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Investor Reactions to Twin Transformers Announcements

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Abstract:

Research Question: This study aims to empirically test the effects of the digital and sustainability announcements of twin transformation companies on their shareholder value creation. **Motivation:** This paper builds on the vast research regarding the Efficient Market Hypothesis, such as the work of Fama (1970, 1998) which discussed efficiency of the capital markets. Stock markets reflect new information and future prices cannot be predicted based on historical prices. Investors' reaction, e.g., overreaction or underreaction are well documented. Furthermore, Del Rio Castro et al. (2021) present contemporary research findings related to the emerging issue of reaching Sustainability Development Goals and connects it with digitalization. Ukko et al. (2019) find that a company will reach superior financial performance if managers simultaneously devote their efforts to sustainability and digitalization. This research builds on the previous literature and tries to determine whether stock market recognizes such efforts and whether there is efficiency. **Idea:** The idea behind this research is to empirically determine whether investors react to twin transformation. Short- and long-term investors' reaction was tested against sustainability and digitalization announcements of the companies that are recognized by professionals to follow the path of simultaneous transformation. **Data:** The sample includes companies from the Accenture research of the European twin transformation companies. Data implemented in this study were collected from several sources. Share prices were collected from the Yahoo Finance website, and event announcements from corporate websites. **Tools:** The methodology employed in this research is the event study methodology. Cumulative abnormal returns are calculated for different event windows and t-statistic is calculated to determine whether there is statistically significant investors' reaction to sustainability and digitalization events. **Findings:** Sustainability announcements yield significant market reaction. Depending on the news content they can be both positive and negative. Moreover, dates when the sustainability ranking of some company was released are among the most significant sustainability events. In most instances, investors do not react to the information instantaneously, they need time to absorb it. Investors do not find digitalization events to be significant. **Contribution:** To the best of the author's knowledge, this is the first study to test investors' reaction to digitally sustainable announcements of twin transformation companies.

Keywords: investor reactions, event study, digitalization, sustainability, value

JEL Classification: E22, Q56, G32

1. Introduction

Nowadays, corporations are increasingly deciding to digitalize all or most of their operations. Such decision may lead to a superior corporate performance. However, if digital knowledge of their employees is not adequate, that can lead to less than superior results (Li et al., 2022a). Digital transformation changes the manner in which value in a company is created (Piepponen et al., 2022). Competitive advantage can be created with digital resources, but it can be sustained in a longer period only through physical resources along with dynamic capabilities to innovate (Cuthbertson & Furseth, 2022). Furthermore, employee's knowledge and speed at which customer preferences are changing can have a value increasing potential (Latinovic, 2022). For example, in the banking sector, digital transformation should incorporate digitally skilled staff (Kothari & Seetharaman, 2022). Therefore, it can be concluded that employee's knowledge and continuous innovation of digital resources can create value in a sustained period. In that way companies will have the ability to instantaneously satisfy any change in customers preferences.

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On the other hand, sustainability became an important topic ever since Sustainable Development Goals Agenda (SDG) 2030 was adopted. The Agenda has 17 Goals, 169 targets, and it emphasises joint global efforts in the reduction of poverty, which will consequently lead to sustainable development. Each country and each entity within that country should make their contribution by creating their operations more sustainable (Rosa, 2017). To reach SDG innovation should be fostered (Hasse, 2022). Financing and investment activities are usually focused on the traditional energy sources. The problem with traditional energy sources is that they increase carbon emissions. Hence, adoption of innovative climate technology is crucial (Li et al., 2022b).

