal levels within a company. Nevertheless, horizontal integration yields value creation among organizations to improve product life cycle using smart technologies and smooth supply chain operations (GTAI, 2015).

3.1 The Key Components of Industry 4.0

The existing research discusses six fundamental technologies in order for any Industry 4.0 implementation to be successful:

3.1.1 Cyber-physical systems:

Cyber-physical systems usually incorporate material reality into state-of-the-art software and hardware technologies (Bagheri *et al*., 2015). They are composed of real time locating systems, sensors, actuators, controllers and network systems that data or information is being converted and exchanged among various units. Salkin *et al*., (2018) summarize the characteristics of the cyber physical systems as follows: "flexible and reconfigurable parts and machines", "monitoring by sensorless or with sensor switching", "control and monitoring operating reaction loops", "structured and continuous integration of storage and analysis of data

directly and interactively on the local control", "in private networks or in the public cloud system" and "improved safety at work over the exposure of safety-critical grade".

3.1.2 The Internet of things (IoT):

The Internet of Things consists of networked products, systems, and sensors, which uses software and hardware technologies and network interconnections to yield new functions. These "smart objects" require minimal human intervention to generate and transfer data (Rose *et al*., 2015). Giusto *et al*., (2010) points out that the term IoT allows 'things' and 'objects', such as Radio Frequency Identification, sensors, actuators, mobile phones through unique addressing schemas to cooperate with each other and collaborate with their neighboring 'smart' components to achieve mutual objectives. That's being said, Witkowski (2017) imply that three distinctive characteristics of the IoT are identified as follows: context, omnipresence and optimization. Context denotes to the likelihood of an innovative object to contact with a current ecosystems and the instantaneous reply by it to change. Omnipresence exemplifies the fact that objects today are much more than just connections to a user network of human-operators. Finally, optimization is the illustration of the functionality that each object owns.

3.1.3 Artificial intelligence:

Artificial Intelligence (AI) is interested in the formation of a software and hardware system that mimics the smart conduct of a decision maker. It owns the features such as adaptive control, better handling and reusability of stored knowledge (Kumar, 2017). Progress has been made since the advent AI system, which enhance its applications on various problems such as pattern detection, computerization, computer vision, virtual reality, identification, image processing, robotics, automated reasoning, data mining, operational optimization, multi-agents and monitoring, production etc. (Kumar, 2017).

3.1.4. Advanced robotics:

Robots are sophisticated structures that yield autonomy, flexibility and collaboration. It is argued that the robots will quickly begin cooperating with one another and work safely with human decision makers and even learn from them (Kamble *et al*., 2018). They will provide cost benefits and abilities, achieving some of the actions in the context of the smart operational ecosystems (Pei *et al*., 2017). Furthermore, to enable safety and control of the ecosystem, a safety eye is performed. If any interruption such as some workers or equipment such as an automated guided vehicle arrives the virtual space (safety eye), the system stops the robot with unique sound expecting some collusion. In that case, the worker must eliminate the barrier before the robot begins operating (Kamble *et al*., 2018).

3.1.5. Additive manufacturing:

Additive manufacturing (AM) is an evolving systems that yield three dimensional objects right from the software models through an additive process, particularly by keeping and assembling the products with the raw materials such as plastics, polymers, ceramics, or metals. Compared to "conventional" production machineries such as turning, grinding, sawing and injection molding, AM systems can provide distinctive benefits: since no object-specific tools are needed in AM, the manufacturing costs may be decreased (Mellor *et al*., 2014). However, it is argued that there are also some shortcomings of AM such as the narrow selection of materials and surface finishes compared to conventional production systems (Berman, 2012).

3.1.6. Smart Factories:

The Smart Factory has a totally new method to manufacturing (Veza *et al*., 2015). Smart factories enable transparency over the operations, which ease the efficient decision making processes (Kagermann *et al*., 2013). The essential characteristics of smart factory are as follows: (1) manufacturing customized goods, (2) a single extended product combining product itself and complementary services, (3) collaboration through distinctive operational networks (Veza *et al*., 2015).

Once brief information has been demonstrated, the basic methodology of this research will be provided in the next section.

4. METHOD

To achieve the research objectives, the structured literature review is performed with the iterative process depicted as follows:

Phase I – Selection of Database: The search was performed based on all possible pairs from 2010 to the first half of 2019 on prestigious scientific databases, i.e. Science Direct, Emerald, Springer and Taylor & Francis. This time period is selected because Industry 4.0 has become a global phenomenon since 2010.

Phase II – Selection of the keywords: In this step, keywords that can detect the current research with respect to our research topic were identified. Keywords were organized into two groups: Group one includes the words such as "Industry 4.0", "Internet of Things", "Cyber Physical Systems", "Robotics", "Artificial Intelligence", "Cloud Computing", "Smart Factory" and "Additive Manufacturing". Group two consists of the words related to Occupational Safety and Health as "Occupational Health", "Occupational Safety" and "Occupational Health and Safety Management". We also used Boolean operators AND in search terms to specify logical relationships between two groups.

Phase III – Elimination of Papers: After the initial search, duplicated results were eliminated. Then, the significance of the remaining studies was monitored by eliminating the researches that do not include both keywords with respect to Industry 4.0 and occupational health and safety in title or abstract. After this assessment procedure, the remaining studies were then filtered based on its publication platform.

Phase IV - Analysis: All selected studies were analyzed in the fourth phase.

Phase V- Research Directions: Finally, in the fifth phase, new research opportunities, directions and proposals are provided in the context of Industry 4.0 based occupational safety and management systems. Potential research plans are discussed, and possible implications are also provided.

5. RESULTS AND DISCUSSION

Once the key components of Industry 4.0 and OHS have been demonstrated, we now focus our attention on the research about OHS in the context of Industry 4.0. Note that Badri *et al*., (2018) is the only research that concentrates specifically on incorporating the idea of Industry 4.0 into OHS. Their research was grounded on four facets of OHS, namely: (1) work organizations, (2) OHS based legislative and regulatory structures, (3) OHS management systems, and (4) managing work hazards. The authors make some recommendations to improve Industry 4.0 based on OHS in the context of these four aspects. In another study, Fernández and Pérez (2015) argue that cutting-edge production systems can yield new OHS hazards but that old tools of occupation hazard evaluation seem incompetent of recognizing these evolving hazards. Beetz *et al*., (2015) suggest the problem with respect to the application of cobots and the intimate collaboration with workers to assist them perform challenging and hazardous duties. Mattasson *et al*., (2016) highlight that the IoT and Big Data put forward huge challenges where the main purpose is to scrutinize and employ information moving downstream and upstream in a workplace. They also pose inquiries about the most proper approach of incorporating innovative means to enhance performance and mishap prevention. Badri *et al.,* (2018) and Fernández and Pérez (2015) argue that the lack of a norm or an update in response to a technological advancement may have main influences in terms of OHS. Advanced manufacturing systems including a remote control process (cloud computing, Internet of things, etc.) or sensors that increase machine autonomy will no longer be subject to a standard appropriate for the conventional systems. Badri *et al*., (2018) also argue that OHSMS standards will indisputably assist entrepreneurs transform smoothly to self-governing intelligent systems. This will assist tackle barriers such as errors in ranking hazards and challenges organizing precautionary measures in new business structures.

In summary, researchers conclude that if the technologies of Industry 4.0 grow in a disconnected manner and the OHS proposals of decision makers are disorganized, risks will escalate and some of the benefits made in hazard blocking so far may be missing (Badri *et al.* 2018; Mattsson *et al.,* 2016). They also argue that researchers and decision makers should cooperate on the execution of

possible actions given an all-inclusive vision of achieving transformation to guarantee an optimum and secure conversion to the ecosystem of Industry 4.0.

Given the scrutiny of the literature, we conclude that more research is necessary to achieve that transformation smoothly since there have been very few research attempts with respect to Industry 4.0 related OHS frameworks and their applications. We also conclude that the lack of sufficient scientific work, in general, indicates the importance of doing qualitative and quantitative research on developing a necessary OHS infrastructure for supporting the safe realization of Industry 4.0.

However, before proceeding to any of these attempts mentioned above, we argue that one must take into consideration the WHO's healthy work standards that depict a healthy work environment as "one in which workers and managers collaborate each other to protect and boost the health, safety and well-being of all workers and the sustainability of the work environment" by contemplating four discrete, but interconnected fields (WHO, 2011) as follows: (1) health and safety challenges of the physical workplace; (2) health, safety, and well-being concerns in the psychosocial workplace ecosystem, including work organization and workplace culture, (3) individual health supplies and the means in the work ecosystems, encouraged by employers, and (4) the means of contributing to the society to advance the health and safety of workers, their families, and members of the society.

We argue that the disruptive technologies of industry 4.0 may have a fundamental influence on the societal atmosphere and financial circumstances of work, which will, as a result, may affect the sustainability of business ecosystem and thus might have a meaning, which is more than satisfying the need for just some new safety necessities. Industry 4.0 and the possible transformation process that it needs is not only a phenomenon in manufacturing but it also influences industries from policy and strategy selection to implementation and execution. As digitalization gives rise to more mobility and flexibility with computerized instruments, it can be observed that work becomes possible anywhere and at any time. On the other hand, this might bring about psychological overload, rising job denseness or a damaged work-life-balance. In addition, note that new technologies offer discrete possibilities to monitor the performance of workers, which may

form a business ecosystem of ambiguity and stress. However, in some cases, researches suggest that Industry 4.0 provides the means to build safer work environment due to the capability to collect information in real time manner before a probable risk emerges. That's being said, we conclude that as Industry 4.0-based disruptive technologies become widespread, they may affect the way occupational health and safety is managed in value chains and organizations even if we cannot be sure in what direction these effects will take place.

Given the current state of the art, our brief discussion about the overall picture of Industry 4.0 and its possible effects on the OHS scene and the WHO's healthy workplace model, we propose five RPs as follows:

RP 1:   New qualitative and quantitative studies are needed to explore how disruptive technologies of Industry 4.0 affect the way white and blue-collar workers perform their tasks: Research should be conducted how existing companies in various industries are dealing with incorporating their human capital and the way they fulfill their functions into the distinctive components of Industry 4.0 to form a safer and healthier work ecosystem in general, which is consistent with the ideas of Badri *et al*., (2018). Specifically, researchers must investigate how certain systems such as IoT, additive manufacturing, robotics, cyber physical systems, smart factories etc. may impact working conditions and labor force and how these disruptive technologies can be used to reduce certain hazards that companies have been facing. To achieve that, empirical studies based on surveys that explore the opinions of occupational health and safety experts in various industries must be planned. Accordingly, hypotheses must be constructed testing the possible negative and positive effects of Industry 4.0 technologies on the healthiness and safety of various work ecosystems in manufacturing and service industries. Moreover, case studies are also needed to reveal how companies using Industry 4.0 technologies are managing the conditions in digitized working environments to ensure the resulting challenges.

RP 2: Research is also needed to demonstrate how Industry 4.0 will impact the performance of the current OHSMSs: Empirical studies should be performed to expose the performances of the existing OHSMSs based on a comprehensive indicator framework in terms of various OHSMS activities, such as planning, policy, procedure, implementation and monitoring. The followings are some

examples of the criteria that may be used to achieve that assessment: "top management commitment", "workers' participation level", "allocation of financial resources to OHSMS activities", "training workers", "sharing precautionary actions", "numbers of investigative meetings held" etc. Given such a scrutiny, in accordance with Badri *et al.* 2018; Mattsson *et al.,* 2016, we argue that it is possible (1) to reveal how strategic the existing OHSMSs role is in terms of maintaining efficient health and safety practices in the workplaces, (2) to adapt the existing systems to the new requirements of Industry 4.0 based on the findings.

RP 3: New standards should be studied and developed in order for the current OHSMSs to adapt to the necessities of Industry 4.0: Note that the existing OHSMSs have been designed to satisfy the requirements of the conventional business ecosystems. However, digital transformations of the business systems necessitate defining and contemplating new types of hazards, risks, health issues, risk assessment methodologies, streamlined occupational health and safety models, new implementation methods, societal issues etc. That's being said, we maintain that it is not probable to meet those new needs using the current OHSMSs. As Fernández and Pérez (2015) also maintained, they should be redesigned based on the possible effects of contemporary technologies that organizations employ. To this end, surveys should be conducted to investigate what new strategies, plans, rules, guidelines, policies, tactics and procedures should be added to the current programs to achieve today's Industry 4.0-based occupational health and safety challenges.

RP 4: Current legislative framework should be reviewed, necessities should be discussed, and a new legislative framework should be developed to achieve its adaptation to Industry 4.0: Consistent with Badri *et al*., (2018), researches should be performed to demonstrate how the decision makers of companies and governmental institutions should streamline the existing legislative framework to satisfy the current needs of new working environment. Note that this is an ecosystem that entails human, machine and information systems interoperability. Therefore, one should investigate if new laws are to be enacted, or only the modifications to existing laws are sufficient. Moreover, we argue that identifying stakeholders are invaluable to achieve optimum legislation framework. Therefore, we also argue that relevant stakeholders should be identified possibly through a comprehensive social network analysis. To this end, an empirical study that

surveys the interactions of all possible stakeholders with one another should be launched.

RP 5: Studies should be done on how educational programs associated with occupational and safety science should be designed and streamlined: Social sustainability is one of the pillars of sustainability phenomenon in today's challenging business world. Note that to achieve social sustainability, employees' health and safety requirements must also be maintained besides the requirements of the rest of the stakeholders (Hakkinen, 2014). Note also that maintaining health and safety necessities entail skilled human capital that has higher education on occupational health and safety. Moreover, it is also crucial to comprehend that training for contemporary OHMSs is essential for building an occupational health and safety-based culture in organizations. We argue that comprehensive training programs assists them to gather the information and dexterities needed for them to perform their duties and introduce them to the probable hazards. Since building undergraduate, graduate, training and certificate programs and forming their underlying curriculums are so crucial, comprehensive surveys, case analyses and possibly the Delphi studies that investigate the stakeholders' view on how to develop such educational programs should be conducted.

6. CONCLUSION

It is argued that Industry 4.0 and its underlying technologies have been impacting the business models of today's value chains. It is also argued that this impact on the performances of organizations has been both positive and negative depending on key performance indicators considered. Then, the question that should be raised is if the current business models have been affected by the components of Industry 4.0, what may be suggested with respect to the health and safety performances of the same organizations? Given the review of the state of the art, we argue that the three pillars of any OHS, OHS management systems, legislative frameworks and benchmarks, may mainly be affected. Therefore, in order for organizations to deal with this transformation process smoothly, new scientific studies that will possibly propose effective frameworks are needed. To this end, we propose five research questions with respect to exploring (1) the way white and blue collar workers perform their tasks in the context of Industry 4.0 based systems, (2) the performance of the current OHSMSs (3) the adaptation of the

current OHSMSs to the necessities of Industry 4.0, (4) the prospective legislative framework in the context of Industry 4.0, and (5) the future occupational and safety science programs in higher educational institutions.

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WEBSITE USAGE IN DIGITAL PUBLIC RELATIONS – AN ANALYSIS OF IT COMPANIES IN TURKEY

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─**Abstract**─

Digital public relations, which can be defined as the use of Internet-enabled tools such as social media management, social bookmarking and sharing, search engine optimization (SEO), creating and distributing online press releases, blogs, forums, news sites, corporate web pages, etc. are an indispensable field for companies and brands. In this research, it is aimed to analyze the content of corporate web sites used as a digital public relations tool. In this study, we take "Turkey's Top 500 IT Companies" survey and analysed the content of newly established companies.
Our study reveals that new all IT companies have a website. In technical side, they provide most of the criterias but they are unsufficient in content side. In total, almost half of the companies are under 50% coverage rate. When all of the categories were calculated, 51.8% of the criteria were met and 9 companies (53%) received a score above this rate.

Key Words: *Digital public relations, corporate web site, IT Management*
JEL Classification: M15

1. INTRODUCTION

The Internet, which was previously used only for the transmission of information in the military field, began to become popular in the 1990's and gained popularity especially after 1995 (John Naughton, 2016), creating a new environment for public relations practices.

The Internet was used as a one-way communication tool with websites initially focused on public relations activities. In this sense, the function of the Internet, as traditional media, mostly occurred from the organizations to publicize the public.

Nowadays, technology gives firms the opportunity to use the Internet to establish and maintain public relations. A successful and preferred website is generally a user-friendly and user-oriented site with high usability in both interactive and functional aspects. (Lee & Koubek, 2010, p. 330)

Web 2.0, which is accepted as a new era of the Web and called as social media in terms of its technical aspect, is the basic quality of the period that users have become content producers. In this environment, where everyone produces and shares all kinds of content and everyone develops mutual communication and relationship with everyone, social interaction has brought important opportunities in terms of public relations.

Public relations in the traditional roles of public relations, stakeholder relations, corporate culture, identity and image. The communication activities carried out by the institutions with the target groups through public relations are carried out in order to increase the awareness with the corporate awareness as well as the products and services. Through public relations, the target audience can also be empathized with the institution. In this context, while public relations contributes to advertising and marketing activities, on the other hand, it tries to establish long-term relations with its target groups by carrying out the necessary studies on the identity, culture and reputation of the institution (Philips and Young, 2009: 58). Now, institutions should reach the target groups with the freedom to receive information through this new communication technology and provide information on their corporate structures, products and services through the websites of Internet's tools and applications (Metin and Altunok, 2002: 93).

In addition, through web sites, organizations perform promotional activities independent of time and place, and also contribute to the process of developing mutual understanding with their target audiences by taking advantage of the feedback feature of websites. With this tool, organizations can carry out various activities in order to recognize their target groups and to introduce themselves to their target groups (Tarhan, 2007: 81-82).

The subject of this study is usage of IT companies' websites in the Turkey as a digital public relations tool. Along with the developing communication technology, changing marketing communication has required companies to use their websites at a level and level that can effectively interact with their target audience. In this context, the websites of IT companies established in last 3 years have been analyzed by content analysis method and a comparative analysis has been made.

It is important to get the data to be obtained with this study:
- To determine the status of the existing web pages of the related companies,
- Pointing out the convenience of Internet technology in developing relations with companies' target groups,
- To address the shortcomings in this area by pointing out the areas where internet technology facilities cannot be used adequately.

The main objectives and benefits of using the Internet as a public relations tool can be listed as follows (Sayımer 2006: 164, Biber 2000: 64):
- Access to various cameras simultaneously and quickly.
- Easier to be monitored and measured.
- Possibility to simultaneously transmit all necessary information to the press.
- Ability to learn the opinions, requests and expectations of the target audience related to products or services in a short time due to the interactive environment.
- Ability to deliver new developments related to any product or service to the target audience
- Ability to educate and inform the target audience at a lower cost and shorter time.

