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**A Case Study on Performance Analysis
through Digitalisation and Gender Equality**

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Abstract

As the digital progress is significantly increasing, businesses must adjust and adopt the latest technologies in order to maintain their position in a competitive environment. Although digitalisation involves an important financial effort from companies, the benefits have proven to exceed the costs, contributing to the improvement of labor productivity and business growth. Nowadays, companies also strive to adjust their policies and business models in order to promote gender equality and comply with the Sustainable Development Goals. This paper aims to demonstrate the positive link between digitalisation, gender equality, and business performance on public companies worldwide. Current research uses the panel data regression method in order to analyse the relationship between total revenue, investment in software development, and board gender diversity. The results showed that businesses that engage in digital progress and promote gender diversity on the board of directors experience an improvement related to activity performance. The findings of this study can be used by employees in management positions in order to better understand the implications of digitalisation and gender equality in business processes and also the advantages of integrating them in the company's long-term goals. Although many studies regarding the impact of these two areas of interest already exist, this paper adds to the literature by providing an overview of the combined effect of both dimensions regardless of the activity field.

Keywords: business performance, digitalisation, gender equality, software investment.

JEL Classification: J16, O33.

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1. Introduction

In recent years, digitalisation has evolved into a critical component for companies in a variety of activity fields, altering workflows, and elevating functionality. Digital tools help the business environment grow faster by automating manual, repetitive work, removing the possibility of human error, thus improving efficiency and reducing costs. In addition, it assists in decision making by processing large amounts of data, offering valuable information for the management, while also creating a better experience for the customers. Even though the process of digitalisation implies significant costs, companies are investing large amounts of money to keep up with the technological progress.

By understanding how digital tools work and using them in a sustainable way, companies can achieve their strategic objectives in the competitive marketplace of today. In consequence, the relationship between digitalisation and business performance has become a topic of interest for business owners, employees, and specialists in the field. Together with digitalisation, the majority of companies around the world became more gender equality oriented, seeking to implement policies and processes which encourage the integration of women. Gender equality represents one of the 17 Sustainable Development Goals established by the United Nations, namely the fifth objective “Achieve gender equality and empower all women and girls”. This goal serves as a tool for the elimination of any form of discrimination between men and women in both public and private life. Gender equality intervenes in the process of harmonising the interests of shareholders with those of stakeholders, women having both executive and nonexecutive roles. The experiences and backgrounds of both men and women lead to ideas and visions which drive creativity, collaboration, and communication inside and outside of the company.

This paper is aimed to investigate if both the investment in digitalisation and gender equality promotion can push a company forward by increasing its overall performance. We endeavour to perform a quantitative analysis by using a multiple linear regression based on relevant indicators for the dimension of digitalisation, gender equality, and performance.

2. Problem Statement

The definition of any business model should be centred on performance as a key objective to achieve. In today’s society, the idea of performance has evolved, meaning not only remarkable results in terms of revenue, cash flow and efficiency of the allocation and use of resources, but also brand awareness, customer satisfaction, and sustainable growth.

Each company strives to achieve such objectives and maintain its long-term relevancy in the market through the most efficient means. Lately, the business environment had been facing a crisis towards the fast advancement of technology, which made it comply with the new tendencies in terms of activity automation and digitalisation.

The concept of digitalisation in relation to businesses can be explained as strategies that fundamentally transform company's operations, elevate customer value delivery for increased profitability, efficiency, and business progress. According to other definitions, digitalisation refers to the adoption of digital technologies in order to reshape the company's business model and release opportunities which facilitate value creation and change business conduct in a positive way (Wang et al., 2023). A more concise, but equally comprehensive definition is saying that digitalisation represents a managerial tool having the ability to improve the development of organisations due to risk mitigation and optimisation ways (Salvi et al., 2022).

A digitised industry involves the implementation of cyber-physical systems, smart factories, cloud-based management systems, and artificial intelligence meant to enhance visibility, productivity, and tracking of business performance (Fallahpour et al., 2021).

Despite being an expensive process to deploy, the overall results seem to exceed the efforts and contribute to a long-term better performance at all business levels. Findings have shown that digitalisation is simultaneously a prefactor for growth, plays an active role in the company's growth process and it is reflected in the outcome of growth. In regards to the first form of digitalisation, this is mirrored in new markets creation and opportunities on the one side and growth capabilities on the other side. As for the role played through the growing process, this is visible in market penetration, product innovation, market development, and diversification. Furthermore, digitalisation in the outcome of growth involves learning about growth and defining future digitalisation goals, adopting a pioneering approach by investing in competence development and continuous learning, management evolution, and creation of reputation capital (Matalamäki et al., 2021). According to other studies, knowledge-intensive industries and services can be reshaped by making fundamental changes and big data analytics. Also, digitalisation contributes to business performance and competitiveness, especially due to enhanced network cybersecurity and strong verification of personal certificates (Ribeiro-Navarrete et al., 2021).

