

NEW TRENDS
IN BUSINESS MANAGEMENT
Strategy, Branding, Teamwork



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NEW TRENDS IN BUSINESS MANAGEMENT

Strategy, Branding, Teamwork

edited by
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and **Joanna Radomska**



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Introduction

Contemporary business management is driven by digital acceleration, changing stakeholder demands and the pressure for organisational agility. Technologies, such as AI and cloud platforms, allow firms to process vast streams of data in real time, reshaping how markets are served. At the same time, customers, investors and regulators expect greater transparency, sustainability and social impact – hence, brands need to increasingly extend beyond logos to represent authentic narratives and create real value. Fast change and digitalisation also create new challenges in people management, requiring the alignment of staff development, leadership approaches and team organisation with the growing complexity and changeability.

In this issue of *Students Debuts: New Trends in Business Management*, student authors particularly examine strategy, branding and teamwork through case studies and analytical considerations.

Several articles focus on the strategic aspects of business management. One case examines Italmetal's implementation of Lean Manufacturing, Six Sigma and digital supply-chain systems to raise equipment performance. Another traces the Wielton Group's entry into African markets, showing how strategic sales approaches and close customer engagement drive growth.

Brand studies feature Maison Margiela's Tabi boots and Tommy Hilfiger's collections, demonstrating how consistent product narratives shape customer loyalty. A separate analysis of influencer personal brands and B2B social media campaigns reveals the impact of clear messaging and online communities on brand expansion.

Teamwork research addresses Zillennials' preferences for transformational leadership in project settings, and proposes models to optimise group workflows in the automotive industry and improved team agility, emphasising the value of transparency and rapid feedback.

Together, these articles illustrate how strategy, brand identity and team processes evolve in a fast-moving business landscape.

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The Tabi Boots Phenomenon. Exploring the Impact of Signature Products on a Brand: A Case Study of Maison Margiela

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Abstract: Some fashion products go beyond their functional purpose and become cultural symbols. In the luxury fashion industry, iconic items can significantly impact a brand. This study aims to discover how companies can benefit from signature products and implement them in their overall branding and marketing strategies. It specifically focuses on the Tabi Boot by Maison Margiela, a unique item that has gained increased media attention in recent years. The analysis of branding concepts and the various case studies on iconic products revealed especially a gap in the research on Tabi boots. The main research problem focuses on how consumer perceptions and what behaviours can be observed in regard to iconic products with a focus on Maison Margiela and Tabi boots. This study uses a quantitative method to collect data using a CAWI questionnaire. The findings present valuable insights about the impact that iconic products can have on branding and marketing strategies.

Keywords: Maison Margiela, Tabi Boots, iconic product, luxury fashion, luxury fashion branding

1. Introduction

In fashion, certain products exceed their functional purpose and become cultural symbols that can have substantial impact on a brand. This study focuses on discovering how companies can benefit from signature products and how they can be implemented in their overall branding and marketing strategies. Additionally, this paper explores a specific product which is the Tabi Boot by Maison Margiela. This unique item has received increased attention in media over the past few years and this research analyses its phenomenon and how it impacts the Maison Margiela brand. The significance of this study lies in its potential to provide insights into the strategic creation and promotion of iconic products within the luxury fashion

industry. It may also offer practical information regarding the impact of popular products on brand image, awareness and loyalty.

The research problem is centred on the consumer perceptions of Maison Margiela Tabi shoes and the overall impact they have on branding which can be divided into a few objectives. The first one is to find out what consumers from various backgrounds consider iconic as well as how their perceptions fit with the presented examples of iconic products. The next objective is specifically about the consumers' attitudes and perceptions towards Tabi Boots. The literature review was conducted from December 2023 to May 2024 and the research was conducted during May 2024. The research approach was quantitative and was carried out using a survey and a CAWI questionnaire.

2. Role of Iconic Products in Luxury Fashion

The product plays a central role in the offer of a luxury fashion brand. It could be considered as the foundation which the rest of the brand is built upon. Luxury goods are valued beyond their functional purposes because of the intangible attributes and associations consumers create based on a company's branding efforts. Consumers form opinions based on attributes and benefits of products offered by the brand (Jain, 2017). How companies construct and communicate these values is a crucial part of their strategy. One of the signs of this communication can be seen in a surge of labelling certain fashion items as 'iconic' or 'signature' in the recent years.