- Ability to provide information about competitors
- Ability to monitor visibility in the media
- The ability to do research on customers and the agenda
- Ability to communicate with colleagues via newsgroups

1.1. Website and Properties

There are many features that should be considered for easy use of a website. These features may vary according to the target groups of the sites. In order to make the content published on the websites meaningful and usable, it can be said that it should be short, easy to review and aim-oriented, and users should have a simple and easy to understand language (Morkoç and Doğan, 2014). Fang & Holsapple (2007) says that the major function of a website is to serve as a platform for companies and for users to gain information.

According to Kotler and Armstrong (2012: 513), organizations should design interesting websites to carry out their online marketing activities or where consumers can routinely visit and receive information. From this point of view, the creation of web pages is based on two basic purposes, and the websites are basically structured in two ways depending on the purpose and content:

- Corporate web pages
- Marketing web pages

Corporate web pages, which are the most basic form of website, are designed to create goodwill and feedback from customers. Corporate websites are designed for users or customers to access various information, find answers to their questions, or establish close customer relationships, and create enthusiasm and interest in users and customers related to the organization or brand (Kotler & Armstrong, 2012:513).

In order to have a mutual communication, the company has open communication channels, as well as analysing the various requests and evaluations from the target groups, evaluating and responding to them. It should be ensured that the questions or requests that are answered individually are compatible with the company's policy. Organizations should visit their sites from time to time in order to evaluate their web sites and critically review the information such as whether the information on the site communicates the information and messages that the

organization wants to give, whether the information given is current. (Okay and Okay 2005: 514).

The average adult spends 5.9 hours per day with digital media, up from 3 hours a day in 2009, according to Mary Meeker's 2018 Internet Trends Report (Tech Addiction By, 2018). People are spending more time in front of screens today. So, effects of existence in digital world are increasing.
Website is easy accessible, easy-to-install and inexpensive public relations tool and using this tool is useful for companies. Usability of this tool is important and these properties are increasing interactivity.

2. METHODOLOGY

As a sample of research, it is used the last built 13 corporate web sites from the research by IT500 Organization Services in Turkey. (Türkiye Bilişim Sektörünün, 2017) Companies are listed in Table 1.

Table 1: Companies and Their Web Sites

Company Name	Web Site
ATACEL	www.atacel.com
ESTE BİLİŞİM	www.estebilisim.com
MICRO FOCUS (8)	www.microfocus.com
HORİZON BİLİŞİM	www.horizonbilisim.com
PM TEKNOLOJİ	www.pmteknoloji.com
NGTECH	www.ngtech.com.tr
YAPI KREDİ TEKNOLOJİ	www.ykteknoloji.com.tr
MULTİNET TEKNOLOJİ	www.multinet.com.tr
ARCHITECHT BİLİŞİM	www.architecht.com
İNERA BİLİŞİM	www.inera.com.tr
KLOİA	www.kloia.com
FİZ BİLİŞİM	www.fiz.com.tr
EGİS BİLİŞİM	www.egisbilisim.com.tr
ASOS BİLİŞİM	www.assosbilisim.com
FİO BİLİŞİM	www.fio.com.tr
EPLATFORM	www.eplatform.com.tr
TEAMPRO	www.teampro.com.tr

In this study, content analysis method which is one of the qualitative research methods was used. The main purpose of content analysis is to reach the concepts and relations that can explain the collected data. The data gathered for this purpose should be conceptualized first, then it should be rationally arranged according to the concepts that emerged and the themes explaining the data should be determined accordingly (Yıldırım & Şimşek, 2013: 259). Falkingham and Reeves (1998) also stated that content analysis is a new method for evaluating the mass of publications.

For this purpose, the following aspects of the web sites of the companies established in the last 3 years have been analysed: general information about the company, relations with the media, publications accessible from the website, access to the web site for other communication activities, features for the use of the website and finally the integration of the company's website with social media tools.

In content analysis, it is necessary to divide the content into a number of categories, to identify certain coding units in order to examine the content. The categorization process, which is the essence of content analysis, is of great importance and the research becomes meaningful at this stage (Yıldırım, 2015; 138).

2.1.Content Analysis Criterias

While analyzing content, all literature was reviewed and one criteria table was built. While generating criterias Ozturk and Ayma (2007) "Public Relations Uses Web Pages" determined by the Istanbul Chamber of Industry studies in Turkey's top 100 companies of which they use to examine and analyze web pages and websites of the table which were developed to determine the purpose of public relations some changes were utilized. For example, Google+ platform is not used anymore. Google announced that its service was closed. (Extremetech, 2018) In addition, company mission and vision are accepted even if there is no title but content contains the mission and vision.

Criterias are:
- Company Information

- o   About Company
  - o   Services/Products Of Company
  - o   References Of Company
- Corporate Identity
  - o   Logo
  - o   Company Name
  - o   Vision
  - o   Mission
- Company Advertising & Publish
  - o   Online Magazine/Newspaper
  - o   Image Gallery
  - o   Advertorial Video
  - o   News
- Communication
  - o   Multi-language
  - o   Search bar
  - o   E-newsletter
  - o   Contact Mail
  - o   Contact Phone
  - o   Contact Address
- Social Media Tools
  - o   Facebook
  - o   Twitter
  - o   Youtube/Vimeo
  - o   Instagram
  - o   Linkedin

3. RESULTS AND DISCUSSION

In this research, 6 different table was built according to categories. In the following tables, 'Yes' means criteria exists, 'No' means criteria doesn't exist.

First of them is company information. This category consists of 'About Company', 'Services/Products' and 'References'. Services/Products criteria are taken in same category because some companies working in service sector, some companies are working in product sector.

Table 2: Company Information

Criteria	Yes / Percentage	No / Percentage	Total / Percentage
About Company	12/70%	5/30%	17 / 100%
Services / Products	16/94%	1/6%	17 / 100%
References	10/59%	7/41%	17 / 100%

About sections are visited by first visitors in order to take basic information about company. That's why, it is important for first impression. In analysis, 70% (n=13) of websites have about section inside.

Services or products are important area in corporate web sites. It was observed that, 94% (n=16) of companies have services or product page.

References are companies which the company working with or the works which was done before. 59% (n=10) of web sites have a references page.

Table 3: Corporate Identity

Criteria	Yes/ Percentage	No/ Percentage	Total/ Percentage
Logo	17 / %100	0 / %0	17 / %100
Name	17 / %100	0 / %0	17 / %100
Vision	9 / %53	8 / %47	17 / %100
Mission	9 / %53	8 / %47	17 / %100

Table 4 is about Identity of Company. This category consists of 'Logo', 'Name', 'Vision' and 'Mission'.

Having a corporate identity is important for companies. Because, Constantin (2008) says that "Vision and mission are two distinct concepts reflecting different existential time frames. Vision is an idealistic projection of the company in an undefined future, in a mature and successful position. Vision is not a dream and not a fantasy. It is an idealistic projection of what the company might be and might achieve. However, the roots of this projected image should be well defined in the present business dynamics of the company."

100% (n=17) of companies have logo and name in their websites. 53% (n=9) of them have mission and vision sentence.

Table 4: Company Advertising & Publish

Criteria	Yes/ Percentage	No/ Percentage	Total/ Percentage
Online Mag. Brochure	1 / %5,9	16 / %94,1	17 / %100
Image gallery	0 / %0	17 / %100	17 / %100
Advertorial Videos	3 / 17,6	14 / %82,4	17 / %100
News About Company	4 / %23,5	13 / %76,5	17 / %100

6% (n=1) companies has online brochure/magazine in their websites. 0% (n=0) of company has image gallery. 17,6% (n=3) companies have advertorial video. 24% (n=4) companies have news about company section.

Table 5: Communication and Accesibility

Criteria	Yes/ Percentage	No/ Percentage	Total/ Percentage
Multi-language	5 / %29,4	12 / %71,6	17 / %100
Search bar inside	2 / %11,8	15 / 88,2	17 / %100
Newsletter subscription	4 / %23,5	13 / %76,5	17 / %100
Contact mail	15 / %88,2	2 / %11,8	17 / %100
Contact phone	17 / %100	0 / %0	17 / %100
Contact address	17 / %100	0 / %100	17 / %100

Multilingual web sites are important to reach everyone. If person doesn't know Turkish, he/she could select English at least. It was observed from Table 5, 29% (n=5) companies have multilingual web site. 12% (n=2) of companies have search bar inside web site. Search bar is important to reach requested information easily. Newsletter subscription is used to inform clients about news, new products, new services etc. 24% (n=4) of companies have newsletter subscription form.

All websites have contact phone and address information. 12% (n=2) cof ompanies' web sites have not contact mail information but they have inline contact form instead of mail info.

Table 6: Social Media Tools

Criteria	Yes/ Percentage	No/ Percentage	Total/ Percentage
Facebook	9 / %53	8 / %47	17 / %100
Instagram	4 / %23,5	13 / %76,5	17 / %100
Twitter	8 / %47	9 / %53	17 / %100
LinkedIn	9 / %53	8 / %47	17 / %100
Youtube Vimeo etc.	7 / %41	10 / %59	17 / %100

Table 7: Companies and Total Counts

Company Name	Count	Total	Ratio
ATACEL	5	22	%28
ESTE BİLİŞİM	16	22	%73
MICRO FOCUS (8)	15	22	%68
HORİZON BİLİŞİM	8	22	%36
PM TEKNOLOJİ	15	22	%68
NGTECH	12	22	%55
YAPI KREDİ TEKNOLOJİ	8	22	%36
MULTİNET TEKNOLOJİ	18	22	%82
ARCHITECHT BİLİŞİM	8	22	%36
İNERA BİLİŞİM	9	22	%41
KLOİA	7	22	%32
FİZ BİLİŞİM	14	22	%67
EGİS BİLİŞİM	6	22	%27
ASOS BİLİŞİM	13	22	%59
FİO BİLİŞİM	8	22	%36
EPLATFORM	18	22	%82
TEAMPRO	15	22	%68
Average	11,4	22	%51,8

While analyzing social media links, the links were controlled they are active or not. If web site has social media button but doesn't link to corporate social media page, it wasn't counted as 'Yes'. In this research, it was examined for the social media accounts which is referenced from the web site. The fact that whether the company has social media account or not was not checked.

53% (n=9) companies use Facebook and Linkedin social media page. 47% (n=8) companies are using Twitter and 41% (n=7) companies are using video sharing platform like Youtube, Vimeo etc.

Instagram usage is lower then other social media usage. 24% (n=4) companies are using Instagram account.

Research within the scope of the web pages of Turkey's newly established IT companies were investigated. The fact that the web pages are open to the outside of the institutions, informing the relevant people and providing the necessary information about the company presents them as part of the organization's communication activities. In this sense, web pages also serve as part of public relations activities. In this context, the elements foreseen to hold a web page in terms of public relations were analyzed through the web pages of the companies.

As company information, it was observed that 70% (n=13) of websites have about section inside. 94% (n=16) have services or products section. 59% (n=10) have references section. It was reviewed that, 8 company provides all company information. Ratio of providing all criteria is 47%.

As company identity, all companies have logo and name in their websites. 53% (n=9) have mission and vision information. 8 company provides all company identity information. Ratio of providing all criteria is 47%.

As company publish, just 1 company has online brochure or magazine. Noone has image gallery. Just 3 of 17 have advertorial video in their website. 4 of 17 have company news section. There is no company which has all criterias. In contrast, 11 of 17 don't provide all four criteria.

As communication and accessibility, just 5 of 17 (%29,4) have multi-lingual web site. Just 2 of 17 has search bar inside. 4 of 17 have newsletter subscription area. Contact phone and address exists in all company websites. Contact mail exists in 15 of 17 companies. There is no company which has all criterias.

As social media tools, 9 of 17 have facebook account. Just 4 of 17 have instagram account. 8 of 17 have twitter account. 9 of 17 have linkedin account. 7 of 17 have youtube or vimeo account. 4 of 17 provides all criterias.

As total, Multinet Technology and EPlatform has 18 yes answer of 22 criterias. Atacel has the lowest rate with just providing 5 criteria. Criteria average of all companies is 11,4. 9 company (%53) are above average.

4. CONCLUSION AND RECOMMENDATIONS

In the content analysis, the corporate websites of the newly established IT companies were examined. The study subjects are grouped under 5 categories.

The first is the 'Company Information' category. 'About Us' page is one of the criteria in this category. This page is very important for someone who wants to take information about the company for the first time. Very of web sites have this criteria. All web sites except for 1 site, 'Products' or 'Services' page is available. Few of web sites were given information on 'References' page. When it was reviewed throughout the category, Almost half of web sites were found to have all these criterias. The ratio of existing all criterias in this category is almost three quarters.

The second category is named as 'Corporate Identity'. The ratio of the 'Vision' sentence describing the future expectations of the company, 'Mission' describes the position and self-determination of the company. Almost half of companies have mission and vision sentences. All sites contain logo and company name information. The ratio of existing all criterias in this category is almost three quarters.

The third category is named 'Corporate Publication'. Online Brochure/Newspaper /Magazine publication exists in only 1 site. The image gallery has not been seen on any site. Only minority of companies publishes a corporate promotional film on their web site. Company announcements were placed by a few of company on their website. It was reviewed that there is no company which provides all criterias. The ratio of existing all criterias in this category is almost half of one quarters.

The fourth category is named 'Communication and Accessibility'. If customer wants to reach a company, he/she uses the contact page. As everyone's preferred communication style may be different, having all communication paths increases accesibilty of the company. Besides, language option is important for surfing of foreign language visitors. Almost one third of web site has multiple language option. The ratio of existing 'Search Bar' criteria is less than half of one quarter. 'E-Mail Subscription' criteria is used by the companies for customer loyalty. This feature is placed by one third of all websites. While the contact phone number and address are available on all sites, the e-posta address is placed by most of websites. There is no company website which has all criterias. The ratio of existing throughout this category is almost more than half of all websites.

The fifth category is named 'Social Media'. Social media today plays an important role in reaching customers and taking feedback from them. 'Facebook' account was linked by almost half of all companies. 'Instagram' criteria was provided by nearly one third of reviewed websites. 'Twitter' account was provided by nearly half of websites. Professional job web 'Linkedin' account is provided by almost half of websites. 'Youtube or Vimeo' video content platform account is provided by the less than half of companies. One third of companies provide all social media criterias.

Multinet Technology and E-Platform provides majority of all criterias. On the other hand, Atacell provides almost one third of all criterias.

When all of the categories is calculated, 51.8% of the criteria were met by all companies and a little more than half of all companies receive a score above this rate.

The average corporate criterion was very low. If companies attract a corporate promotional film and publish it on the website, customers will know the company better, and they will be able to watch the film instead of reading long texts. In addition, the absence of an Image Gallery may effect the company in negative way. It was reviewed from the findings, usage ratio of visual materials is too low. The more visual material is used in its website, the more informative company will be.

Website is easy to access, easy to install, inexpensive and very useful digital public relations tool. As a result of research, the companies don't use their corporate websites very effectively. If they use this tool in full capacity, they can be more succesfull and thay can earn more customers.

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A COMPARATIVE ANALYSIS OF E-GOVERNMENT SERVICES OF CROTIA, POLAND AND TURKEY

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ー**Abstract**ー

This study aims to examine and compare the electronic government (e-government) services of Croatia, Poland and Turkey. In this study, e-government of three countries were examined with comparative case study method. A comparative case study conducted with using United Nation's E-Government Survey 2018, academic studies, researches, reports, legal regulations and

statistics. The e- Governments of the countries were examined under five headings. These were e-governments' analysis, historical developments, legal regulations, services on the systems, users' profiles, satisfaction surveys of the service. Firstly, the historical process of e-governments for each country was explained. Then, historical developments of e-government were explained for each country. The legal arrangements of the countries were identified. User profiles and services the countries provide were compared. As the final heading, it was inquired whether there was any satisfaction survey conducted by the countries. In the conclusion part, there will be suggestions based on the differences in e-governments of the countries.

Key Words: *E-government, Comparative analysis, Croatia, Poland, Turkey*

JEL Classification: M15, H11, O38

1. INTRODUCTION

Developments in communication and information technologies and commercial relations almost all kinds of activities have been moved to the public services throughout the electronic environment. In particular, the Internet has virtually reduced the costs of access the information, and eliminated the dependence of time and place. E-government is a generic term for web-based services from agencies of local, state and federal governments. In e-government, the government uses information technology and particularly the Internet to support government operations, engage citizens, and provide government services.

The e-government services emerged in the late 1990´s as a context within which to share experiences among practitioners but the history of computing in government organizations can be traced back to the beginnings of computer history. A literature on "IT in government" goes back at least to the 1970s (Danziger and Andersen, 2002; Boughzala, Janssen and Assar, 2015). Over the past few years e-government gave rise to several conferences with more and more scientific content.

This study aims to examine and compare the e-government services of Croatia, Turkey and Poland. In this study, e-government of three countries were examined with comparative case study method. The e-governments of the countries were examined under five headings which are given below:
- E-government historical development analysis
- E-government legal regulations
- E-government services offered by countries
- Characteristics of e-government users

- Users and satisfaction surveys on e-government

These headings have been examined with research articles, review articles, written materials, government publications, newspapers, world reports in order to support their viewpoint or argument of an academic study. In conclusion, it is expected to compare and suggest improvements for e-governments in examined countries.

2. LITERATURE REVIEW

In this part, e-government comparisons are presented to understand the topic more comprehensibly. Also, other studies on e-government comparison are used to feed the heading. Chen et al. (2006) examined the e-government strategies of developed and developing countries. As a result of the study, they proposed conceptual framework for identifying critical success factors for countries' e-states. They have demonstrated how successful the conceptual framework is, with a case study on USA and China. Matei and Savulescu (2011), the e-government status and ICT development levels of 11 Balkan countries. They used the results of the United Nation's e-government survey reports in 2010, which is conducted every two years. Croatia, Poland and Turkey were the samples from the study. As a result of the study, it has been pointed out that the e-government activities of the countries have increased when compared to 2008 and have started to become compatible with the European standards. In another study, Zefferer (2011) compared countries in terms of e-services defined in seven European countries: Estonia, Germany, Netherlands, Spain, Austria, Turkey and the United Kingdom. In the European Commission's e-government benchmarks define life events; Electronic ID, qualified electronic signature, tax systems, births, social security benefits, certificates, residence and re-location, setting up a company. As a result of the study, it was reported that only the Estonian service was offering these eight services to its citizens. In a study by Alshomrani (2011), the USA and Saudi Arabia e-government indicators were compared. In the study, e-government reports published by UN, USA and Saudi Arabia were taken into consideration. E-government portals and different research results were used for documentary research in the frame of this study. Another comparison study by Jonathon, Ayo and Misra, Nigeria and Republic of Korea were compared in 2015. In this study, researchers used four UN E-government Surveys published between 2008- 2014. As a result of the study, the researchers emphasized that Nigeria could develop its e-government trough cooperation with the Republic of Korea.