Consequently, pursuit of the sustainable future became an integral part of the corporate aims and strategy. But at the same time, each company is undergoing intense changes due to technological advancements (Rosamartina et al., 2022). Convergence of digitalization and sustainability represents a tool which multinational corporations can utilize to create an impact. Digitalization enhances visibility of corporate behaviour, but at the same time it can be used for reducing costs of monitoring corporate carbon emissions. Therefore, models of how corporations create value are changing (George & Schillebeeckx, 2022). Digital Twin technology is one of the main tools for production and maintenance activities which can help in reaching SDG (Franciosi et al., 2022). Gomez-Trujillo & Gonzalez-Perez (2021) examine digital transformation and its relation to firms' sustainability. Their findings suggest that a digital transformation is a prerequisite for sustainability (Gomez-Trujillo & Gonzalez-Perez, 2021). Digital technologies ease corporate data gathering and analytics. Moreover, digital technologies expand communication channels and can promote the company's digital reputation. That in turn can increase the company's return (Rosamartina et al., 2022). Artificial intelligence can introduce innovation and help the company increase its sustainability, through digitalization and optimization of activities. When the company changes its business model, that tackles their stakeholders as well. Consumers, for example, can actively post reviews through web and that can lead to sustainable improvements. Therefore, digitalization can be a value-added tool. Hilali et al. (2020) find that customers, data, and innovation are drivers of digital transformation, and they also help companies to become more sustainable. Therefore, companies should create business models through which they can increase customer experience, built data analytics capabilities and innovativeness (George & Schillebeeckx, 2022).

Hence, there is a connection between digitalization and sustainability. Also, there is a necessity for companies to undergo the process of digitalization. Furthermore, sustainability agenda and legislative policies require companies to increase their sustainability. Companies need this synthesis and consumers could benefit from it. But how do investors react to such fusion? So far, the literature related to the connection between digitalization and sustainability has been rather scarce. Furthermore, published papers are connected to the entrepreneurship (Holzmann & Gregori, 2023) or start-ups (Lammers et al., 2022). Most researched stakeholders are communities, learners, and consumers (Guandalini, 2022). Thus, there is a gap in the current research regarding how different corporate stakeholders are affected by the interaction between digitalization and sustainability. Therefore, the purpose of this study is to determine investors' reaction to digital and sustainability events of twin transformation companies. The structure of this paper is as follows: the second section of this study will present contemporary research; the third section presents research design and the results of the study. The forth part gives concluding remarks.

2. Literature Review

There are increasing expectations regarding the impact that digitalization will have on the process of reaching Sustainability Development Goals. It is expected that this synergy will create additional value. However, theoretical and empirical findings related to this subject are still in their infancy (Del Rio Castro et al., 2021).

Rosamartina et al. (2022) test digital reputation and its influence on different performance measures. Digital reputation is defined as stakeholder sentiment toward corporate digital footprint. They find that digital reputation has a positive impact on the company's financial and non-financial performance. How many SDG are covered in the company's reporting, as well as to what detail they are elaborated, have a moderating role in this equation. For example, corporations often produce very detailed reports, with a vast amount of information regarding their sustainability actions. That can be overwhelming for the different stakeholders, among which are investors. Therefore, corporate sustainability value creation efforts might be missed. Digital platforms and media can help in direct communication with stakeholders, where the gist of corporate actions is communicated, which in turn can be value increasing. Ukko et al. (2019) study the relationship between digital business strategy and financial performance, where sustainability strategy is a linking vehicle. They analyse digital strategy with respect to two dimensions, managerial and operational. They find that managers must simultaneously be dedicated to digitalization and sustainability strategy. In that way the company will achieve superior financial performance. With respect to the operational dimension, they conclude that

sustainability strategy constrains the relationship between digitalization and financial performance. Therefore, it might be wise that companies reconfigure their existing operations and make them less unsustainable. Ricci et al. (2020) test whether stock market values the disclosure related to the digital strategy. They find that investors value digital initiative as a form of intellectual capital, and that companies with better sustainability reputation receive higher valuations.

Efficient market hypothesis states that stock market prices reflect available information. There were opposite results about how market responds to new information. One argued that lag in reaction is short term, others that stock prices slowly adjust to new information. Event study methodology show how stock prices react to new information (Fama, 1970; Fama, 1998). Event study methodology is a classical corporate finance methodology. So far, various events have been used for testing market efficiency. Investor's reaction was tested in connection to the introduction of the new environmental regime in China. Due to the expectation of higher costs related to new legislation, investors' reaction was negative, and it caused a significant decrease in the company's value (Sam & Zhang, 2020). Feng et al. (2020) find that adoption of sustainable practices in a luxury company cause a negative investors' reaction. Larger firms exhibit a more severe loss in share value, but more profitable companies provoke a milder reaction from investors. Vargas (2016) finds that there is a stock price reaction, but it cannot be attributed to the Corporate Social Responsibility announcements. Nakajima & Inaba (2022) find that stock market reacts positively when ESG is part of integrated reporting. Yuan et al. (2022) test investors reaction to Industry 4.0 and Industry 5.0 supply chain announcements. They find that supply chain innovation announcements have a shareholder value creation effect, which is more pronounced with service companies in comparison with manufacturing companies. Liu et al. (2022) test investors' reaction to the different kind of technological advancements, namely blockchain announcements. Their findings suggest a highly positive investor's reaction, which is enhanced toward the announcement day.