In terms of the involved costs, much of the literature has shown that intense modelling and simulation can improve the cost-benefit assessment of digitalisation. This approach is useful for costs and benefits prediction, such as the resources consumed in delivery, customer wait times, and product quality.

Although digitalisation has proven most of the time to offer satisfactory results and amplify competitiveness in the business environment, the literature also provides analysis towards its potential negative impacts. Some studies relate that digitalisation can be negatively associated with money laundering but that is influenced by the ethical behaviour of companies in a given country. This belief is driven by the fact that systems and technologies are projected and treated by humans, and not paying attention to business ethics may lead to serious consequences such as erroneous decisions and illegal acts (Kheilil et al., 2023).

Furthermore, digitalisation raised serious difficulties in many fields of activity due to its rapidity, that puts organisations and individuals through a serious effort of getting accustomed and change their procedures and routines. Accounting for instance is a domain that evolved in parallel with information technology, however, the process of digitalisation of business processes is considered to be insufficiently covered and systematised (Kovalevska et al., 2022).

Alongside with digitalisation, the business environment seems to be more concerned about another concept which garnered significant attention in recent years, respectively, gender equality. Gender equality intervenes in the process of harnessing the company's human potential through making use of the entire available talent. The promotion of gender equality is beneficial for the creation of new carriers and positions within the company, increases productivity, and it also facilitates the transition to a green and digital economy.

Gender disparities in employment and entrepreneurship are influenced not only by macroeconomic factors such as country's development level, education, culture, and religion, but also by microeconomic factors such as the time allocated for business activities and the size of the organisation.

According to the existing literature, women should initiate and conduct businesses for a more prosperous economy. Adding to that, women entrepreneurship drives gender equality, women empowerment, social inclusion, and economic freedom. In 2022, research had been conducted in order to investigate the contribution of women to the total family income. The study had been focused on the rural areas from Faisal district in Pakistan where the financial opportunities are very small, the dominant profit source being agriculture and the related activities. Their research displayed local women's impressive efforts to support their family and cope with the poor economic conditions (Ge et al., 2022).

The progress towards gender equality had been tracked by the 3 authors: England, Levine, and Mishel who examined the evolution of multiple gender equality indicators during period 1970 - 2018. Their study represented the in-depth exploration of the gender inequality statistics for the United States, through researching the changes which occurred between 1970 and 2018 for a set of variables including educational attainment, segregation of fields of study, employment, segregation of occupations, and remuneration. The results have shown no significant gender differences between the level of studies and their segregation, however, fewer women than men were hired during the analysed period and had lower wages. Regarding the segregation of occupations, this variable had a descending trend demonstrating that the nature of professions does not represent an important determinant of gender inequality (England et al., 2020).

All of these aspects captured by the literature help us to create an overview of gender equality and how it impacts the business environment. The findings demonstrate that gender equality has a positive influence on the company. Escamilla-Solano et al. (2022) have performed a statistical analysis in regards to the effects of gender policies on company's financial performance, taking into consideration a number of 91 publicly listed companies in the Spanish Continuous

market during period 2016 - 2018. In order to evaluate the financial performance, the authors used the return on equity and the return on assets. The gender dimension has been studied based on the sustainability reports. The control variables were represented by the following indicators: company size, asset turnover, liquidity, and financial autonomy. The results proved that financial performance is positively influenced by the disclosure of the gender policies if the company monitors these control variables (Escamilla-Solano et al., 2022).

The positive correlation between gender equality and financial performance is strengthened by the research conducted by Hosoda and Nagano, who investigated the relationship between financial and nonfinancial results within a Japanese bank which consistently pursued the promotion of gender equality even though the banking industry in Japan is male-dominated. All interviewees were employees with experience in gender equality promotions at various levels of the organisation. Their answers demonstrated that gender equality has enhanced bank's general performance, due to the remarkable results obtained by the female employees in areas like personal contact, insurance to customers and selling investment products (Hosoda & Nagano, 2023). Furthermore, it has revealed that gender equality led to an increase in market relevancy due to the attraction of prospective investors. Another benefit expressed in the interviews was related to the cash flows generated by activities related to the innovation of products where female managers were part of the planning, development, and selling of the new products. Adding to that, studies show that women's contribution to family's total income can be very important in countries where the financial opportunities are rare.