As a result of the literature review, it has been observed that there are few studies comparing different countries. In the studies, the countries with high E-government Development Index (EGDI) are compared with the countries with low EGDI index. According to the UN E-Government Development Survey published in 2018, the E-Government Development Index (Turkey's EGDI = 0.71, Croatia's EGDI = 0.70, Poland's EGDI = 0.79) and the E-Participation Indices (EPART), respectively, it was carried out between Croatia and Poland 0.77, 0.86 and 0.89 of the three countries. In this way, the differences between the three countries will be presented and suggestions will be made for both countries (United Nation, 2019).

2. RESEARCH METHODOLOGY

In this study, comparative case study method was used to analyze the current status of the samples. Turkey's e-government data was taken and compared with Croatia's e-government and Poland's e-government.

2.1. Data Collection

The data of this study were collected from different data sources. Researchers in Croatia, Poland and Turkey have studied e-government portals. In addition, academic studies, researches, reports, legal regulations and statistics on e-government were examined in these countries. Besides above-mentioned United Nations E-government Survey 2016 and 2018 were examined in detail for the three countries being investigated (United Nations, 2019).

2.2. Data Analysis

In this part, data according to the UN E-Government Survey published in 2018 were examined for Croatia, Poland and Turkey to better understand the current status. The United Nation E-government Survey was first published in 2003 then 2004, 2005 and 2008. Since 2008, it has been conducted and published every two years. In this study, the results of the last two surveys of 2016 and 2018 were taken into consideration.

According to the UN E-Government Survey published in 2018, Turkey was analyzed in Asian continent, while Croatia and Poland were analyzed as being in the European continent. Income levels were in the upper middle-income range for both countries. According to the 2018 EDGI report, Turkey was 53th, Poland was 33rd and Croatia was 55th out of 193 ranked countries. Compared with 2016, the report showed progress in both EDGI and Turkey were the EPART index has managed to move to the top. Poland was 36th in 2016 and in 2018, it was 33rd.

Croatia showed a decline in both indices compared to the 2016 rankings and ranked lower in 2018 than in 2016 (United Nations, 2019).

The EGDI score is computed by using online service index (OSI), technology infrastructure index (TII) and human development index (HDI). As mentioned above, although Croatia's EDGI and Turkey's EDGI values are very close, when HDI value TIU (Turkey TIU = 72.8, HDI = 0.79; Croatia TIU = 76.8, HDI = 76.8) examined, Croatia's score is higher than Turkey's score with more top rankings It is also noteworthy. This difference is due to OSI difference.

3. FINDINGS

In this part, detailed information on e-government services in Croatia, Poland and Turkey will be presented. Firstly, the historical development of e-government will be examined. After giving detailed information about the legal regulations that the countries have started to use for e-government, e-governments' structures in these countries have been determined. This study draws attention to the services that countries offer to their citizens. In the last part, the e-government status of the countries, user profiles and satisfaction survey about the e-government or other studies will be mentioned.

3.1. E-government Historical Development Analyses for Croatia, Poland and Turkey

Croatia started with the implementation of e-government services in 2003 when Government founded Central state office for e-Croatia (Središnji državni ured za e-Hrvatsku). Their task was promotion and systematic building and improvement of information communication infrastructure in Republic of Croatia, public access to the internet services and content and development of the application of information and communication technologies and electronic administration systems. This office stopped with work in 2011 when their tasks and obligations were transferred to the Ministry of Public Administration of the Republic of Croatia and their department for e-Croatia. During the development of e-government in Croatia, Government created two strategies. First one was Strategy for development of electronic administration in the Republic of Croatia for the period from 2009 to 2012 (MINGO, 2009) and the second one was Strategy for e-Croatia 2020 (Ministry of Public Administration, 2017). The responsible body for e-government in Croatia is the Ministry of Public Administration of the Republic of Croatia and their department for e-Croatia.

In Poland, the first mentions in Poland about e-government in Europe began with a report published in 1994. It showed the directions of development of the global

information society in Europe. Since then, the e-government concept, as a component part of e-Europe, has been permanently involved in the issues raised in the Union. In Poland, the Scientific Research Committee developed a document based on seven expert opinions in 2000. Today, the material is known as the official document of the Committee for Scientific Research and the Ministry of Communications "Goals and directions of development of the information society in Poland". In 2000, the parliament also adopted a resolution to build an information society, and then in 2001 passed a law important for the development of e-government: introducing the Public Information Bulletin, the Act on Access to Public Information and the law on electronic signature regulating the e-signature. Containing an action plan for the development of the information society in Poland, which was modeled on the European e-Europe development plan. This document was updated in 2002. The next version of this strategy was called e- Polska 2006. The adoption of this document resulted in the Committee for Scientific Research preparing the initial concept of the Polish Gateway project (central IT system whose task was to provide administrative services for citizens and business entities via e-mail) and the Strategy for Informatization of the Republic of Poland.

The development of e-government in Turkey starts with some of the public institutions' web page creation, inspired by the private sector e-commerce services. Since the late 1990s, the e-government services in Turkey has been seen more planned and discussed on it. Due to the investments made in IT infrastructure, computer and internet usage increased and some government institutions started to provide their services in electronic environment. E-government, opened on 18 December 2008 is an important turn for Turkey on the transition to be a knowledge society. E-government studies the historical development of Turkey has been examined as follows: Information and Economic Modernization Report (1993), Turkey's National Information Infrastructure Master Plan (TUENA) Training (1996-1999), E-Commerce Coordination Board (1998-2002), Public-Net Supreme Council and Public-Net Technical Committee (1998-2002), E-Turkey Initiative (2001), E-Transformation Turkey Project (2003), Information Society Strategy (2006-2010), Vision 2023 and 2016-2019 National E-government Strategy and Action Plan (Afyonluoglu, 2018).

3.2. E-government Legal Regulations of Countries

E-government in the Republic of Croatia is regulated by one law and two decrees. Croatia brought Law on the State Information Infrastructure (Official Gazette, 2014a). This Law establishes the rights, obligations and responsibilities of

competent public sector bodies regarding the establishment, development and management of the state information infrastructure system, the establishment and management of the system of public registers and the conditions that the state information infrastructure must provide in relation to public registers, as well as the use of a common base for secure data exchange within the state information infrastructure system, a common identification and authentication system, a unique point of interaction with citizens and other users. Two Decrees are (i) Decree on the Establishment of the Public Register for Coordination of Projects on the State Information Infrastructure (Official Gazette, 2014b) and (ii) Decree on organizational and technical standards for connecting to government information infrastructure (Official Gazette, 2017). First Decree establishes a Public Register for the Coordination of State Information Infrastructure Building Projects (ProDII Register) and regulates its content, form, and manner of management. The purpose of the Registry ProDII is to rationalize, direct the development and coordination of all jobs and projects of the application of state information infrastructure while at the same time increasing the quality of public services and disabling the planning and implementation of similar or similar public sector projects. The second Decree prescribes organizational and technical standards for linking the state information infrastructure, conditions, and activities necessary for the launch, implementation, development, monitoring, and maintenance of projects related to the state information infrastructure, management, development and other elements necessary for the operation of the state information infrastructure. It also regulates the way of linking e-services to the central government portal system, to the national identification and authentication system (NIAS) and to the customer's mailbox.

In Poland, an important aspect that concerns e-administration are legal and organizational grounds, this concerns development at both European and national and regional level. Poland's accession to the European Union has forced Poland to comply with European requirements. However, European standards are rare in the field of e-government. Issues related to administrative cooperation are among the EU's supporting competences, so EU actions are mainly supportive and complementary. One of the most important acts in the field of e-administration was Directive 2003/98 / EC of the European Parliament and of the Council of November 17, 2003 on the re-use of public sector information. The national legal basis for the creation of e-administration was the resolution of the Sejm of the Republic of Poland of July 14, 2000 on building an information society. First legal basis of e-Administrations was announced in 1990 that was about commune self-government. Traffic law in 1997 and e-signature and allowance to access

public information in 2001 started. The Act of February 17, 2005 on computerization of entities performing public tasks and Regulation of the Council of Ministers of 12 April 2012 on the National Interoperability Framework, minimum requirements for public registers and information exchange in electronic form and minimum requirements for ICT systems were announced.

There has been published some changes, directives and regulations that concern e-government directly or indirectly in the law in Turkey within past 10 years. The current legislation in the frame of e-government is from the Ministry of Transport, Maritime Affairs and Communications: The Regulation on Principles and Procedures for the Execution of the E-government Services. The purpose of this regulation is to determine the procedures and principles regarding the scope and execution of e-government services within the framework of information society policies, targets and strategies, to carry out action plans related to these services, to carry out coordination and monitoring activities.

3.3. E-government Services Offered by Countries

Current e-government services in Croatia can be divided into services for business (G2B) and services to citizens (G2C). The most common services in e-government for business include E-Customs, E-tax office, health and pension insurance, e-visitor and e-agriculture. G2C e-government services are available through e-građanin (e-citizens) portal–www.e-gradanin.hr. The Croatian Government adopted the Decision Launching the e-Citizens Project (Official Gazette, 2013**),** which enabled to access to public information and information on public services in one place, secure access to personal data and electronic communication between citizens and the public sector. In the second group, there are 54 different e-government services for citizens which are divided into 10 different areas (state and security, family and life, education, traffic and vehicles, active citizenship, finance and taxes, health, working, business and living and environment).

Polish citizens can use several hundred public e-services located on various platforms and government portals. These include, among others: The Electronic Platform of Public Administration Services (ePUAP), the Platform of Electronic Services of the Social Insurance Institution (PUE ZUS), the portal obywatel.gov.pl, the portal biznes.gov.pl. Currently, the Portal of the Republic of Poland (Portal RP) is being created - gov.pl, which will ultimately be the gateway to all public information and e-services. It will integrate websites of ministries, central offices and provincial offices and facilitate access to digital services that the state offers to its citizens. The administration provides, modernizes and builds

new e-services that allow people to settle official matters from any place and at any time without having to leave their home. Public services can be used by anyone who can confirm their identity on the internet, for example; using a trusted profile (eGO). A trusted profile is also a free tool that serves as an electronic signature in communication with the public administration. Launching e-services on different portals is usually preceded by the process of logging into the system. After integration of thematic portals with the Portal of the Republic of Poland, the gov.pl electronic account will be the key to all digital administration services.

Currently, the portal gov.pl offers services located on the obywatel.gov.pl and biznes.gov.pl websites that biznes.gov.pl informs how to set up and run your own company and allows you to complete the necessary paperwork online. It is a source of information for people who run a business or plan to start it and obywatel.gov.pl informs how to handle popular official matters.

There are some other web sites for various recipients such as Central Register and Information on Economic Activity (CEIDG) which allows entrepreneurs to register their businesses, ekw.ms.gov.pl allows companies to make changes in their files, data, partners, etc. Also, for finance, there is finance.mf.gov.pl where people can follow their taxes or returns. Similar to this service, there is PUESC (Platform of Electronic Tax and Custom Services). PUESC is the e-service of the National Tax Administration in the scope of servicing and controlling trade in goods with third counties and trading in excise goods. For citizens' insurances, Polish government has opened a web site addressed to ekrus.gov.pl where citizens can check their current insurances. Ufg.pl stands for Insurance Fund's Guarantee and helps citizens to check the OC insurance of the perpetrator of the accident, the number of the damage, receive information about the course of the third-party liability insurance, the history of transport damages. Praca.gov.pl is a web site used by unemployed people, job seekers etc. to get a job. About healthcare, Platform for Electronic Services of the Social Insurance Institution (PUE ZUS) is in use. In addition to PUE ZUS, Integrated Patient Information Guide provides data collected by the National Health Fund. In ZIP, you can access information such as on the subject of your treatment and benefits, reimbursed medicines, your place on the list waiting for medical advice or admission to the hospital.

Services provided to citizens through e-government in Turkey can be broadly categorized integrated electronic services, information services, payment transactions and short cuts to institutions and organizations. The most used services on e-government of Turkey are Social Security Institution, Ministry of Justice and Revenue Administration. Through Turkey e-government, the most successful public institution is the Undersecretaries of Maritime Affairs (98 %),

then Social Security Institution (31 %), the Ministry of Communication (29 %). On the other hand, mobile line, traffic summons, e-payroll, weather forecast, title deed information, daily exchange rates, student documents, domestic voter registration and IMEI inquiry services were among the most beneficiary services of the citizens in 2018.

3.4. Characteristics of E-government Users of Countries

When Croatia is examined, the total number of companies using different e-government services for them is not available, but it can be stated that most of the companies are using services due to the different obligations regarding different services. Services can be accessed also with mobile phones so presumably the number is the same as the number of citizens who are accessing e-government services using computers. Regarding companies, mobile access to the e-government is mostly used for information purposes due to safety issues.

In Poland, e-administration services should be tailored to the client's needs. Customer orientation is possible with the co-existence of personal contacts and access to various devices, such as: internet, information kiosk, TV, mobile phone with WAP. A study named "E-administration in the eyes of Internet users 2014" carried out by ARC Rynek Opinia commissioned by the Ministry of Administration and Digitization (MAC) on a sample of 4848 Internet users showed that 78% of this group often sought address and contact data on the websites of public institutions, and 68% were looking for information on how to settle the matter. The difference between these results and previously presented indicators from the GUS survey seems to be large and comes from the research of other populations that in the GUS study covered persons aged 16-74. On the other hand in the MAC survey included people using the internet in the age of 18 and above. It is obvious that people aged 16-18 rarely have the need to enter into relations with the public administration, so they underestimate the result in the entire population in the study of the Central Statistical Office. Discrepancies also arise from a different way of formulating questions and are the effect of limiting the GUS research only to private matters. In 2014, over half of the respondents often downloaded or filled out forms on websites, and about 30% read the reports or statistical data, as well as submitted their own opinions on various issues. Only 10% of internet users declared that they never downloaded or filled out official forms. An attempt to use e-administration is less frequently undertaken by people

with lower education (26%) than with higher education (59%), aged 18-24 than 55 and older (59%), rural residents (46%) than over 100,000 cities (58%). It is worth noting that among all age groups, Internet users aged 55+ are the most likely to obtain electronic administration services.

In Turkey, there is www.turkiye.gov.tr where people can use the services provided by the government. It is the one and only web-site for the citizens and citizens can reach by a single authentication. In order to ensure that all users benefit from these technologies at the same rate, the e-government also includes works to ensure the accessibility and availability of disabled citizens in technical, design and content issues. E-government started with 22 services but now it reached 3121 services. The number of e-government users exceeded 37 million and increased by 112% in the last 5 years. E-government service requirement has been reduced to the age of 15 and 1 out of every 3 persons over 15 years of age is currently using e-government service. The objectives are to provide e-government services more than 60% of the population in the short term. While the mobile e-government application provides 1350 separate public services to the users. Nearly 3 million hearing impaired people live in Turkey. To make disabled people benefit from the e-government services in Turkey, "No Barriers to the e-government Project" was launched. In addition, the sign language in the frame of Frequently Asked Questions on the e-government has been created and made available. There are also options for visually impaired users to enlarge the site's font size and access a simple website. For Croatia and Poland, there is not any project like the one in Turkey. This project can be a step to reach all the disabled citizens (Kose, 2019; Turkey E-Government Portal, 2019).

3.5. Users and Satisfaction Surveys on E-government in Countries

When the surveys made on e-government in Croatia searched, it has seen that there was one survey in 2014/2015 about satisfaction with e-građanin services and what citizens would like to have in the future within e-government. Ministry of Public Administration conducted this survey (Vrbanus, 2016). According to the results published on the pages of the mentioned ministry, the areas of greatest interest are citizens' finances, taxes, and health. Following are the areas of legal state and security, education and work, labor, consumer rights, traffic and vehicles, business, family and life, active citizenship and leisure, housing and the environment, veterans and tourism, and culture. With the immediate involvement of the public concerned, the Ministry of Administration has gained insight into the e-government Internet users' views in the Republic of Croatia, apart from information on what e-services the Internet users expect from the public

administration. The services that users have achieved through the Internet have also been identified, their quality is estimated and obstacles in their use are identified. Besides this survey, there is no further information or any other studies regarding quality and satisfaction with the e-government services in Croatia.

In community research of the information society (conducted in Poland by the Central Statistical Office), e-administration is the subject of research both from the point of view of the society and enterprises. Consider three types of activities that reflect the advancement of administration services: search for information on office websites, download office forms, send completed governmental forms or fill them online. The Ministry of Digitization monitors the state of e-government satisfaction. 4800 Internet users took part in the study "E-administration in the eyes of Internet users 2016" on the perception of electronic public services. Among the users of e-administration, three types can be distinguished. In the group of people with practice in dealing with official matters via the Internet, we have active users (25%) and unconverted (29%). The rest is inexperienced (46%) who have not used online public services so far. The vast majority of activities dealt with positively via the Internet (90%). As much as 98% announce that he will use e-government services in the future. Only 28% of exceptions prefer to do business over the internet, while the majority (56%) choose a personal contact. This group, much less often than in the previous one, positively assesses the method of providing e-government services (53%). The worse experience can be influenced by the experience of unblemished Internet users: nearly half of them (47%) settled their case only partially, and 18% without success. In the every segment, as many as ¾ respondents are in favor of personal contact with the office in order to settle the matter. Despite this, 59% declare that in the future they will definitely or probably use the Internet for this purpose.

According to the survey's result done by Turkish Statistical Institute (TSI) in 2015, individuals' usage of e-government services rate was 53.2% in Turkey. According to another survey in the same year, Turkish Statistical Institute found that the rate of usage of e-government services in the private sector was 81.4%. In another study that was done in 2014, the satisfaction rate of public services provided by e-government was 88.7%. When examining the ways of being in touch with public institutions and organizations, getting information is taking the first place with the rate 93.7%. While to download the official forms or documents (86.4%) takes the second place, form filling or filled form submission (71.9%) is in the third place. In the fourth place, bidding activities for public tenders in electronic environment are 7.1%. A study done by Osman et al. in

2019, users show that e-services are attracting highly educated citizen with a cumulative of 51.6% for graduate and postgraduate degree holders (Osman, Anouze, Irani et al., 2019). In addition, there is no regular e-government user satisfaction surveys in Turkey (TSI, 2015).