Based on the previous research summarized in this section, we can see that the investors' reaction is tested to either sustainability announcements or to technological advancement announcements. Since prior research presents evidence that digitalization utilized to reach higher sustainability levels is value increasing, further research in this area is the needed one. Therefore, this study is trying to fill this gap, and provide evidence whether investors approve or disapprove of digital and sustainable operations of twin transformation companies.

3. Research

3.1 Event study methodology and data description

The methodology implemented in this research is the event study methodology, which is used to test the investor reactions toward a certain event (Kothari & Warner, 2007). Investor reactions are determined based on the cumulative abnormal returns which are calculated as cumulation of the abnormal returns. Abnormal return is calculated as a difference between the market and the estimated return. Estimated return is the return investors could expect to generate if a certain event did not take place. There are different models that can be used for return estimation, and in this study the market model will be implemented. Abnormal return is calculated based on the equation, in formula 1:

$$A_{it} = R_{it} - (\beta_{0i} + \beta_{1i} R_{mt}) \quad (1)$$

Table 1: Events description

Comp. name/ country/Sector	Date	News
Orsted/ Denmark/ Utilities	23.09.2019. 28.01.2022. 08.06.2022.	- Orsted partners with Pict Offshore to develop green technology - Orsted ranked world's most sustainable company - Use of AI to improve bird life data from Offshore wind farms
Schneider Electric/ France/ Industrials	19.01.2022. 17.02.2022. 30.05.2022.	- Dropped ranking on the world's top list of sustainable companies - Announced progress on the sustainability impact program - Schneider Electric & ETAP announce new digital twin integration
Christian Hansen/ Denmark/ Basic Materials	31.05.2021. 19.01.2022.	- Chr. Hansen launches global online platform on probiotics - ESG rankings published

Comp. name/ country/Sector	Date	News
Siemens/ Germany/ Industrials	07.12.2012. 17.11.2021. 27.05.2022. 29.06.2022.	- Siemens train wins German Sustainability Award Design - Siemens is first in DJ Sustainability Index rank - AI and Digital Twin to a sustainable water management - Xcelerator launch – an open digital business platform
Merck/ Germany/ Healthcare	30.07.2020. 12.11.2020.	- Award for the first quantitative green chemistry evaluation tool - New sustainability strategy presented
Kering/ France/ Consumer cyclical	01.03.2021. 06.10.2021.	- Financing second-hand platform in fashion industry - Launch of Watch & Jewellery sustainable Initiative 2030
L'Oréal/ France/ Consumer defensive	28.04.2020. 28.05.2021. 13.11.2021.	- AI in skincare launch - Spotted in the annual report AI in skincare - CAC40 company with the best website
Deutsche Post DHL/ Germany/ Industrials	27.06.2019. 19.05.2020. 16.06.2021. 08.02.2022. 23.05.2022.	- Implementation of digital twins to optimize logistics operations - Launch of an innovative digital platform - Adding sustainable marine fuel - Purchase of sustainable air fuel - Digital customer platform becomes greener and smarter
ABN AMRO/ Netherlands/ Financial services	03.02.2020. 02.07.2020. 29.04.2022.	- In 10 most sustainable banks according to S&P Global - 20.000 households get sustainable wind energy - Stake in technology manufacturer of carbon products sold

Source: Data compiled from: Baltic Wind (2022), Orsted (2019), OEDIGITAL (2022), Investigate (2022), Schneider Electric (2022a, 2022b), FoodIngredients1st (2022), Chr. Hansen (2021), Siemens (2022a, 2022b; 2021; 2020), Merck (2020a, 2020b), Kering (2021a, 2021b), Loreal (2021a, 2021b, 2020), DHL (2022a, 2022b; 2021, 2020, 2019), ABN AMRO (2022, 2020a, 2020b)