Although most of the literature states that the promotion of gender equality is beneficial and a good driver of performance, there are some areas in a company's activity which indicate that the introduction of gender equality will not necessarily mean equal salaries for both men and women. An example in this regard is the gender pay gap, which has been evaluated to be negatively affected by a higher proportion of female managers with discretionary pay-setting power (Romero et al., 2023).

3. Research Questions / Aims of the Research

The study was driven by the need to find an answer to some theoretical and practical questions. Therefore, from a theoretical standpoint we wanted to validate if the investment in technology represents a competitive advantage for a company and also if gender equality promotion can facilitate long-term revenue growth. The practical objectives of the research were to determine which indicators express the best financial performance, digitalisation, and gender equality, and whether the effects of these three dimensions of interest are beneficial and should be integrated in business models.

4. Research Methods

In order to capture the impact of digitalisation and gender equality on companies' performance, data were collected from the Refinitiv Eikon database over the period of three years (2021-2023) and analysed using EViews 12 statistical software. The sample consists of 123 public companies worldwide, the data being collected independently of the field of activity to ensure a general overview of the connection between the three dimensions of interest.

The variables were divided into three categories: performance – total revenue, digitalisation – software development costs, gender equality – board gender diversity percentage.

In terms of measuring the degree of digitalisation in a company, investment in software development was considered relevant, as it enables automation of manual processes, increasing efficiency, and reducing human error. Increased costs in this area can also imply better data integration and processing, which helps management make important decisions. Software investment is also linked with sales, as it can improve the online platforms that clients use, such as websites or apps.

Board gender diversity was used as an indicator of gender equality, as the presence of women at the highest management level indicates that a company values diversity and inclusion. Gender diversity can contribute to the success of a business, as it brings a wider range of perspectives and experiences, which can lead to better informed and balanced decisions.

Total revenue is an essential indicator of a company's performance: it represents the base for profitability, the ability to cover expenses, makes a company trustworthy by both clients and investors, and helps the business generate cash flow, which is necessary for ongoing operations and long-term financial stability.

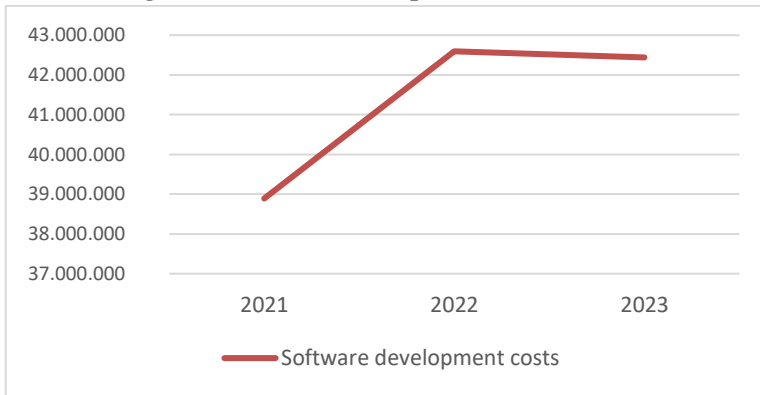
The research has a quantitative approach, using a panel data regression model based on the above indicators, where total revenue was chosen as the dependent variable, while investment in software development and board gender diversity represented the independent variables.

Total revenue is a metric that indicates if the company's strategies are leading to increased sales and business expansion and is calculated as revenue from all of a company's operating activities after deducting any sales adjustments and their equivalents. The degree of digitalisation was reflected by the investment in software development, translated into costs accumulated and capitalised to integrate technology information and automatise operations. The index for gender equality was determined by calculating the percentage of women on the board of directors.

The estimation in the regression analysis was done by using the Ordinary Least Square method (OLS). In order to enhance data comparability, total revenue and software development costs were normalised by applying the square root transformation.

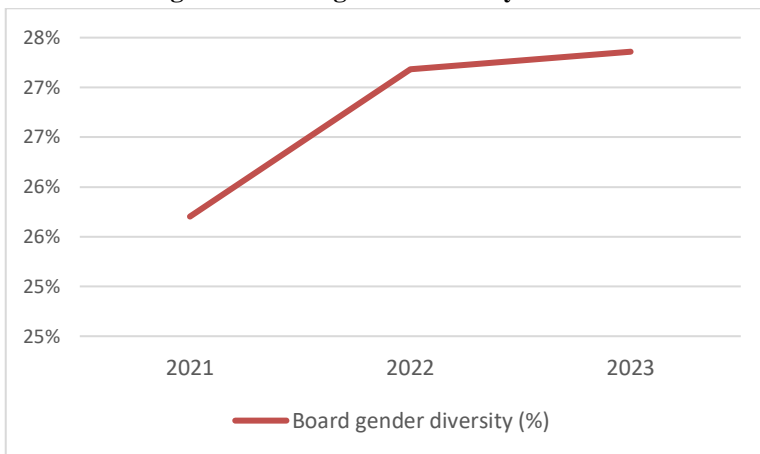
5. Findings

Figure 1. Software development costs evolution



Source: authors' own research results.