4. CONCLUSION

E-government has emerged in late 1990s as a result of IT development and has been developing rapidly ever since. Together with emergence of e-government different researchers conducted many studies in order to evaluate current development phase and influence of use on companies and citizens.

E-government is a platform that provides public services from a single portal and provides secure and efficient access for its users. Croatia started its e-government in 2003 for advertising purposes and created a more comprehensive system in 2011. On the other side, Poland first referred to the word "e-government" in a report published in 1994. In this case, it is seen that Poland started e-government before Croatia which is the other EU country. In addition, Poland began full integration as a system in 2000. Poland has started e-government earlier than Croatia for about 11 years. However, Poland still lags behind the European Union in terms of providing public administration services on the Internet. The development of e-government is a great opportunity for the country's economic development. Building an information society is an important condition, stimulating the growth of competitiveness of the economy, Poland's integration with the EU structures as well as the implementation of a coherent regional policy, the development of the growing unused workforce and the development of many other areas of social life. Most of the social and economic problems are solved with the help of information techniques. The technological revolution is not enough to bring socio-economic progress in the globalization era, which is why close international cooperation is needed, legal regulations conducive to the free exchange of goods and services. What is needed above all is the involvement of human capital in public administration to make changes. One of the main problems is the lack of data exchange standards. Poland intensively implements activities related to standardization aiming at the cooperation of systems, openness of the market, products and services, increasing the level of information security as well as the confidence of the Polish society in e-services. Therefore, the attitude of Poles to use online services must change. Research shows that Poles believe that it is better and safer to settle the matter in the office than through the offered e-government solutions. The fight against digital and IT exclusion of society becomes the key to this. On the other side, Turkey is the

earliest in running e-government and it is a fact that Turkey was affected by other counties. In the late 1990's, Turkish Government opened an "e" version online. In 2008, it began to make the e-government site more comprehensive which meant the number of services provided by the government has increased. Although it is one and the only way not going to institutions and do citizens' works through a device connected to internet, it has got lack of control. In Turkey, there is not a strong structure to direct and coordinate the works. Croatia and Poland have the same problem. To ensure the whole system and make it work properly and under control, there should be an auditor. E-government needs a legal framework to complete the deficiencies. In Turkey, it is still being processed. In addition, the inequalities (digital divide) must be eliminated. In addition, the governments should measure to increase the digital literacy of society and take steps to reduce the cost of the Internet and free access to public spaces.

Integration works can be given more emphasis between e-government projects and practices carried out by public institutions. Also standards can be developed within the framework of Interoperability principle. In Turkey, all the intuitions and companies haven't integrated to e-government system just like in Croatia and Poland. There can be created by the governments to make it a must. By time, all works in the frame of e-government could be done on the internet. Also, there is no place where citizens can request something from their e-governments. In the frame of requesting, a study found that there was no requesting area, such as request about public services or bank services (Medeni, Erdem, Osman et al., 2011). Concerning the problems, trends, innovations and bringing solutions and suggestions will improve the e-governments of countries.

If it is the era of technology, the systems should be fully supported with internet. Also, it has observed that these 3 countries in the article are not supported with the internet; such as social networks like Instagram, Facebook and etc. From this point of view, e-governments would be offered more customized/specialized services for individuals depending on their data. Turkish personalized e-government, citizen-centric e-government approach basically is set up over idea of using society level knowledge reachable by government for again benefit of each citizen individually services (Medeni, Erdem, Osman et al., 2011). Poland and Croatia can take a step with Turkey for more personalizing the systems.

Based on research results, followings can be proposed further studies about e-government implementation that study about e-government in larger sample and repeat study after period of five years in order to evaluate potential development and influence on users.

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AGRICULTURAL PRODUCTION IN SOUTH AFRICA: INFORMATION AND COMMUNICATION TECHNOLOGY (ICT) SPILLOVER

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−**Abstract**−

The positive spillover impacts of the efficiency of information and communication technology (ICT) and land accessibility as factor inputs to agricultural productivity are well documented in the literature. Furthermore, input-output efficiency as a measurement of factors contributing towards gross production is no exception in this regard. Few studies on agricultural production and ICT at the household level in South Africa show divergent empirical results. This study investigates the effect of information and communication technology (ICT) and land for farming in the context of household food production in South Africa. Household engagement in agricultural activities is proxy for agricultural production, farm land size is a proxy for land accessibility, telephone and internet use are proxies for ICT in this study. Household data of twenty-one thousand, six hundred and one (21,601) households on agricultural activities and ICTs were generated from the existing survey data of General household survey, 2015 by Statistics South Africa. Majority of the households are not engaging in agricultural activities due to no access to land for farming, but more than 80 percent of the

households have access to at least one form of ICTs penetration i.e. mobile telephony. The logit regression shows that internet connection in the household have positive and significant impact on household agricultural production but land accessibility is indirectly related and significant to household food production in South Africa. Therefore land accessibility may be a barrier to agricultural activity involvement in South Africa. The study shows that the positive spillover impacts of ICT may not be possible due to lack of access to land for agriculture. Land for farming, CDMA telephony and internet are highly required for agricultural activities in order to promote food production, reduce cost of telecommunications, promoting agricultural research and development via internet accessibility.

Key words:
Agricultural production, Land accessibility, Information and communication technology (ICT), General household survey, Binary logit regression, South Africa

JEL classification code:
Q11, Q15, O3, C83, C81, P42

1. INTRODUCTION

South Africa's democratisation advent in 1994 birthed resurface of land reform and agricultural programs to redress pre-1994 injustices in resources distribution. Two decades after the democratisation, issues of inequality (economic, social and political) are still frequent in public discourse due to more than half of the population trapped in poverty boundary[1] and a quarter of the population is extremely poor (food poverty)[2]. Increasing rate of poverty has been largely attributed to unemployment rate moving in the same direction. Since 1994, the agricultural sector is positioned to serve as source of employment in

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[1] http://www.statssa.gov.za/?p=10334
[2] https://africacheck.org/factsheets/factsheet-south-africas-official-poverty-numbers/

order to reduce poverty and increase food production in the rural area
in the short-run while in the long-run contributing to economic
growth and development. Agricultural sector has experienced four
phases of reforms in order to boost production and sustained
productivity.

South African economy as the second biggest in Africa is a net-
supplier of food produce at the national level but deficit at the
household level due to more than 80 percent of households not
involved in agricultural activities (Statistics of South Africa
[StatsSA], 2016). The number of households engaged in agriculture
was 2.33 million in 2016 compared with 2.88 million in 2011. This
represents a decrease of 19.1 percent between the two years. The bulk
of households engaged in agriculture in South Africa were in
KwaZulu-Natal (23.0 percent of country's total), Eastern Cape (21.3
percent) and Limpopo (16.6 percent) in 2016. Free State, Western
Cape and Northern Cape reported the lowest numbers of households
engaged in agriculture, with 6.8 percent, 3.0 percent and 2.1 percent
(of country's total) respectively. Within the provinces, the highest
proportion of households that were engaged in agriculture in 2016
was 27.9 percent in Eastern Cape, down from 35.4 percent in 2011.
This was followed by 24.1 percent in Limpopo (33.0 percent in 2011)
and 18.6 percent in KwaZulu-Natal (28.2 percent in 2011). Western
Cape and Gauteng recorded the lowest participation rates, with 3.6
percent (5.2 percent in 2011) and 4.9 percent (7.1 percent in 2011)
respectively[3].

Productivity in agriculture ensures availability of food which is the
supply-side of food security. Studies show that food inaccessibility is
one of the contributors of high level of poverty in South Africa.
Incentivising food production at the household level may reduce the
challenges of food accessibility and poverty since excess household

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[3] http://www.statssa.gov.za/?page_id=1856&PPN=03-01-05&SCH=6979

food production may be converted to income. In engaging the household in the food production, required factors such as land for agricultural production, agricultural skills, farm implements and ICT gargets for information dissemination are needed for innovative agricultural practices. In order for household to attain optimal level of production, technological and managerial innovations - smart production techniques are key inhibitors.

"Smart" technique to agricultural production has being the point of discourse since the beginning of the millennium in order to promote efficiency and productivity in Agricultural practice (Food and Agriculture Organisation [FAO], 2013; Aldosari et al., 2017; Liao, Wang, Li, & Weyman-jones, 2016; Salampasis & Theodoridis, 2013; Zhang, Wang, & Duan, 2016).

Ochieng, Juma and Jakinda (2014) study finds that positive and significant contribution of farm land size and information and communication technology (ICT) on the use of inputs (seeds, fertilizers and labour productivity) has an indirect impact on Agricultural productivity in Kenya. Findings revealed that radio/ICT assisted in the dissemination of agricultural information to smallholder farmers in sub-Saharan Africa and thereby increasing productivity (Hudson et al. 2017). Most of the studies on agricultural production as it relates to land accessibility and ICTs in South Africa were conducted from macroeconomic perspective and the few ones from microeconomic perspective viewed food production from the demand side - food security. These studies evaluated the impact of ICT on agricultural production without the disaggregation of impacts of ICT gargets. In this study, household - microeconomic analysis impact of land accessibility and ICTs - dissagregated on agricultural production is conducted from the supply-side. This study investigates the impact of land accessibility and ICTs on agricultural production in South Africa.

2. LITERATURE REVIEW

The importance of technology ICT to productivity/growth is clearly shown in the theory of innovation and endogenous growth theory (Schumpeter, 1942; Solow & Swam, 1956). Information services provide data that are tied to helping farmers improve their productivity, yields and profitability during the course of their normal business of growing agricultural produce. Information services are one of the most common ICT-related categories for inclusive agricultural value chains (Hudson et al. 2017; Mafizur et al. 2017; Ali & Kumar 2011). They are broken down into sub-categories of information services that involve short-term and long-term productivity enhancements; those that minimize the negative effects of crisis events, for example, by informing on how to protect crops from freezing weather in the short term; and those that improve field-based risk management, for example, by guiding the implementation of crop rotation to preserve the soil in the long term (FAO, 2013).

Food sufficiency - availability in South Africa is not challenging but food accessibility and utilisation have been perennial challenges in the country due to a high level of poverty, income, employment and social inequality (Grobler, 2014; 2015). It is argued that high level of poverty is largely caused by a deficiency of appropriate skills and manpower by the nationals. This study will be streamlined to household food production which will enhance food accessibility that has been a challenge due to a low level of real income of the household but if the household is involved in the direct production of the food, the problem of accessibility can be taken care of. With access to information and communication technology (ICT), agricultural activities can be promoted and made easier since ICT promotes productivity.

Fu, Mohnen, and Zanello (2018) in their study employed firm-level approach to impact of technological innovation on labour productivity in Ghana and Crepon-Duguet-Mairesse (CDM) structural model techniques were used for estimation. The study identifies positive impacts of technological innovation on labour productivity in formal and informal firms but the role of technological innovation overshadowed the managerial innovation and greater in formal firm. With technologies, transition from traditional society - extractive (agricultural) society to high mass consumption state - industrialisation is highly possible since innovation drives efficiency and ICTs ensure the smooth transformation process (Rostow, 1960). The emergence of adequate ICTs in relation to productivity, promotes optimal agricultural value chain and agricultural produce wastes are reduced to the production efficient level. Zhang, Wang and Duan (2016) assert that with continual emergence of ICT, agricultural production has transformed from traditional practice to modern practice in China. The deployment of ICT gargets for dissemination of information to farmers have aided productivity and efficient produce distribution. The study used exploratory techniques to evaluate the impact of ICTs - telephony, short message service (SMS), internet and social media on effective information dissemination to farmers in rural and urban areas in order to increase agricultural production.

Studies in the field of ICT and productivity have driven a new technological revolution that has modified not only the ways of doing business - food production but also the way to perform daily household activities. Due to its widespread applications, ICT has been classified as a General Purpose Technology (GPT) like other capital required for production (Jovanovic & Rousseau, 2005). ICT has attributes considerable of technological progress, a pervasive use in a wide range of economic sectors, as well as by the ability to boost complementary innovations and to generate spillover effects (Solow

& Swam, 1956; Romer, 1990; Bresnahan & Trajtenberg, 1995; Lipsey et al. 2005; Aldosari et al., 2017). These characteristics have produced positive productivity effects throughout the economy (Jovanovic & Rousseau, 2005; O'Mahony & Vecchi, 2005; Venturini, 2009; David, 2013). ICT is now recognised as an important determinant of productivity growth especially if coupled with investments in other intangible assets such as R&D, organizational and human capital (Brynjolfsson & Hitt, 2000; Brynjolfsson & Hitt, 2003).

The direct impact of ICT on agricultural productivity is well documented, it is still unclear whether ICT generates positive spillovers as the empirical evidence so far has been rather weak and inconclusive. While some studies find significant effects (van Leeuwen & van der Wiel 2003; Severgnini, 2011; Venturini, 2011), others strongly reject the existence of spillovers (Stiroh, 2002; Acharya & Basu, 2010; Haskel & Wallis, 2010; Van Reenen et al., 2010, Moshiri & Simpson, 2011). This mixed set of results has lead researchers to doubt the importance of the GPT effects related to ICT (Draca et al. 2007) and has prevented the formulation of appropriate policies aimed to facilitate the absorption and diffusion of new technologies to promote agricultural productivity in South Africa.

The majority of studies that fail to find a positive ICT spillover effect are based on industry or economy-wide data. It is, therefore, possible that the lack of a spillover effect from ICT is the result of an aggregation effect. In this study, household level data are generated to reassess the evidence on ICT spillovers on food production and to understand their role in the South Africa productivity - economic growth.

3. METHODOLOGY
Endogenous growth, innovation and technological theories are the skeletal framework for this study in which the importance of

technology (ICT) is clearly identified as determinant of modern growth and productivity (Solow & Swam, 1956; Schumpeter, 1942). Propositions of these theories spur the inspiration of the models for this study, in which productivity is captured from static model perspective since household microeconomic variables are employed in this study. Technique for estimating the spillover impact of ICT and land accessibility on agricultural productivity in this study lies in the theoretical paradigm of endogenous growth model in which the role of technological progress, labour and capital in productivity are extensively highlighted (Solow & Swam, 1956; Romer, 1990). The theory is developed on the basis of dynamic macroeconomic variables but this study evaluated the same causal-effect relationship with static microeconomic variables. Target variable centered around agricultural productivity at the household level in South Africa. Optimal level of agricultural output depends strictly on optimal mix of factor inputs in relative to factor prices and product market price. To achieve productivity - maximum level of returns to production, static model of optimisation problem is employed with the aid of Hotteling's Lemma approach to profit maximisation.

3.1. Models

The profit maximisation equation may be stated as:

$$Max\pi = pq(w, x) - \upsilon w$$

$$(1)$$

where p is the average price of agricultural produce, q is the aggregate agricultural output level, w is the vector of factor inputs, x is the vector of farmer and farming attributes and v is the vector of agricultural factor inputs price. The return to the household agricultural production is evaluated by profit maximisation approach due to robustness of the included variables. Therefore, the household return on agricultural activities is represented by profit as stated in equation (2)

$$\pi = \pi(r, \upsilon, p, x)$$

$$(2)$$

Application of Hotelling's Lemma to equation (1) with respect to agricultural factor inputs prices and aggregate agricultural output price yields reduced form equations for negative factor input demand and agricultural output supply, equation (3) and equation (4) respectively;

$$d\pi\big/d\upsilon = -w = w(r,\upsilon,p,x)$$
(3)

$$d\pi\big/dp = q = q(r,\upsilon,p,x)$$
(4)

The specifications in equations (3) and (4) show that the decision to engage in agricultural activities depends on agricultural factor inputs price and agricultural outputs price, as well as farmer and farming attributes of households tend to affect household's agricultural production, net returns, demand for factor inputs and output levels in South Africa. The connotation is further stated in mathematical form in equation (5)

$$agpr = \eta_1 ghc_i + \eta_2 d_i + \xi_i$$
(5)

agpr represents the household agricultural engagement in the last one year and ghc represents the determinants of household agricultural production/activities in the last one year which is categorised into farmers, farming and assets characteristics. The farmers characteristics are the demographic attributes of the household involved in agriculture; age of household head, gender of household head, education level of household head, household size, location etc. Farming characteristics are the direct implements/tools required for agricultural activities; loan, grant, support (agriculture extension program) etc. Asset characteristics are other properties owned by the farmers/households that facilitate agricultural production; access to

land, ICTs equipments for communication and research etc . Mafizur
et al. (2017) and Ochieng et al. (2014) model and indicators on
agricultural production and ICT in their study form the rationale for
variable measurement in this study with modification. Mafizur et al.
(2017) employed macroeconomic variables but in this study
microeconomic variables are used in order to capture the impact
analysis at the household level. In this regard, Ochieng et al. (2014)
conducted the impact analysis of ICT program on productivity with
the aid of microeconomic variables in Kenya. The household survey
data are categorical in nature, applying ordinary least square (OLS)
will yield bias estimation, so logistic regression through maximum
likelihood technique is one of the sufficient method of estimating
categorical data.

Since, the rationale for this study lies in the impact evaluation of ICTs
use by household in agricultural production, in which if household
engages in agricultural activities; the probability is one and if
otherwise zero. Then, stating (5) in probability form yields (6)

$$P_{ri} = E\left(agpr_i = \frac{1}{f_i} \right)$$

$$(6)$$

Where f_i is the vector of ghc_i (farmers, farming and assets
characteristics of the household) and d_i denotes the dummy variables.

f_i implies that probability of an household engaging in agricultural
production; 1, but if otherwise not engaging in agricultural
production; 0. The vector of farmers' attributes in this study are
gender, age and household size; vector of farming characteristics are
land and labour, and vector of assets are telephone, cellular and
internet.

The outcome of logistic regression are in ratio form which is
represented as a relative exponential function.

$$e^{f_i} = e^{\eta_1 ghc_i + \eta_2 d_i + \xi_i}$$

$$(7)$$

substituting (7) in (6);

$$P_{ri} = E\left(agpr_i = 1/f_i\right) = \frac{1}{e^{\eta_1 ghc_i + \eta_2 d_i + \xi_i}}$$
(8)

Assuming $Z_i = \eta_1 ghc_i + \eta_2 d_i + \xi_i$
(9)

Thus, $P_{ri} = \dfrac{1}{1 + e^{-Z_i}} = \dfrac{e^{Z_i}}{1 + e^{Z_i}}$
(10)

The equation (10) represents the cumulative logistic distribution function, where P_{ri} ranges from 0 and1 and Z_i ranges from $-\infty$ to $+\infty$.