Coefficients in the equation above (β_{0i}, β_{1i}) represent the intercept term and coefficient of the market index return on the return for the company i. Rate of return for the company i on the day t, is described with R_{it}. R_{mt} represents the rate of return on the relevant stock market index on day t. Cumulative abnormal return can be calculated over the event window using formula 2:

$$CAR_i(t_1, t_2) = \sum_{t=t_1}^{t_2} AR_{it} \quad (2)$$

Implementation of event study methodology assumes that event date needs to be specified. The event date is the date when the company announced certain sustainability, digitalization, or twin transformation information. Investor reactions could be immediate upon the release of certain information or reaction that can be observed in some prolonged period. Therefore, this research follows Bouzzine & Lueg (2020) and investigate investors response in several event windows:
[-1; 1], [-3; 3], [-10, 10], and [-20, 20].
Moreover, to be able to estimate a normal return, estimation window is defined. This research bases estimates on the 200-day period, which starts 220 trading days prior to the event and lasts till 21 days before the event.

In this study we are going to test investor reactions to the announcements of Twin transformation public companies, identified in the Accenture's report (2020). We use twin transformers because this type of company is more likely to achieve superior performance. These types of companies stem their superiority from the new value that is being created at the intersection between digitalization and sustainability. So far, researchers explored investors' reaction to either some sustainability announcement or to announcements related to the technological advancements. Up to now, no research has studied investors' reaction related to the digital and sustainable announcements at the same time. In this research, announcements are collected from the companies' websites. Therefore, for the period of the last 3 years, searches are performed using words: digital, sustainable, and digital sustainability. Since digital platforms increase corporate digital reputation and help in the value increasing process (Rosamartina et al., 2022), the search also looked for announcements that are related to the establishment of the digital communication channels. Table 1 displays dates and description of the twin transformation events that are going to be tested.

3.2 Results and Discussion

Results for the most relevant sustainable, digital, and twin transformation events are displayed in Table 2.

There are differences in how investors react toward sustainable, digital, and twin transformation announcements of the leading European twin transformation companies. If we look at the "sustainable events", in most cases, investors react to the announcements about some sustainability ranking. We can see that reactions are mixed, they can be both positive and negative, which is in accordance with prior research (Nakajima & Inaba, 2022; Sam & Zhang, 2020; Vargas, 2016). Such results might be expected since ESG investing strategies have been the mainstream investing strategies for some time now and investors are used to screen for such information. They seek ranking and if it is increasing, it represents a positive signal and investors react positively. A negative reaction is provoked with the decrease in sustainability ranking. Investors' reaction to sustainability announcements is not instantaneous. Rather, investors need a longer period to react to such news.

In some instances, the reaction to ranking announcement is an industry and rating agency dependent. Investors react positively to news regarding sustainability ranking increase in utilities and basic materials sectors. There is a negative investor reaction toward a decrease in sustainability rankings in the industrial sector. Those reactions are expected since they are in accordance with the news content. Only unanticipated investors' reaction is related to the announcement of sustainability ranking in the financial services sector. Perhaps, that sector is still not recognized enough in this manner and investors expect banks to be strictly focused on the financial and not sustainable return. They might think that sustainability actions can divert efforts from increasing banks' profitability. Moreover, investors might perceive that the increase in sustainability in the financial services sector are not value increasing activities.