Figure 2. Board gender diversity evolution



Source: authors' own research results.

Taking into consideration the three fiscal years, a significant increase in both investment in software development and women integration in board can be observed from 2021 to 2022. In the next period, from 2022 to 2023, the costs for software development slightly decreased, while the board gender diversity percentage experienced a modest growth.

The equation of the regression model has the following form:

$$y = a + bx_1 + cx_2 + \varepsilon \quad (1)$$

where:

y – dependent variable – total revenue;

x_1 – independent variable – software development costs;

x_2 – independent variable – board gender diversity;
 a, b, c – unknown parameters of the regression function;
 ε – error term (residue) – random variable.

The first step is to perform the Hausman test, in order to determine if the estimates from two different models, namely fixed effects and random effects, are consistent with each other.

Table 1. The Hausman test

| Test Summary | Chi-Sq. Statistic | Chi-Sq. d.f. | Prob. |
|----------------------|-------------------|--------------|--------|
| Cross-section random | 60.371427 | 2 | 0.0000 |

Source: authors’ own research results using EViews.

Running this test shows a probability associated with the Chi-Square test of less than 5% (0.0000). Therefore, the null hypothesis that the random-effects model is preferred over the fixed-effects model is rejected, which means that applying the least squares method with fixed-effects corrections to panel data is most appropriate.

Furthermore, the redundant fixed effects test was performed to establish if fixed effects are necessary to determine the impact that software development costs and board gender diversity have on total revenue.

Table 2. The Redundant Fixed Effects test

| Effects Test | Statistic | d.f. | Prob. |
|--------------------------|-------------|----------|--------|
| Cross-section F | 424.77942 | -122,244 | 0.0000 |
| Cross-section Chi-square | 1978.991324 | 122 | 0.0000 |

Source: authors’ own research results using EViews.

The associated probabilities of the two tests assessing the joint significance of the cross-section effects (Cross-section F and Cross-section Chi-square) are less than 5%, so the null hypothesis that the individual effects are redundant is rejected, and the inclusion of the individual effects is accepted.

Table 3. Results of the regression analysis

| Variable | Coefficient | Std. Error | t-Statistic | Prob. | F-statistic | Durbin-Watson |
|----------------------------|-------------|------------|-------------|--------|-------------|---------------|
| c | 34106.6887 | 1661.7646 | 20.5243 | 0.0000 | 0.0000 | 1.8973 |
| Software development costs | 0.8131 | 0.3085 | 2.6355 | 0.0089 | | |
| Board gender diversity | 8827.5579 | 3395.1915 | 2.6000 | 0.0099 | | |

Source: authors’ own research results using EViews.

It is found that a higher degree of digitalisation implementation at the company level had a direct positive effect on the company's financial performance, statistically significant. Our results are similar to those of previous studies (Abou-Foul et al., 2021; Broccardo et al., 2023; Ribeiro-Navarrete et al., 2021) that investigated the link between digitalisation and performance considering specific indicators and including the sustainability objective. At the level of the studied sample, the impact of promoting the application of digital technologies is reduced. Also, between gender equality and performance, there is a positive, statistically significant relationship, a result similar to that of the studies carried out by Moreno-Gómez et al. (2018) and Wang et al. (2023). The presence of gender diversity on the board has a significant effect on board performance.

6. Conclusions

The findings of our study are good arguments towards the necessity of digitalisation and gender equality within an organisation. The independent variables represented by the software development costs and the board gender diversity percentage proved to be positively linked to the growth of company's total revenue. Consequently, companies should integrate in their business models the gender equality dimension as well as invest in process automation and technology in order to increase their general performance.

The main limitations of the research were represented by the small number of digitalisation and gender equality indicators determined by the companies, correlated with the short reporting period, which led to a relatively small sized sample. Data was also collected only from public companies; therefore, small enterprises were not taken into consideration for this study. Furthermore, there are many other unobserved variables that might still affect the observed relationships, such as economic factors. The results may not apply to organisations in other cultural or economic contexts and are mostly applicable to developed nations. Including a wider range of industries and geographical areas will improve the results' external validity.

As a recommendation for future research projects, the current study can be approached using other databases in order to collect representative indicators for company's performance, digitalisation and gender equality or address the research problem in different industry contexts or a in specific part of the world.

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