If P_{ri}, is the probability of household engaging agricultural activities, then $(1 - P_{ri})$ is the probability of household not engaging in agricultural activities. It is mathematically stated as:

$$(1 - P_{ri}) = 1 - \frac{e^{Z_i}}{1 + e^{Z_i}}$$
(11)

$$1 - P_{ri} = \frac{1}{1 + e^{Z_i}}$$
(12)

The odd ratio of household agricultural production in South Africa is (10) divided by (12)

$$\frac{P_{ri}}{1 - P_{ri}} = \frac{e^{Z_i}}{1 + e^{Z_i}} \Bigg/ \frac{1}{1 + e^{Z_i}}$$
(13)

$$\frac{P_{ri}}{1 - P_{ri}} = e^{Z_i}$$
(14)

Taking the natural log of (14) to obtain the liner probability equation
for estimating household agricultural production:

$$L_i = Ln\left(\frac{P_{ri}}{1-P_{ri}}\right) = Ln\left(e^{Z_i}\right)$$
$$(15)$$

$$L_i = Z_i$$
$$(16)$$

Thus,

$$L_i = \eta_1 ghc_i + \eta_2 d_i + \xi_i$$
$$(17)$$

We estimate the probability effect of vector of farmers' attributes
(gender, age and household size), vector of farming characteristics
(land and labour) and vector of household assets (telephone, cellular
and internet) on household agricultural production with (17).
Therefore, equation (17) is a binary logistic equation in which
maximum likelihood techniques of estimation are applied since OLS
will yield bias estimates due to categorical nature of the target
variable, household agricultural production. Thus, the summary of the
dataset in this study are presented in table 1.

Table 1: Summary of dataset

Variable	Variable definition	Measurement in the questionnaire	Code of categorical set	Source
agricultural production	Household agricultural activities	Has the household been involved in the production of any kind of food or agricultural products during the past twelve months? (e.g. livestock, crops, poultry, food gardening, forestry, fish, etc.)	1 = Yes 0 = No	StatSA Survey, 2016
gender	Sex of household head	Is ...... a male or a female?	1 = Male 2 = Female	StatSA Survey, 2016
age	Age of household head	What is …..'s date of birth and age in completed years?	-	StatSA Survey, 2016
household size	Household size	Total number of persons in household	-	StatSA Survey, 2016
land	Size of the land that the household use	Approximately how big is the land that the household use for production? Estimate total area if more than one piece.	1 = Less than 500m^2 (approximately one soccer field) 2 = 500m^2 to 9 999m^2 (between one soccer field and one hectare) 3 = 1 but less than 2 hectares 4 = 2 but less than 5 hectares 5 = 5 but less than 10 hectares 6 = 10 but less than 20 hectares	StatSA Survey, 2016

			7 = 20 or more hectares 8 = Do not know	
telephone	Land/CDMA telephone	Does this household have a functional/working landline telephone in the dwelling?	1 = Yes 2 = No	StatSA Survey, 2016
cellular	Mobile telephone	Is there a functional/working cellular telephone available within this household?	1 = Yes 2 = No	StatSA Survey, 2016
internet	Internet connection in the household	Internet connection in the household	1 = Yes 2 = No	StatSA Survey, 2016
labour	Member of household engaging in agricultural activities	How many household members, aged 15 years or older, were involved in these agricultural activities, even if only once in a while?	-	StatSA Survey, 2016

Note: - open-end response

4. RESULTS AND ANALYSIS

The respondents' characteristics are categorised to farmer's attributes, farming characteristics and household assets in this study. The results show that 80.1 percent of the respondents (households) are not involved in agricultural activities while only 19.5 percent of the households are partaking in agricultural activities in South Africa. This results evident that about 20 percent of the households are involved in agricultural production in South Africa. Distribution of the household heads by gender shows that 58.3 percent of the respondents are male while only 41.7 percent are female household head. Age distribution of the household heads revealed that the average age of the household head is approximately 48 year with the

upper age limit to be 58 year and lower age limit to be 35 year. The
median age of the household head is 46 year which is close to the
mean age. The household size of the respondents show that 23 percent
of the respondents are stand alone family size with one family
member; 19 percent with two family member; 16 percent with three
family member; 15 percent with four family member; 10 percent with
five family member; 6 percent with 6 family member and 9 percent
with more than 6 family member in South Africa.

Table 2: Respondents' characteristics results and analysis

Farmer (household) attributes		Farming characteristics		Assets	
Variable	Percent	Variable	Percent	Variable	Percent
Household agricultural activities		**Size of the land that the household use**		**Land/CDMA telephone**	
Yes	19.5	Less than 500 m^2	13.3	Yes	10.0
No	80.1	500 m^2 to 9 999 m^2	1.3	No	89.2
Sex of household head		1 but less than 2 hectares	0.2	**Mobile telephone**	
Male	58.3	2 but less than 5 hectares	0.1	Yes	95.8
Female	41.7	5 but less than 10 hectares	0.1	No	4.1
Age of household head		10 but less than 20 hectares	0.0	**Internet connection in the household**	
Mean	47.55*	20 or more hectares	0.1	Yes	8.0
Standard Deviation	15.75*	**Member of household engaging in agricultural activities**		No	91.7
Percentile 25	35.00*	1	8.8		
Percentile	46.00*	2	5.4		

50 Percentile 75	58.00*	3	2.1	
Household size		4	0.9	
1	22.8	5	0.3	
2	19.4	6	0.1	
3	16.2			
4	14.9			
5	10.3			
6	6.4			
7	3.8			
8	2.4			
9	1.4			
10	1.4			

Source: Authors' computation, 2018
Note: unspecified and not applicable responses are not reported, * not in percent

The farming attributes of the respondents are captured access to farming land and number of family members used for farming. The results show that 13 percent of the respondents use less than 500 m2 (approximately one soccer field) for agricultural production and 1 percent of the respondents use 500 m2 to 9,999 m^2 (between one soccer field and one hectare) for agricultural production. And less than one percent of the respondents use 1 but less than 2 hectares, 2 but less than 5 hectares, 5 but less than 10 hectares, 10 but less than 20 hectares and 20 or more hectares for agricultural production in South Africa.

The assets of the household as they impact on the agricultural production are captured from the perspective of the information and communication technology [ICT] (land/CDMA telephone, mobile telephone and internet connection in the household). The results show that 10 percent of the households have access to land/CDMA telephone but 89 percent do not have access to land/CDMA telephone. The study further shows that 96 percent of the household have access to mobile telephone and only 4 percent of the households

do not have access to mobile telephone. And, 92 percent of the respondents have internet connection in the household but 8 percent do not have access to internet connection in the household in South Africa.

Table 3: Binary logit estimates for household agricultural production in South Africa

Variable	Coefficient	Wald statistic	p – value	Odds ratio
Constant	11.798	117.364	0.000	132994.842
gender	0.014	0.011	0.915	1.014
age	0.032***	56.045	0.000	1.032
household size	0.118***	25.080	0.000	1.125
land	-0.122***	121.524	0.000	0.886
telephone	-0.037	0.152	0.696	0.963
cellular	-0.116	0.185	0.667	0.890
internet	0.340***	12.769	0.000	1.404
labour	-0.091***	1234.053	0.000	0.913

N = 21,601,   Nagelkerke R^2= 0.928 , $\chi2$ = 18847.457*** (0.000)

Source: Authors' computation, 2018
Note: "*", "**" and "*" indicate at least significant at 1 percent, 5 percent and 10 percent level.**
Reference category: Yes

The empirical results show that gender (sex of household head), age (age of household head), household size and internet (internet connection in the household) are directly related to household agricultural activities in South Africa. The coefficients of land (size of land use for farming by household), telephone (land/CDMA telephone use by household), cellular (mobile telephone use by household) and labour (member of household engaging in agricultural activities) are inversely related to household agricultural production in South Africa. These results imply that sex of household head, age of household head, household size and internet connection in the household have positive impact on household agricultural production

in South Africa. Whilst size of land use for farming by household, land/CDMA telephone use by household, mobile telephone use by household and member of household engaging in agricultural activities have negative impact on household agricultural production in South Africa.

The Wald test revealed that age of household head, household size, size of land use for farming by household, internet connection in the household and member of household engaging in agricultural activities are statistically significant to household agricultural production at 1 percent significance level. But, sex of household head, land/CDMA telephone use by household and mobile telephone use by household are statistically insignificant to household agricultural production at least at 10 percent significance level. The assertions of the wald tests are further validated by the odds ratio of the predictors (sex of household head, age of household head, household size, size of the land that the household use, land/CDMA telephone, mobile telephone, internet connection in the household and member of household engaging in agricultural activities) and as it shows the proportion of their contributions to household agricultural production in South Africa. The results show that sex of household head, age of household head, household size and internet connection in the household have the potential of contributing more proportionately to household agricultural production. The return to scale of production for sex of household head, age of household head, household size and internet connection in the household are higher. Whilst proportionate contributions of land that the household use, land/CDMA telephone, mobile telephone and member of household engaging in agricultural activities to household production are less in South Africa.

Coefficient of variation of the predictors is evaluated using Nagelkerke R square coefficient and the result suggested that sex of household head, age of household head, household size, size of the

land that the household use, land/CDMA telephone, mobile telephone, internet connection in the household and member of household engaging in agricultural activities caused 92.8 variations in household agricultural production but inexact components are responsible for 7.2 percent variations in household agricultural production in South Africa. The overall significance of the predictors to household agricultural production is determined through chi-square test and the result shows that the predictors (sex of household head, age of household head, household size, size of the land that the household use, land/CDMA telephone, mobile telephone, internet connection in the household and member of household engaging in agricultural activities) are jointly significant to household agricultural production at 1 percent significance level in South Africa.

5. CONCLUSION AND RECOMMENDATIONS

The internet connection in the household is the only ICTs proxies that aligned with a priori expectation and this may be due to the importance of internet access to research and development that can spur household agricultural production in South Africa. The study shows that size of the land that the household use for agricultural production currently is significant but has negative relationship with household agricultural production which partially negate the a priori expectation. Land shows some level of statistical significance to agricultural production in South Africa but access to land for farming may be one of the limitations to household involvement in agricultural activities. As a result of these assertions, this study recommends that:

1.   The telecommunication operators should ensure access to internet facilities in the   household by making   internet connection cheaper on the mobile telephone since more   than   90 percent of the households are using mobile telecommunication. Also,   encouraging households to use internet enabled telephones

such as smart phones. Having   access to internet in the household will encourage further research in agriculture that   enhance productivity.

2.   Government should make land accessible for agricultural production. This will encourage   households to engage in agricultural activities and may serve as a source of employment   and wealth creation, thereby reducing unemployment rate.

3.   There should be a policy to encourage people above 58 years to relocate to the rural areas where they   can   easily   practice agriculture since they would have gain wide range of   experience and they getting closer to retirement age, thus eventually retired to   agricultural practice.

4.   There should be programs subsidizing farm implements so that modern tools can be   access for agricultural production and thereby enhancing productivity.

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AN ASSESSMENT OF THE VALUE OF PMI AND MANUFACTURING SECTOR GROWTH IN PREDICTING OVERALL ECONOMIC OUTPUT (GDP) IN SOUTH AFRICA

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-Abstract-

Macroeconomic indexes are useful tools in forecasting long and short-run changes in the economy. The purpose of this study is to assess the usefulness of the Purchasing Managers' Index (PMI), and changes in the manufacturing sector as predictors of economic output. This study is quantitative in nature and employed an ARDL econometric model, vector error correction (VEC) and Granger causality approaches to determine the short and long-run relationships amongst the variables. The ARDL method was used as the variables had a mixture of stationarity at levels I(0) and first difference I(1). The model used economic output measured as GDP, as the dependent variable, while PMI, output in the manufacturing sector and CPI (used as the control variable) were the independent variables. Quarterly data sets were obtained from Statistics South Africa and the Bureau of Economic Research (BER) for the period 2000 to 2017. Findings of the ARDL estimation revealed that the variables cointegrate in the long run and changes in manufacturing output had the highest impact on long-run economic growth of the three variables. In the short run, all independent variables had a significant impact on economic growth. The main findings from the Granger causality tests indicate that bi-directional causality exists between both PMI and GDP as well as between PMI and manufacturing output. Additionally, bi-directional causality was found between GDP and manufacturing, while CPI just causes manufacturing changes. The implications of the research is the confirmation of the importance of PMI, CPI and output of the manufacturing sector as indicators for changes in overall economic activity on a macro level.

Key Words: ARDL, Economic output, MPI, South Africa.
JEL Classification: C32, E37

1.   INTRODUCTION

Macro-economic indexes such as the Purchasing Managers Index (PMI) and the Consumer Price Index (CPI) are linked to boom and bust business cycles. Periods of economic expansion lead to a rise in employment and increases in demand for commodities. This rise in general economic activities could lead to skills shortages and supply-chain problems. This situation usually results in excessive demand and supply shortages, leading to price increases and inflation due to higher production costs and demand (IHS Markit, 2017). Globally, PMI is recognised as the earliest leading indicator of possible changes in an economy (Tsuchiya, 2012). PMI surveys have been developed to analyse sections of the above-listed process and allow for analysis of economic growth patterns where data are available at the beginning of every month, in advance of most other macro-economic data sets. According to Khundrakpam and George (2013), PMIs are used by many central banks to analyse overall economic activities relating to strength and direction.

PMI is globally considered a leading indicator of economic activity and could be used as a forecaster of movements in GDP, inflation and especially manufacturing activity (Lindsey & Pavur, 2005; Tsuchiya, 2012). It should however be noted that the strength of PMI, as a leading indicator of economic activity, has in recent years lost some of its strength due to the diminishing role of manufacturing in the global economy (Barnes, 2017). According to Barnes (2017), PMI is however significant as most recessions of boom periods still start in the manufacturing sector. The main objective of the study is to determine the prediction value of PMI, and output in the manufacturing sector regarding total economic output measured as GDP. PMI is the main focus of the analysis with CPI only used as a control variable. The study uses secondary time series data and is founded on quantitative data in South Africa from 2000 to 2017. The study layout firstly includes a literature review, which consists of an analysis of definitions and concepts and an empirical review of quantitative results of previous studies; secondly, the research methodology is explained with the associated results and findings. Lastly, recommendations are made with some concluding remarks.

2.   REVIEW OF LITERATURE

PMI is defined as a composite index that measures activity and growth in the manufacturing sector and also indirectly the total economy of a country (Chien & Morris, 2016). In addition, Aprigliano (2011) states that PMI provides timely information on the spread of improvement or deterioration of business conditions

without the measurement of the extent of the change. According to Joseph, Larrain and Turnerc (2011), PMI is a user-friendly and subjective survey to determine the state of the manufacturing sector in a region. It is a composite index which is compiled through surveys of purchasing and supply conditions of manufacturing firms in a country or region (Khundrakpam & George, 2013). The survey also indicates if manufacturing input and output costs have changed from quarter to quarter. It is a leading indicator of economic activity due to the fact that purchasing managers are surveyed on their purchase and productions conditions and decisions (Khundrakpam & George, 2013; Pelaez, 2003).

Although the use of the PMI has some drawbacks, such as the fact that it does not capture the intensity of changes or take into account the size of firms, it is an important measurement tool (Harris, 1991; Koenig, 2002; Lahiri & Monokroussos, 2012). According to Barnes (2017), purchasing managers in the monthly survey have to indicate in their response if conditions are better (increase), the same (unchanged) or getting worse (decreased). The PMI is a score between 0 and 100. For example, a PMI of 50 indicates that an equal number of managers indicated that conditions are better compared to getting worse. A PMI of 50 and above therefore indicates possible expansion of specifically the manufacturing sector and a value of 42 indicates GDP expansion (Koenig, 2002). In SA, the PMI is compiled by the BER on a monthly frequency based on the principles as used by the Institute of Supply Management (ISM) in the US. PMI consists of a number of components: production, new orders, employment, supplier deliveries and inventories (stock). The first surveys were completed in September 1999 (BER, 2015). PMI's strengths of a leading indicator are the freshness of its data, the power to explain and understand other indicators better, showing trends in changes and its' ability to analyse supply in the commodity sectors (Barnes, 2017). Weaknesses of the index are its subjectivity and that it just addresses the manufacturing sector (Barnes, 2017). PMI with its base as the manufacturing sector is a strong leading indicator for the broader economy due to its linkages to the primary and tertiary sectors of the economy and indicates cyclic changes.

In terms of empirical results from previous studies which analysed the relationships between the variables, the following results are presented from major world economies. PMI originated in the US; therefore results from the largest economy in the world are listed first. Concerning the US economy, Koenig (2002) tested the relationship regarding PMI, manufacturing performance and

GDP changes for the period 1948 to 2002. He found that a 1 point increase in PMI leads to a 1.54 point increase in manufacturing output, but only a 0.70 increase in subsequent quarters. He confirmed the threshold index of 50 for expansion of the sector. Subsequently, he also found a similar, but slightly weaker relationship between the PMI and GDP in the US. A 1 point increase in PMI leads to an increase of 0.57 in GDP and 0.28 in subsequent quarters. He confirmed a critical value of 41 for GDP expansion and concluded that PMI is at least a strong and reliable indicator of conditions of the manufacturing sector. Tsuchiya (2012) tested the relationship between PMI, the manufacturing sector and the overall US economy for the period 1991 to 2010. It was found that PMI was a significant predictor for manufacturing, but was not a significant predictor for change in the direction of GDP, possibly due to the declining share of manufacturing in the total economy. Banerjee and Marcellino (2006) also tested the relationship between PMI, inflation and GDP growth in the US and found a significant relationship between indicators. Koenig (2002) in his investigation of PMI and its predictability towards the manufacturing sector and overall GDP growth in the US, found that a PMI value of 47 indicated expansion of the manufacturing sector, while a value of 40 indicated GDP growth. A value of 52.5 indicated an increase in interest rates.

Chien and Morris (2016) found that PMI and GDP in the US and China were closely correlated with coefficients of 0.75 and 0.73 respectively and an index of 50 or more indicated positive GDP growth. According to Chin (2017), PMI in China is used with success and is seen as an early indication of the outlook for the manufacturing sector. In a study by Aprigliano (2011) in Italy from 1997 to 2010 in an econometric model, it was found that PMI has a significant relationship with manufacturing output and with GDP growth with the 50-threshold rule applicable. In India, for the period 2005 to 2012, using an ARDL econometric method, it was found that PMI was a significant predictor of inflation and economic activities and especially of manufacturing growth (Khundrakpam & George, 2013).