Table 2: Investors' reaction to twin transformation news

Name			[-1, 1]	[-3, 3]	[-10, 10]	[-20, 20]
	Date	R^2	CAR	CAR	CAR	CAR
Orsted	23.9.2019.	0.188	-5.153E-05	-0.041	-0.104*	-0.130*
	28.1.2022.	0.411	-0.023	-0.041	0.030	0.195*
	8.6.2022.	0.284	0.011	0.001	-0.026	0.202
Schneider Electric	19.1.2022.	0.487	-0.012	-0.056*	-0.125**	-0.154**
	17.2.2022.	0.518	-0.006	-0.012	-0.007	0.034
	30.5.2022.	0.682	0.020	0.008	0.012	-0.026
Christian Hansen	31.5.2021.	0.200	0.002	-0.001	0.050	0.065
	19.1.2022.	0.176	0.044*	0.029	0.055	0.037
Siemens	7.12.2020.	0.835	0.019	0.010	0.020	-0.026
	17.11.2021.	0.558	0.025	0.028	0.065	0.047
	27.05.2022.	0.747	-0.018	0.031	0.002	-0.051
	29.06.2022.	0.715	-0.030	-0.006	-0.075	-0.053
Merck	30.07.2020.	0.603	-0.012	-0.006	0.007	0.017
	12.11.2020.	0.630	0.023	-0.084	-0.147	0.015
Kering	01.03.2021.	0.585	0.053*	0.036	0.043	-0.038
	06.10.2021.	0.435	0.003	0.022	0.008	-0.119
L'Oréal	28.04.2020.	0.563	0.021	0.029	0.037	-0.019
	28.05.2021.	0.379	-0.001	0.005	0.055	0.075
	13.09.2021.	0.318	0.004	-0.017	-0.061	-0.103
Deutsche Post DHL	27.06.2019.	0.463	0.016	0.017	0.063	0.102
	19.05.2020.	0.705	-0.024	0.014	0.020	0.037
	16.06.2021.	0.369	-0.005	0.005	0.0002	0.045
	08.02.2022.	0.330	0.007	-0.029	-0.072	-0.137*
	23.05.2022.	0.629	-0.042	-0.034	-0.040	-0.022
ABN AMRO	03.02.2020.	0.136	-2.31E-05	0.037	-0.077	-0.134*
	02.07.2020.	0.479	0.023	0.086	0.091	-0.021
	29.04.2022.	0.257	-0.014	0.027	0.048	-0.039

Note: *, **, *** denote statistical significance at the 10%, 5%, and 1% level respectively. Source: author's own calculation.

If we look at the "digital events", digital initiatives do not represent statistically significant events in any of the analysed companies. Such results are opposite to the findings of Yuan et al. (2022) and Liu et al. (2022). The reason why investor reactions may not be significant can be due to unfavourable market conditions. Many of events that were tested in this study took place in the year 2022, which is proved to be challenging for the companies worldwide. European companies and markets suffered serious downturn. Therefore, investors' reaction toward digitalization might be missing due to energy uncertainty and anticipation of high electricity costs.

Twin transformation companies are the ones that are trying to increase their sustainability through digitalization. There is a statistically significant investors' reaction in relation to a certain "twin transformation event". Investors' reaction for luxury firm twin transformation announcement is immediate and positive. Such reaction is not in accordance with the findings of Feng et al. (2020). Although investors in luxury goods companies are specific type of investors, it is possible that they are beginning to acknowledge that the increase in brand sustainability is positive, even when it comes to luxury goods.

The results of this study suggest that investors react to "sustainability events". Also, there is no evidence that investors react to "digital events". There is a modest investor reaction toward "twin transformation events". Such findings suggest that investors could yield a positive return if they would invest in companies whose sustainability ranking is increasing. Such results, however, are not related to the financial services sector.

Conclusion

Twin transformation companies are those that are trying to increase sustainability through the digitalization of their operations. The concept of twin transformation and research related to this area is still in its early stages. New business models introduce new value creation potentials that lie at the intersection between digitalization and sustainability. New business models have an impact on all corporate stakeholders. This research investigates investors' perspective, namely investors' reaction to a specific event.

Prior research looks at investor reactions to either sustainability announcements or to the technological announcements. This research tries to capture investor response toward sustainability, digital and twin transformation announcements. Results show that investors react to the sustainability ranking announcement, and that reaction is mostly positive. If we look at the timing of investors reaction, we can see that reaction is not short-term, it is rather a longer-term one. Investor reaction in the year 2022, especially for the digitalization announcements is missing. Energy uncertainty could be the reason why investors are being conservative to this type of announcements. There is a positive investor reaction toward twin transformation. However, the main limitation of this study is a very small sample size, and such results should be taken with caution.

Since there is evidence of statistically significant investors' reaction toward "sustainability" news, these findings might be of interest to practitioners when they create their trading strategies. Policy makers might promote digitalization as a means of accomplishing SDG, while making energy supply more stable. We acknowledge that the limitation of this study is a small sample size. Further research should include companies that exhibit twin transformation characteristics from the markets other than European markets. Also, more stable periods should be analysed. Perhaps once energy uncertainty is removed, investors will show more interest in digitalization and especially twin transformation.

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