3.   METHODOLOGY

This study assesses the value of PMI, and examines whether changes in the manufacturing sector's output and CPI are useful in predicting overall economic output in the South African economy. To achieve this objective, time series data from the first quarter of 2000 to the last quarter of 2017 is employed. This data was acquired from the South African Reserve Bank (SARB) and the Bureau of Economic Research (BER). The study uses data from 2000 because the

compilation of the PMI started at the end of 1999. The general discussion follows the following estimated model represented by Equation (1):

$$GDP_t = f(PMI_t, MANU_t, CPI_t)\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots(1)$$

Variables were transformed into natural logarithm form to provide reliable and consistent empirical estimations. Equation (2), following, is the model in the Equation (1) transformed into logarithmic form:

$$LnGDP_t = \beta_0 + \beta_1 LnPMI_t + \beta_2 LnMANU_t + \beta_3 LnCPI_t\ u_t\dots\dots\dots(2)$$

In the Equation 2, $LnGDP_t$ is the natural logarithm of economic output (GDP) at the time t, $LnMANU$ is the natural logarithm total output in the manufacturing sector, $LnCPI_t$ is the natural logarithm of consumer price index (CPI) at time t, and u_t is the stochastic error term. In the econometric contest, two or more series are cointegrated if they have a long-run relationship (Brooks, 2008). Various approaches, in the econometric field, can be employed to determine whether time series cointegrate or not. Some of those approaches comprise Engle and Granger (1987) cointegration model, Phillips-Ouliaris's (1990) cointegration test, Johansen's (1991) maximum eigenvalue test, error correction model (ECM)-based F-test of Boswijk (1994), the ECM-based *t*-test of Banerjee, Dolado and Mestre (1998); and Bayer and Hanck's (2013) combined cointegration test. All of these mentioned tests require variables or series under consideration to have the same order of integration. The current study applied the ARDL bound test introduced by Pesaran, Shin and Smith (2001) to examine the long-run relationship amongst variables. The ARDL approach is known to be more flexible as it can analyse the long-run relationship among variables that possess different order of integration, thus, a mixture of I(0) and I(1) variables. Applying the ARDL Bounds test in ECM, it is not restricted to the number of lags, as well as a different number of lags can be included in the model and each variable can have its optimum number of lags (Laurenceson & Chai, 2003). Additionally, the ARDL model provides a better result than other models when applied on a small simple data set (Haug, 2002; Narayan, 2005). The ARDL approach also estimates the short and long-run simultaneously. Nonetheless, while applying the ARDL approach, the researcher has to ensure that none of the variables is I(2). In this regard, the ARDL approach is the most suitable for this study because the series under consideration are I(0) and I(1). To determine the long-run relationship amongst variables, the following model is estimated (Equation (3)):

$$\Delta LnGDP_t = \alpha_0 + \sum_{i=1}^{k} \alpha_{1i} \Delta LnGDP_{t-i} + \sum_{i=0}^{k} \alpha_{2i} \Delta LnCPI_{t-i} + \sum_{i=0}^{k} \alpha_{3i} \Delta LnPMI_{t-i} + \sum_{i=0}^{k} \alpha_{4i} \Delta LnMANU_{t-i} + \beta_1 LnGDP_{t-1} + \beta_2 LnCPI_{t-1} + \beta_3 LnPMI_{t-1} + \beta_4 LnMANU_{t-1} + e_t \dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots..(3)$$

Where Δ is the first difference operator, α_0 is the component of drift, α_1 to α_4 are short run coefficients, β_1 to β_4 are long run coefficients, and e_t is the residual white noise. To investigate cointegration amongst variables, the Bounds test suggested by Pesaran, Shin & Smith, (2001) is estimated. In this procedure, the F-test is performed. The F-test assists in making decisions about the null hypothesis on no cointegration amongst variables against the alternative hypothesis suggesting the existence of cointegration among variables:

$H_0 : \beta_1 = \beta_2 = \beta_3 = \beta_4 = 0$ (no cointegration)

$H_A : \beta_1 \neq \beta_2 \neq \beta_3 \neq \beta_4 \neq 0$ (cointegration exists)

Pesaran *et al*. (2001) suggested two critical values for the cointegration test. The lower critical bound assumes that variables are integrated of order zero I(0), and the upper bound assumes that variables are integrated of order one I(1). If the calculated F-statistic is greater than the upper bound critical value, the null hypothesis of no cointegration is rejected; meaning that a long-run relationship exists amongst the variables. However, if the F-statistic is lower than the lower critical value, the null hypothesis is not rejected; meaning the absence of a long-run relationship amongst the variables. In the presence of a long-run relationship or cointegration amongst the variables, the unrestricted error correction model (UECM) is performed. Equation (4) displays the ECM pertaining to variables estimated in Equation 3:

$$\Delta LnGDP_t = \alpha_0 + \sum_{i=1}^{k} \alpha_{1i} \Delta LnGDP_{t-i} + \sum_{i=0}^{k} \alpha_{2i} \Delta LnCPI_{t-i} + \sum_{i=0}^{k} \alpha_{3i} \Delta LnPMI_{t-i} + \sum_{i=0}^{k} \alpha_{4i} \Delta LnMAN\_OUT_{t-i} + \varphi EC_{t-1} + u_t \dots\dots\dots\dots\dots.(4)$$

Where φ denotes the speed of adjustment and EC denotes residuals abstained from cointegration estimation in Equation 3. The approaches that have been employed to determine the long-run relationship and its coefficients are additionally tested through some of the diagnostic tests such as serial autocorrelation, normality, heteroscedasticity and the stability tests. The CUSUM test is used for the model stability checks. Furthermore, the robustness of the techniques, as used in determining long and short-run, are employed to justify the study outcome.

4.   RESULTS AND DISCUSSION

Table 1 displays the descriptive state of the preliminary data for analysis. The data for CPI is skewed to the left and also normally distributed, while the rest of the variables are skewed to the left and non-normal. Despite its normality, the data of CPI fluctuates more compared to the rest of the data as its standard deviation is 0.295501. The standard deviations of LnGDP, LnPMI, and LnMANU are 0.154881; 0.091200 and 0.107574, respectively.

Table 1: Descriptive Statistics

	LnGDP	LnPMI	LnMANU	LnCPI
Mean	14.7647	3.9329	12.7560	4.1609
Median	14.8023	3.9412	12.8042	4.1827
Maximum	14.9652	4.0859	12.8766	4.6472
Minimum	14.4717	3.6234	12.5285	3.6523
Std. Dev.	0.1548	0.0912	0.1075	0.2955
Skewness	-0.4770	-1.0766	-0.6533	0.0091
Kurtosis	1.8481	4.9937	1.8950	1.7282
Jarque-Bera	6.7114	25.8357	8.7856	4.8534
Probability	0.0348	0.0002	0.0123	0.0883

Figure 1 and 2 indicate the individual trends of the four variables. It is interesting to note the impact of the financial crises on both the GDP and manufacturing output during 2008 where the manufacturing output was affected more severely and did not fully recover. The PMI trends also reveals a low point from 2007 to 2009, with the lowest value of less than 40. The CPI indicates its negative relationship with the other variables.

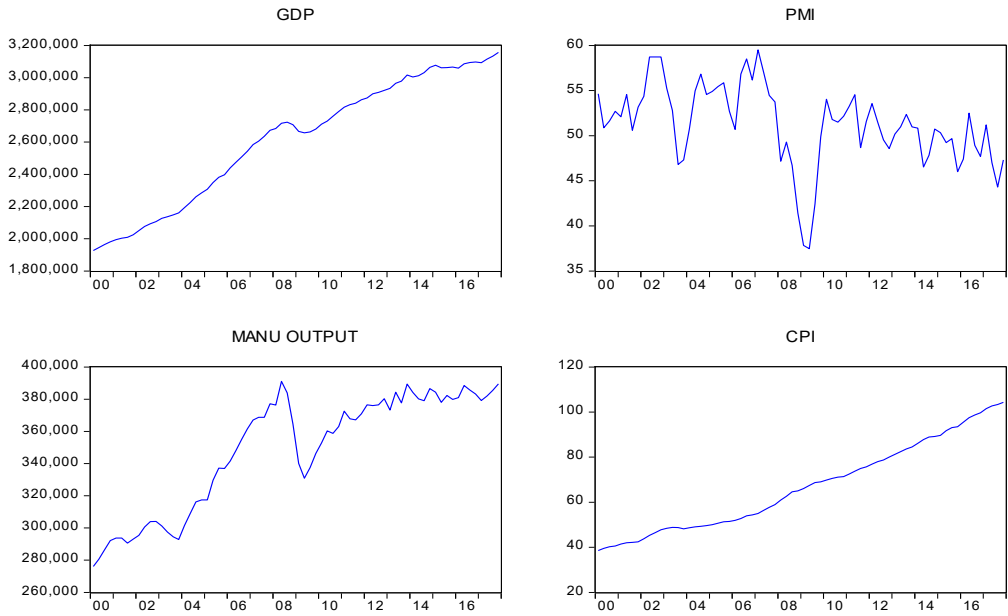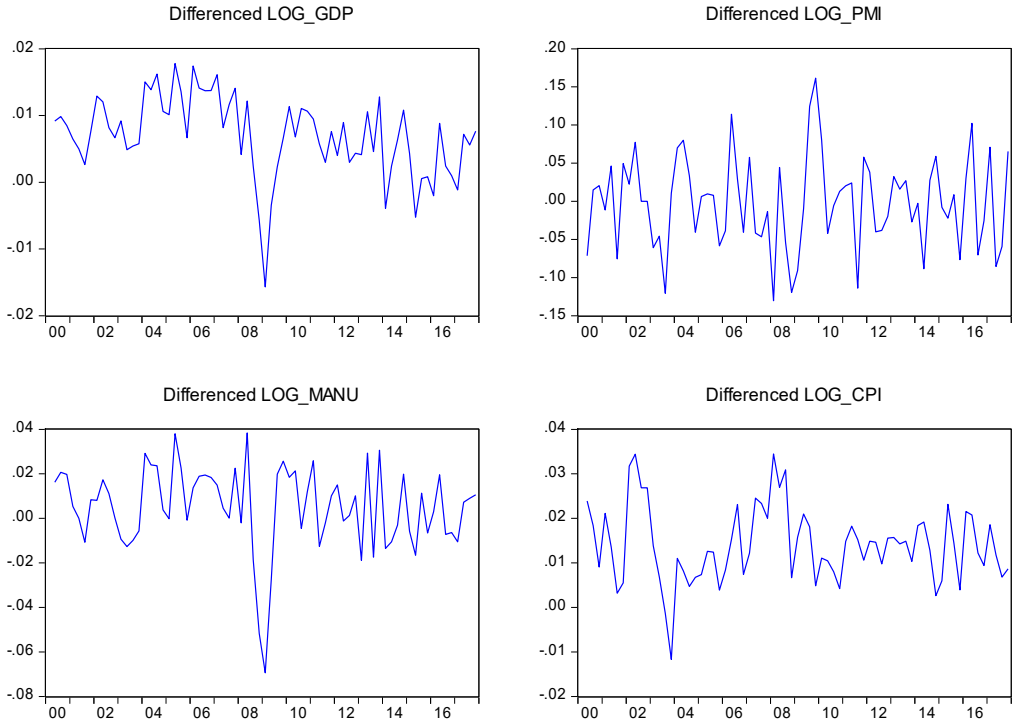### Figure 1: Graphical trends of the variables (original raw data)

Figure 2: Graphical trends of the variables (logged and differenced data)

The first step before the cointegration analysis is to determine the order of integration for variables under the study. For this reason, a unit root test was performed using the Augmented Dickey-Fuller (ADF) test. The test results displayed in Table 2 indicate a mixture of the variables. While LnPMI is stationary at levels [I (0)], other variables are stationary after being first differenced [I (1)]. These results justify why the ARDL Bounds test is the appropriate approach to investigate whether or not variables are cointegrated in this case.

Table 2: Results of ADF unit root tests

Variables	Levels		First Difference	
	Constant	Constant and trend	Constant	Constant and trend
LnGDP	0.2893	0.9449	0.0005*	0.0009*
LnPMI	0.0122*	0.0138*	0.0000*	0.0000*
LnMANU	0.4679	0.3627	0.0000*	0.0000*
LnCPI	0.9149	0.1204	0.0001*	0.0004*

Note: * significance level at 5%

According to Pesaran *et al.* (2001), the ARDL approach assumes that just one cointegration or long-run relationship exists between the dependent and independent variables. To determine this cointegration, the F-statistics is computed and the results are presented in Table 3. The calculated F-statistic is greater than all upper bound critical values, even at 1 percent level. Therefore, a cointegration or long-run relationship exists amongst variables.

Table 3: Results of cointegration and bound testing results for ARDL Model

Test Statistic	Value	K
F-statistic	12.05708	3

Critical Value Bounds

Significance	I0 Bound	I1 Bound
10%	2.72	3.77
5%	3.23	4.35
2.5%	3.69	4.89
1%	4.29	5.61

Source: Author's calculation

The long-run model corresponding to the prediction of the South African economic output based on the three independent variables PMI, the total output in the manufacturing sector and CPI, is presented in Equation (5):

LnGDP = -1.8838 + 0.2681*LnPMI + 0.3878*LnMANU - 0.1907*LnCPI…..(5)

In Equation (5), the elasticity of CPI is - 0.019. If CPI increases by 1 percent, economic output could decline by approximately 0.02 percent, which is not a significant impact. Contrary to the CPI that is negatively related to economic output, a 1 percent increase in PMI leads to 0.27 percent increase in economic output. Similar results were found by Koenig (2002) and by Banerjee and

Marcellino (2006). Economic output could increase by 0.39 percent with a 1 percent increase in the level of total output in the manufacturing sector. Since a long-run relationship between the dependent and independent variables was established, it is important to test whether the dependent variable could also be forecast based on the short-run results. It is also significant to determine the speed of adjustment following shocks in the system. The ECM coefficient -0.0495 is negative and statistically significant. It infers that there is approximately 5 percent of disequilibrium occurring in the system due to various shocks. The results of the ECM presented in Table 4 indicate that in the short run, all three independent variables are significant predictors of GDP, with both PMI and manufacturing output having a positive relationship with GDP. While CPI negatively affects economic growth. Similar results were also confirmed by Tsuchiya (2012) and Lindsay and Pavur (2005).

Table 4: Results of ECM and Short Run relationships

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(LnCPI)	-0.1255	0.0450	-2.7831	0.0072*
D(LnPMI)	0.0171	0.0054	3.1578	0.0024*
D(LnMANU)	0.2221	0.0220	10.0940	0.0000*
CointEq(-1)	-0.0495	0.0044	-11.1456	0.0000*

Note: * significance level at 5%

The Granger causality test is also used to test the short-run and causal relationships amongst all variables. The test results are exhibited in Table 5. The main results indicate that LnPMI has bi-directional causality with both LnGDP and LnMANU, as also found by Lindsay and Pavur (2005), Chien and Morris (2016) and Aprigliano (2011). While a bi-directional causality exists between LnMANU and LnGDP. Lastly LnCPI only causes changes in LnMANU on the short-run.

Table 5: Granger causality results

| Causality direction	p-value
LnMPI causes LnGDP	0.0338*
LnGDP causes LnPMI	0.0090*
LnMPI causes LnMANU	0.0458*
LnMANU causes LnPMI	0.0019*
LnMPI causes LnCPI	0.5649
LnCPI causes LnPMI	0.0857
LnMANU causes LnGDP	0.0016*
LnGDP causes LnMANU	0.0001*
LnGDP causes LnCPI	0.6692
LnCPI causes LnGDP	0.0054
LnMANU causes LnCPI	0.3675
LnCPI causes LnMANU	0.0002*

Note: * significance level at 5%

The results presented in Table 6 validate the reliability of the model. Using the White test, the obtained result affirms that variables are homoscedastic, while the Jarque-Bera test indicates that variables are normally distributed. Finally, the probability value of Ramsey RESET test supports the CUSUM test as indicated in Figure 3, suggesting the stability of the model used in the study.

Table 6: Results of statistical and diagnostic tests for ARDL Model

Test	F-statistics	Probability
Breusch-Godfrey Serial Correlation LM test		
Serial Correlation	0.0666	0.9356
White Heteroscedasticity Test		
Heteroscedasticity	0.3620	0.9001
Jarque-Bera test		
Normality	0.6157	0.7350

Figure 3 displays the graphical representation of the ARDL model stability test by means of the CUSUM test. Since the statistical plots remain within the critical bounds at 5 percent significant level, the null hypothesis suggesting that the model is stable, cannot be rejected.

Figure 3: CUSUM stability test

Legend: CUSUM ----- 5% Significance
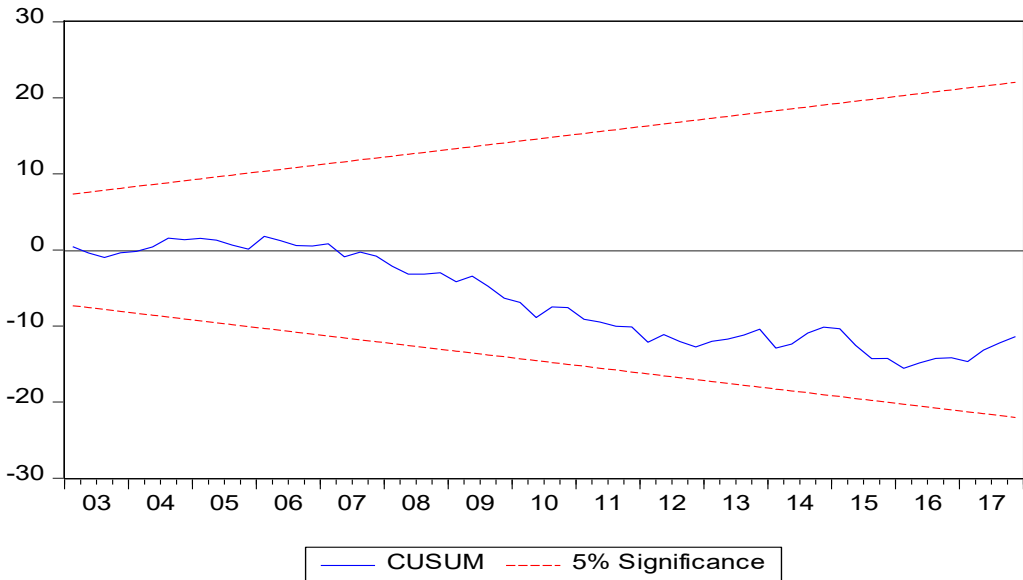
5.   CONCLUSION

The primary objective of the study was to specifically analyse the value of the PMI and output in the manufacturing sector as predictors of GDP output, but also to test causality between all the included variables. Empirical results from the data analysis infer a short and long-run relationship between the variables included in the study: PMI, total output from the manufacturing sector, CPI and economic output (GDP). The total output from the manufacturing sector and PMI were found to have a positive impact on economic output, whilst the increase in CPI leads to a decline in economic output in both short and long-run. In addition to the short-run relationship obtained by estimating the ECM, the Granger causality indicates that changes in PMI and changes in manufacturing output cause short-run movement in economic output. If all three variables (independents) are compared, the output from the manufacturing sector is more likely to influence economic output than other variables. An interesting finding was that CPI has much less of an impact on both manufacturing and GDP output if compared to the PMI and there is no significant relationship between PMI and CPI. This implies that more focus should be placed on increasing the manufacturing sector output, which could lead to overall economic growth and employment creation, which should be the main priority for economic stakeholders and policy makers in South Africa. Future research will focus on adding other relevant variables, such as interest rates to the modelling. Lastly, in making economic decisions, the level of

PMI specifically as a leading indicator should be seen as a key predicator and early warning system for the manufacturing sector and GDP changes on both the short and long-run.

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E-COMMERCE IN TURKEY AND SAP INTEGRATED E-COMMERCE SYSTEM

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ABSTRACT

E-commerce, it is a kind of shopping by use of internet. E-commerce, very different from the usual shopping concept, it is compatible with today's economic dynamics. E-commerce is becoming an indispensable method with the increase of the internet usage. With the use of E-commerce, there are also a number of advantages for companies. On the other hand, SAP is a pioneer and leader in company resource planning software sector. SAP is very important for large-scale companies. They manage all their processes on SAP and its integration is very important with other related software. In this article, we give a brief information in some important aspects about e-commerce and propose a solution for ERP integration of an e-commerce system.

Key Words: E-commerce, E-commerce in Turkey, SAP, E-Commerce SAP Integration.

Jel Codes: L81, L86, M00, M31

1.   INTRODUCTION

According to the definition of many scientific sources, commerce; defined as any kind of trading activity carried out for gain a profit. Commerce or commercial activity is a phenomenon that has emerged with the existence of humanity and has gone through a series of changes until today. These activities have started in the form of exchange of goods in order to meet the needs of people. In time it has developed due to economic and technological changes. Until today, societies have gone through various stages and it is seen that different commercial procedures are used in each stage.

It is accepted that the societies go through three stages such as agricultural society, industrial society and information society. It is seen that this evolutionary development has been passed from hunter-gatherer / nomadic society to agricultural society, then to industrial society and finally from post-industrial society to information society (Bayraktutan, 2004: 48).

In the information society, which is accepted as today's society, goods and services are introduced to consumers through internet sites and televisions. These promotions make it possible for people to buy more than their needs. Thus, consumption habits of individuals are increased and consuming societies are created. Consumers can easily waste goods produced with great efforts. Thus, production processes are developing and it is possible to produce cheaper. In short, a period begins in which today's economic dynamics are controlled by internet portals. However, the rapidly growing and developing shopping sites offer many campaigns to customers. Opportunities such as shopping points or credit card points increase the willingness of individuals to purchase. The amount of shopping made through these sites is increasing day by day. Shopping via the Internet eliminates the popularity of traditional merchandising. It causes the shops which are located in very good places to suffer from the scarcity of sales. With internet sales, costs are reduced and shipments are made directly from the warehouse to the customer.

According to the household information technology usage survey of Turkey Statistical Institute (TÜİK), the rate of computer and internet usage among individuals aged 16-74 was 75.3% shown in Figure 1. Moreover, eight out of every 10 houses have internet access. 34,1% of individuals with access to the Internet do shopping (E-Commerce) via the Internet. Shopping or electronic commerce via the Internet increased by 4,8% compared to just a year ago. It should be seen that this increase, which can be seen as small, actually represents a huge rate increase. The histogram below represents the computer and internet usage rates for the ages 16-74 years between 2008 and 2019 (Source: TÜİK, 2019).
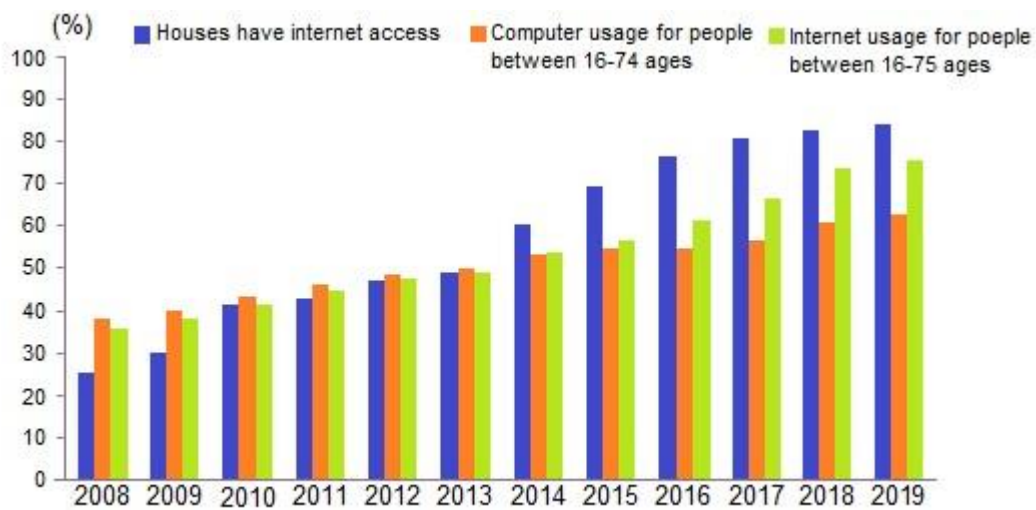
Figure 1. Internet and computer usage statistics in Turkey between 2008 and 2019.

The rapid increase in consumption causes the increase in consumption-dependent production compulsory. Thus, production has become continuous. This dynamic process has led to the production being carried out in a system. Production has to be carried out within the framework of scientific procedures. On the cost side of production, serious optimizations have occurred.

However, consumption based on the capitalist system has shifted with technology over time. It is seen that the internet has become an important tool along with some other factors. Visual media, advertisements, social platforms and sharing networks are the determinants of the increase in consumption (Halis, 2012).

The development and diffusion of e-commerce makes a significant contribution to the development of the logistics transportation sector. E-Commerce contributes to the development of a commercial activity area called E-logistics and the services provided in this area become more serious and institutional (Gülenç & Karagöz, 2008: 78).

Another contribution of e-commerce to national and world economy is to register all trade. Informal economy, which is one of the important problems of developed countries, is completely eliminated and considerable improvements in tax revenues are achieved.

According to the results of the global research company, e-Marketer, the volume of e-commerce is estimated to reach 1 trillion 700 billion dollars in 2015, 2 trillion dollars in 2016, and 2 trillion 500 billion dollars in 2018 (Sabah, 2015).

As we have seen, the share of trade held by the Internet in Turkey and in the world is increasing

every day. As a developing country Turkey is showing remarkable increase in the level of 4% a year of commerce.

These huge changes in the field of trade are called the new economy. New economic relations based on information technologies can be defined as new business opportunities and the reshaping of existing business areas using new communication environments (Baily and Lawrence, 2001: 8).

Turkey has made significant strides in recent years to get a position in the process of the new economy. Turkey's first objective is using and generalizing of information and communication technologies within the country which is one of the basic conditions of the EU membership (Barışık and Yirmibeşcik, 2006).

The economic effects of electronic commerce lead to an acceleration of the transition process from traditional trade understanding to the new economy in the world (Atınok, Sugözü and Çetinkaya, 2007).

2.   E-COMMERCE

There are many different definitions and explanations about E-Commerce. Sometimes these explanations are limited to certain areas of trade. These limitations do not actually conform to the nature of E-Commerce. This is because the definition made by the US-based National Telecommunications and Information Administration is considered to be much more realistic and accurate. According to this agency, E-Commerce is defined as usage of all kinds of electronic technologies for commercial activities in desired form (Isler, 2008: 278). From this perspective, the concept of E-Commerce includes all kinds of shopping activities via the Internet and or any other technological environments. Some of the commercial activities carried out via the Internet are as follows: TV broadband subscription services, mobile phone subscriptions, prepaid phone cards, stock and exchange transactions, banking activities, insurance, hotel accommodation reservations, travel tickets, car rental, sports and cultural activities, education and training, examination services and all other goods.

E-Commerce includes a number of innovations that make life easier for poeple today. For example, banks can make billions of routine banking transactions only through internet banking. It is impossible to make such a large number of transactions through bank branches. There are at least 3 or 5 bills that each family pays with automatic instructions. This has made it very easy for people to make their banking transactions, so people of all ages prefer to do so.

In addition, all operations of our schools, where education and training activities are carried

out, are carried out via the internet in connection with the financial centers. Mission undertaken by the ÖSYM, Turkey's central exam center, is so developed and grown by the internet. Otherwise, it would not be possible to make exams for 20 million people in a year and announce the results within a very short period of time. On the other words, if banking transactions are accepted as a commercial activity for banks, it is not possible to accept other transactions performed under these transactions independently from E-Commerce. Given this situation, it is not possible to define the limits of E-Commerce.

It is necessary to mention the definition made by the Organization for Economic Cooperation and Development (OECD), which is one of the important institutions in the field of E-Commerce. According to OECD, E-Commerce are called transactions that are based on the transmission of digitized data such as written text, voice, and images through open or closed networks with the participation of individuals and institutions (Kalaycı, 2008: 140).

E-Commerce provides a number of advantages for the companies that carry out this activity. These advantages are largely economic advantages. It gives so many advantages such as reducing or eliminating the store rent expenses, personnel expenses, water, electricity, natural gas and a number of other expenses so the input costs of the products can be reduced. Moreover, there is no need to worry about the store location and customer satisfaction from the store staff. The functionality of the designed shopping website and the proper display of the products is sufficient. There are also a number of advantages for the purchaser of the product: Product can be examined more detailed in that web sites and compared with many products in a few minutes and purchased cheaper than classical stores.

If we considering the opportunities offered by the internet and the use of the web sites we can see that E-Commerce enables competition in market. These considerations are due to the elimination of costs through internet technology, the real-time acquisition of market data, and the easy access of accurate information to consumers (Ellison and Ellison, 2005).

The World Trade Organization (WTO) defines E-Commerce as follows: E-Commerce defines the production, advertising, sales and distribution of goods and services through telecommunication networks. According to this definition, which is considered to be very ambitious and different, the trade process has three basic stages (WTO, 1999: 2).

1. Research stage of producers and consumers or buyers and sellers,

2. Making the order and payment,

3. The stage of delivery of goods to the buyer (Kalayci, 2008: 141).

If we consider E-commerce in the framework of the consumer E-Commerce covers searching, finding, ordering, making payments and monitoring the process. On the other hand, if we consider it in the framework of the company, it covers the processes of product promotion, taking orders, collecting fees, sending the products and providing service. (Fidan and Albeni, 2014: 288).

2.1. Types of E-Commerce

E-Commerce is a concept that is changing and expanding its borders in electronic world. This trade, which may be national and international, can be realized in many different ways. Accordingly, E-Commerce types can be found in 6 categories.

1. Business-to-business E-Commerce (B2B),

2. E-Commerce between businesses and consumers (B2C-Business to Consumer),

3. E-Commerce between enterprises and public administration (B2G-Business to Government),

4. E-Commerce between consumers and public administrations (C2G-Consumer to Government),

5. E-Commerce among consumers (C2C-Consumer to Consumer),

6. E-Commerce between States (G2G-Government to Government) (Kalayci, 2008: 142).

The most widely used E-Commerce types are; business to business (B2B), business to consumer (B2C), consumer to consumer (C2C) ((Laudon and Traver, 2010: 17).

2.2   E-Commerce Strategies

E-Commerce has become a strategic trading tool by providing a set of strategic advantages for businesses (Isler, 2008: 284). The main factor that strengthens this strategy is that people prefer to meet in virtual environments instead of meeting face to face. In this context, strategic use is realized within the framework of three elements (Sadowski, 2002: 78).

These three elements;

1. Communication requirements of people,

2. Competition policies of enterprises,

3. Economic and social life needs.

It is unthinkable not to meet these issues which are very important for businesses and people. People who are in danger-free internet environments are shaping their shopping habits as they do not incur additional costs. In addition to the stores in shopping centers, opening virtual stores becomes a strategy for the companies. The shopping behavior of the customers has become a

matter of quality and price balance. Some of the cost independent products are offered to the market at a cheaper price with e-commerce, thus making them the consumer's choice.

Also known as virtual commerce, E-Commerce is a trade area in which the smallest intellectual can realize his thoughts and actions without capital and investment thanks to information technologies (Crimea, 2001: 31). Due to this nature, it is accepted that E-Commerce is a post-modern trade approach (Brown, 1995).

When these qualities of e-commerce are taken into consideration, it is necessary to acknowledge that an easy and effective tool of commerce is encountered and this is an important, valuable and strategic tool.

2.3 Advantages and Disadvantages of E-Commerce

Electronic commerce, which is considered to be one of the most important trading and marketing tools of today, provides many advantages and new business opportunities to visionary firms, and enables consumers to purchase goods and services cheaper and easier. As the Internet and communication opportunities develop, these benefits are constantly evolving and increasing. The advantage of electronic commerce is mainly due to lowering costs related to commercial activities, eliminating geographical limitations and increasing transaction speed (Güleş, Bülbül and Çelebi, 2008: 468).

The advantages of E-Commerce are as follows:

Advantages

• Transactions are fast and instant,

• There are no time barriers to trade. 7/24 continuous operation,

• Profit and cost optimization,

• It is easier to win customers with attractive price opportunities,

• It is possible to find new business partners. In this way, it is possible to establish international partnerships and expand the trade volume,

• Becoming a brand is easier for businesses,

• Supply of raw materials and products is easier and cheaper,

• Trade operations are always recorded, guarantees are real,

• Tax loss and informality disappear,

• Since the supply of goods and services is fast, production and marketing are also fast.

Disadvantages

• It is not possible to convince the customer with the right communication as in the real trade.

• The ideal trade laws required by virtual commerce have not yet been enacted,

• It is possible to be exposed to internet irregularities,

• E-Commerce cannot develop in those who do not use the Internet,

• There is no synergy provided by the shopping and market environment,

• It is not possible to see the product and be informed about the quality of the product,

• Lack of social trade relations,

• Traditionalism is lost.

2.4 Risks in E-commerce

While E-Commerce provides a number of convenience and advantages in the field of commerce, it naturally inherits certain risks. The most important risk of E-Commerce is, of course, security. In addition to security concerns, the fact that shopping via the internet is not adequately secured in the trade laws, virtual sites created by malicious persons, copying credit card information to third parties, not paying the products to the address, products being different from the defined products, product returns and not to be committed to commitments, marketing of used products and similar risks. Based on the existence of all these risks, it is preferable to respect the products of commercial organizations that are confident of their corporate identity and to shop on their sites. Customer reviews about the company and products must be read before shopping through the company portals. It should be noted that customer reviews in particular are a summary of some important experiences.

3.   STORE DYNAMICS

E-Commerce is committed to transforming the foundations of commercial and non-commercial life. (Kalayci, 2008: 140). Retailing in Turkey continues its activities in shopping areas such as traditional trade stores. As a developing economy, competition and product quality are not at the highest levels. In retailing, products of the same quality are marketed with different pricing policies. Therefore, there is a lack of trust due to insufficient protection of consumers' rights. The retail sector, where competition is not at a high level, faces a series of trust problems. The desire of consumers to access the perfect market is considered as a factor enabling E-Commerce

to be accepted.

There are a number of precautions that retailing needs to take in order to avoid this negativity and at least to protect its customer portfolio. For example, the positive and negative effects of the store atmosphere on the employees and customers are within the scope of the research. (See Oğuz and Gürdal, 2017). In addition, even the level of education and age of marketing staff is considered a dynamic in retailing (Yüksekbilgili and Akduman, 2015). All these precautions are necessary and important, but it should be noted that these innovations are cost-increasing factors.

3.1 Risks in E-Commerce

As a matter of fact, this form of trade was accepted as ideal in the first years when E-Commerce entered human life (Bakos, 1998: 35). However, in the following years, this view was taken away and it was accepted that E-Commerce contains some faults (Fidan & Albeni, 2014: 289). Despite all its shortcomings, E-Commerce has become a preferable form of trade in terms of quickly finding and comparing multiple options, comparing products, analyzing prices, and accessing product and store reviews.

Corporate companies have implemented E-Commerce activities together with retailing. Thus, they made their commercial activities alternative. For these companies, shopping activities have stabilized and developed continuously. It is not difficult to predict that there will be a decrease in the sales of the companies which continue their activities by doing only retailing.

In this respect, retailing is traditional but not up to date. Therefore, there are difficulties and cost increases in the supply of raw materials and products. A survey showed that the cost of the product sold in the store increased by 33% until it came to the shelf. (Civelek and Sozer, 3003: 120). This cost increase is very important and is an additional cost that reduces competition in retail.

E-Commerce is a form of commerce that governments want and tries to implement. This is because all commercial transactions are recorded and there is no tax loss. However, it is possible to identify a number of unregistered transactions in shopping from a neighborhood market. It is even possible to come across practices that reduce prices of products and services if a receipt or invoice is not requested in some cases.

As a developing country, Turkey, has to increase tax revenue and record all trading activities. E-Commerce has the dynamics to provide these operations. This is because the trade is made in the form of wire transfers or EFT (Electronic Funds Transfer) through credit cards or banks.

3.2 Advantages and Disadvantages of Retailing

Retailing has a number of advantages that contribute to the development of trade and market phenomena. The basic dynamics that keep the merchandising alive are being traditional, providing a physical environment for the customer, direct communication between the seller and the customer, having a shopping ambience, supporting sales with the advice of the staffs, and having an idea by seeing the goods to be purchased. However, the business of retailing becomes more difficult as customers' alternatives and sources of information increase and diversify (Oğuz & Gürdal, 2017: 42). It is not possible to mention the dynamism of retailing, physical environment and other dynamics in E-Commerce. The advantages and disadvantages identified for retailing are listed as follows:

3.2.1 Advantages of retailing

• Being able to benefit from vendor consultancy,

• Possibility of tasting, testing or seeing according to the nature of the marketed product,

• Bargaining in price,

 • The habit of being at a specific address,

• One-to-one comparison with other brand products.

3.2.2 Disadvantages of retailing

• Having a fixed location,

• Loss of customers due to the negative synergy of vendors,

• The need for continuous renewal of shop design,

• Problems caused by rapid staff change,

• Problems caused by communication problems between employees,

• The intensity of competition and loss of customers resulting from the presence in the alternative stores platform,

• The necessity of movement of goods due to fashion and similar reasons.

4. E-COMMERCE WITH NUMBERS

According to TÜİK data for 2019, some statistical informations about E-Commerce are as follows (TÜİK,2019):

In 2019, the rate of poeple who did not make e-commerce transactions even though they used the internet was 65.9%. The reasons for not shopping online are as follows:

Table 1: Reasons for not use E-Commerce

Reasons	Rate
The desire to see the product and the habit of shopping in the store	81,2
Lack of knowledge and skills	21,0
Problem of delivery of goods	20,3
Privacy and security concerns without paying	44,9
Mistrust in returning the product	27,0
Not have a credit card	16,2
Other	4,0

According to the data of 2019, the proportional distribution of the types of goods and services purchased by customers using the Internet through E-Commerce in the last 12 months can be shown in Table 2.

Table 2: 2019 Types of Goods and Services in E-Commerce for personal use in the last 12 months

TYPES OF GOODS AND SERVICES	RATE
Daily requirements and food	27,4
Household appliances, furniture and other goods	26,9
Medicine	4,1
Clothes and sports equipment	67,2
Computer and hardware	12,1
Mobile phone and other electronic devices	20,3
Telecommunications - services	15,3
Holiday accommodation	14,8
Travel ticket and car rental	31,7
Cinema, theatre, concerts, etc. services	18
Movies, music	9
Books, magazines and newspapers	20,2
E-learning tools	3,3
Games and other software	6,6

The distribution of individuals having problems in purchasing and placing orders during the E-Commerce activity in 2017 is shown in Table 3.

Table 3: Problems in E-Commerce

Problem	Rate
Problem with order or payment	20,1
Failure to obtain information about warranty terms and other	13,6
Late delivery of goods	46,5
Unexpected transaction costs issue	9,8
Wrong or damaged product delivery	49,1
Fraud	15
Problems encountered in complaints and compensation	19,5
The problem of not receiving goods from foreign sites	7,3
Other	1,8

In this context, new companies are organizing their strategies with the principle of "customer-oriented" work. The quality of the companies in terms of service and customer satisfaction is a showcase. In addition, in line with the demands of today's consumers, companies focus on product quality assurance, short lead times and after-sales service.

The primary objective for the companies is to maximize profit. In order to increase the profitability level, it should increase inventory turnover and cash flow control, reduce the changing costs and make its appearance on the financial front more effective. Companies can increase their competitiveness by considering customer-oriented logic and firm's internal balance. Considering today's selective customer portfolio, many companies known as global brands have been able to success about these criterias. Other companies have to keep up with this situation and control their resources in the best way.

ERP software approaches the company with a method based on the production process. ERP integrates all functions in a certain order considering the company's objectives. It is a modern software solution that can be run in many auxiliary systems in order to meet the information and data needs. In this context, ERP system can be seen as a main software system for production, finance, retailing, e-commerce and etc. It has become the name of the information systems infrastructure that supports all corporate processes.

The ERP system, which stands for "Enterprise Resource Planning", has emerged as a result of eliminating the deficiencies in the Material Requirement Planning (MRP) and Manufacturing Resource Planning (MRP-II) systems (Fui-Hoon, F., 2002).

6. SAP

SAP AG is a software company that provides specialized software solutions to companies that are not large-scale in the field of company operations. In addition, SAP AG software enables both small and medium-sized companies operating commercially to operate in an integrated manner, both individually and interacting with each other. Furthermore, in 1972, with the initiative of many analysts, they established the System Analysis and Program Development in Mannheim (Germany). Today, it is possible to say that there are offices in almost every part of the world.

The objective of SAP is to provide support to the senior staff of the company in optimal business solutions in all sectors and especially in large-scale companies. It is also to meet all needs as enterprise resource planning software.

We can examine the development of SAP software, which has developed over the years and made it suitable for today's conditions, as detailed below.

On April 1, 1972, five of IBM's founders founded SAP in Mannheim, Germany. Their goal was to produce and sell standard enterprise software that could integrate all commercial and administration-based applications. In 1977, SAP software developers moved from Mannheim to Walldorf. In 1978 SAP, together with the R/2 software system, took a solid step in the development process. In 1982, in the 10th anniversary of its founding, SAP proved its success by increasing its sales by 48% and exceeding the level of 24 million Deutsche Marks. After 1982, 236 companies, mainly Germany, Austria and Switzerland, continued their activities with SAP software. SAP International was founded in 1984 in Switzerland. In 1985 sales reached 100 million Deutsche Marks. In 1987, the use of SAP application reached 850 companies. SAP released a new sub-software (R/3 system) in 1992. In 1995, Microsoft joined SAP as a R/3 customer. In 1997, different solutions including Customer Relationship Management (CRM) and Supply Chain Management (SCM) were added to the scope. In 1999, Enjoy SAP application aimed to make the learning and use of the software easier. With mySAP.com, it became the leading e-commerce software of the 2000s with its way of working with existing ERP solutions in e-commerce and web technologies. The mySAP strategy later found finally as SAP NetWeaver. SAP NetWeaver has become a highly flexible and compatible application for complete support of production processes. In December 2011, SAP acquired Success Factors, the largest cloud developer (SAP History, 2019).

6.1 SAP Integrated E-commerce

The proposed solution in this article consists of 3 basic layers. All detailed can be seen in Figure 2. These are Main system layer, intermediate database layer and e-commerce system layer. In these three layers, three separate database systems are used. An independent database has been used in the e-commerce system layer due to the difficulties in synchronization between SAP and e-commerce software. The intermediate layer, where the information is temporarily stored prior to importation into SAP ERP, includes the Oracle database. This layer can also include VPN server and Firewall. Another database in which SAP ERP system's own data is kept is Oracle. In this solution, a design can be created by not using the middle layer, which is the second layer, by directly transferring the data received from the e-commerce system to the database used by SAP ERP. However, as a result of the investigations, it was determined that this would cause some problems and an independent database system was added to the design.

The reasons for using the independent intermediate database management system;

• Because the ERP system is alive and in use by the whole company, uncontrolled connection of the client to the system may cause performance problems.

• Since there is no data that can be processed directly from the clients to the system, these data are taken into the intermediate database and processed at any time and taken over the ERP to create a more accurate design.

• Creating records directly in the system means automatic discarding of accounting records. This can lead to incorrect and uncontrolled financial data.

• Even if the SAP ERP system is taken as an open structure, even if all precautions are taken, putting a layer together will reduce the security problems.
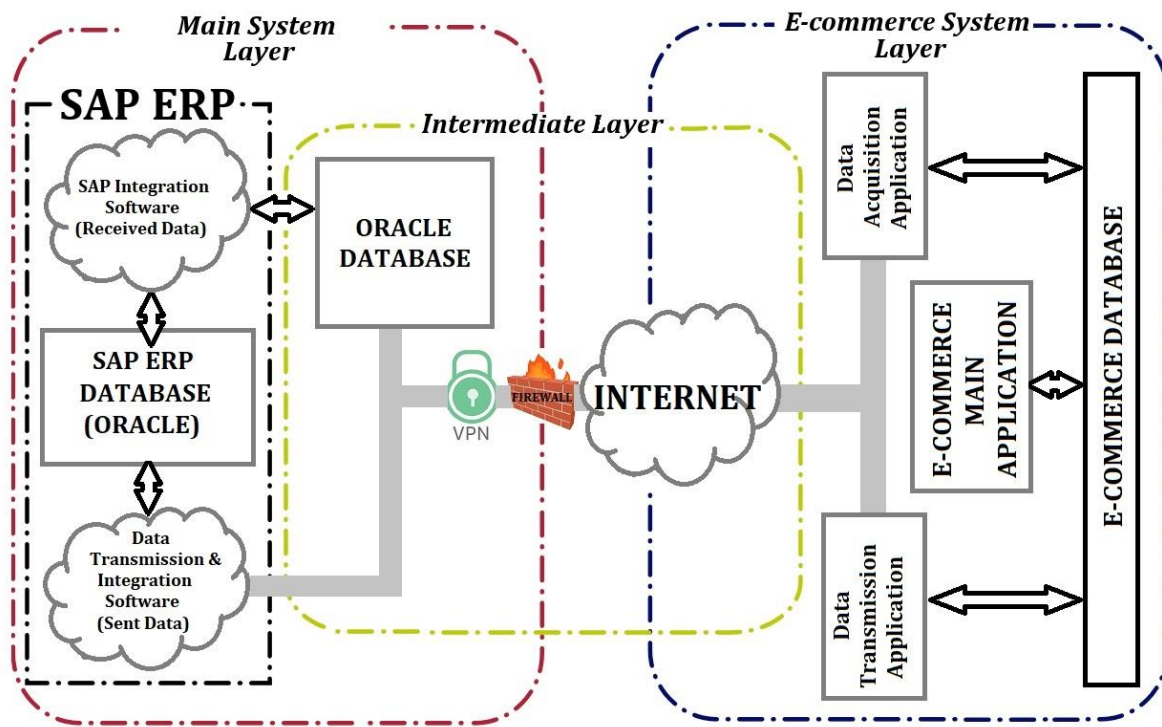

Figure 2. System technical view

6.1.1 Main System Layer

SAP ERP software supports a large number of database management systems. Software can be installed by selecting one of these databases. SAP supports the databases listed below:

- Oracle
- MS SQL Server
- IBM DB2 for Linux, UNIX, and Windows
- SAP live Cache Technology
- SAP MaxDB
- IBM DB2 Universal Database for z/OS
- IBM DB2 Universal Database for iSeries (SAP, 2019)

In our application, Oracle database was used in SAP installation. SAP has restricted direct access

between the database and the user. SAP has two layers between user and database. The first layer is the presentation layer. Users can access this layer. The operations performed here are transmitted to the middle layer which is a sub-layer. The middle layer interprets incoming transaction codes and passes them to the database.

6.1.2 Intermediate Layer

In this study, records created as a result of e-commerce transactions are first kept on the Oracle database which we call intermediate layer and then transferred to SAP. As a result of this transfer, orders, deliveries, invoices and accounting documents are generated for sales on SAP. Since these records are standard SAP processes, all data are generated in SAP standard tables.The SAP Java Connector (SAP JCo) is used to connect to SAP. SAP JCo is a development library that enables a Java application to communicate with on-premise SAP systems via SAP's RFC protocol. It combines an easy-to-use API with unprecedented flexibility and performance (SAP Java Connector, 2019).

A copy of the e-commerce system database is created in the intermediate layer. Thus, the data in the e-commerce system will be provided to the central server. This database will basically keep the sales data and product information that are created in e-commerce system and transferred to ERP system.

6.1.3 E-commerce Layer

This layer enables the e-commerce database to be transferred to central system. Likewise, it transfers product information, prices and other necessary data from the central system layer. In this layer, there are data reception, data transmission programs, e-commerce software and database.

In this layer, the changes made on SAP ERP are reflected in the e-commerce system. For example, product updates, deletions and new product registration are transferred to e-commerce system in this layer.

Unlike the upload application, this layer retrieves data by connecting directly to a function on SAP ERP instead of the using the intermediate database. SAP ERP allows data exchange with several different methods, as well as externally accessible functions. For this operation, a user with remote access and required permissions must be created. Additional packages are required for the connection, which include classes for this user and some connection specific to the programming language used (this connection class is SapJCo because we use Java). All these adjustments have been made on SAP ERP. If the data exchange between the application and the SAP ERP function is multiple, the data structure is performed in the form of series. This data structure will be taken as a table on the Java side and the data in it can be accessed.

7. CONCLUSION

E-Commerce is an increasingly used form of purchasing goods and services in Turkey as in the whole world. It is developing and becoming widespread due to the density of internet usage. Considering the close relationship between e-commerce and information technologies, it is accepted that it is implemented more effectively and accurately in the USA and European countries. Electronic commerce seems to be safer in countries that place trade laws and Internet-connected crimes on legal platforms. It is necessary to accept that the biggest risk to E-Commerce is security-based problems.

According to TÜİK, internet usage rates in Turkey is increasing rapidly. The rate of internet users between the ages of 16-74 has reached 75.3%. 34.1% of these users carry out trading activities through E-Commerce. According to these results, the proportion of individuals between 16-74 who trade in Turkey is 25.6%.

While these changes are taking place on the e-commerce side, a number of problems are experienced in the retailing. In retailing, store rent, dues, water and electricity payments, personnel expenditures and other expenses are factors that increase the price of the goods offered for sale in certain proportions. In this case, customers who are intertwined with technological platforms may have the opportunity to purchase the goods of the same companies through the internet at a much cheaper price. However, it is understood that 81.2% of the consumers who do not prefer to shop through E-Commerce act with the desire and habit of seeing the goods in the store. This is followed by security concerns with a rate of 44.9%. It is understood that customers do not prefer to shop with E-Commerce platforms since they think that he will have difficulty in returning the product at a rate of 27.0%. Other causes can be traced in Table 1.

The types of goods purchased by customers shopping through E-Commerce were as follows: 67.2% of the trade was realized as the purchase and sale of sports equipment. This type of shopping is followed by travel tickets and car rental with 31.7%, Daily requirements and food with %27.4, Household appliances, furniture and other goods with 26.9% and book magazines and stationery products with 20.2%. See Table 2 for other rates. Based on these data, it is necessary to see that sporting goods, white goods and food products take the lead and these sectors are essentially merchandising products.

While E-Commerce incorporates a series of developments, innovations and ease, it is necessary to know that it includes some problems. According to TÜİK data, the main problem

encountered in E-Commerce was determined as the problem encountered in the Wrong or damaged product delivery with a rate of 49.1%. Late delivery of goods is in the second place with 46.5% and order and payment problems are in the third place with 20.1%. After that, the problems encountered in the complaint and compensation, fraud and other problems listed in Table 3.

It should be noted that while the sales increase through the internet, retailing is affected but does not lose its attractiveness, because it is important for the conservative societies that adhere to the traditions. In order to increase the diminished customer interest, retailing is structured within the shopping centers and a series of attraction-enhancing measures are implemented. These measures trigger customer interest and increase the price of the goods sold. This result naturally leads to a situation that leads the customer to E-Commerce again.

The ERP sector has been dominating the SAP ERP software industry for many years. The SAP Enterprise Resource Planning (ERP) application is designed to effectively support the core functions and operations of business processes and meet industry-specific requirements. However, it is not possible for ERP SAP software to fully respond to the needs of the developing and spreading sectors. For some special cases, SAP ERP had to develop software that can work integrated with it and the necessary technological infrastructure was provided for this situation.

This article describes how a company using SAP ERP and doing electronic commerce can integrate two software. This type of developed integration softwares run as a part of ERP and enable enterprises to use the data integratedly without losing the advantages of ERP software. The proposed integration solution provides a secure, manageable, scalable structure.

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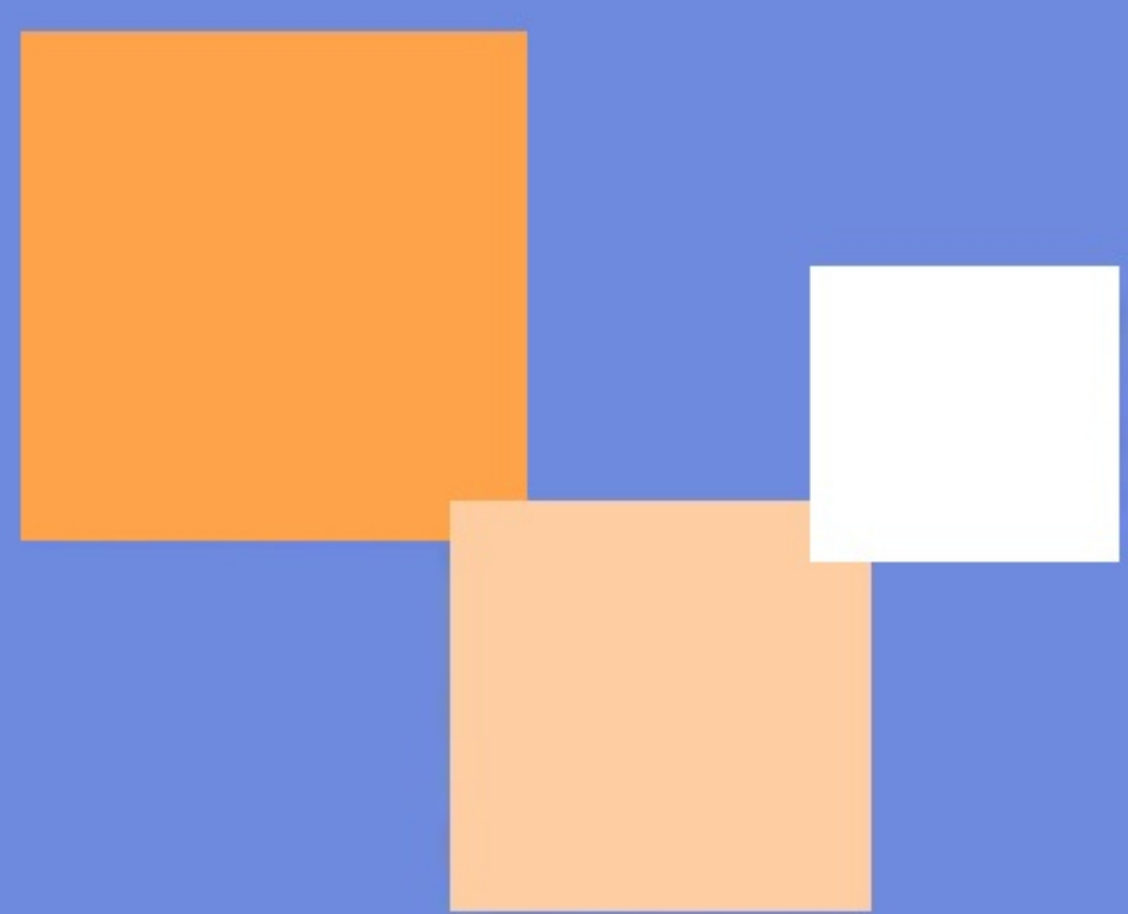
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