Studies emphasise the importance of iconic products and signature design as a vital part of the luxury fashion segment (Bruce & Kratz, 2007; Fionda & Moore, 2009). Research done by Nagasawa and Sugimoto (2015) suggests that iconic products should align with the brand's core values and origins. Iconic products often have a rich history and are deeply rooted in the brand's heritage and tradition. These products are said to represent the brand's DNA (Fionda & Moore, 2009). Additionally, research suggests that iconic products have a halo effect on the rest of the brand's offer which might be considered less iconic or more affordable. This was proven in a study about Hermès Birkin bag and carré scarf – the scarf scored insignificantly lower than the bag on the exclusivity scale (Sugimoto & Nagasawa, 2015).

Luxurious products are meant to represent certain qualities like social status, wealth and style. One of the ways brands can add meaning to their products is via a marketing strategy called celebrity endorsement (Johansson & Bozan, 2017). Iconic products can be promoted using celebrities that the general public is familiar with and associates them with certain attributes (McGuire, 1985). McCracken's research implies that celebrity endorsement can be explained via a process called meaning transfer where a celebrity is able to transfer certain attributes associated with themselves onto the product by various ways of advertising. Finally, the consumer is able to acquire these attributes by purchasing the product. In order for the final stage to be successful and draw consumers to purchase, the product must

represent qualities desired by the consumer. This could mean that iconic items could be created using a celebrity that would transfer the iconic qualities onto it. Products with specific features are one of the main tools for brand differentiation (Okonkwo, 2007). These distinctive characteristics help create a unique brand identity that sets the brand apart in a competitive market, which suggests that iconic products should not be overlooked when it comes to developing a branding strategy.

To further study the concept of iconic products in luxury fashion, chosen items which were described frequently as iconic in literature and various media (movies, TV shows, social media, magazines) were analysed. The results are summarised in Tab. 1.

Table 1. Summary of iconic products

Iconic product	Signature feature	What made it iconic?
Hermès Birkin bag	Oversized yet elegant shape, high-quality leather, signature padlock and key closure.	<ul style="list-style-type: none"> • Celebrity endorsement (Jane Birkin) • Extreme exclusivity and rarity
Lady Dior bag	Quilted pattern, D.I.O.R. letter charms	<ul style="list-style-type: none"> • Celebrity endorsement (Lady Diana)
Dior Saddle bag	Silhouette resembling a horse saddle	<ul style="list-style-type: none"> • Appearance in <i>Sex and the City</i> • A sudden comeback after a few years
Burberry Trench coat	Classic double-breasted coat silhouette, tan and beige colours, checkered lining	<ul style="list-style-type: none"> • Water-resistant gabardine fabric • Celebrity endorsement (Kate Moss) • Classic silhouette associated with British style
Chanel suit	Tweed fabric, contrasting trims	<ul style="list-style-type: none"> • Innovative silhouette that revolutionized womenswear • Association with Coco Chanel
YSL Le Smoking suit	Masculine silhouette with pants, pristine tailoring	<ul style="list-style-type: none"> • Innovative silhouette, for the first time featuring trousers as evening-wear for women • Becoming a symbol of feminism in 1960s
Christian Louboutin Red-Soled Shoes	Red soles, high heel	<ul style="list-style-type: none"> • Eye-catching design feature • Association with luxury and glamour
Rick Owens Geobasket sneakers	Exaggerated shape, extended tongue	<ul style="list-style-type: none"> • Unique aesthetic • Controversy with Nike • Rarity (for the discontinued version)
Rick Owens Ramones sneakers	Chunky silhouette, exaggerated rubber toe box	<ul style="list-style-type: none"> • Unique aesthetic
Balenciaga Triple S sneakers	Chunky multi-layered sole, exaggerated shape	<ul style="list-style-type: none"> • Celebrity and influencer endorsement • Bold oversized shape

Source: own elaboration.

Most of the presented pieces gained their status mainly through unique design elements such as the Birkin bag's padlock, Louboutin's red soles or the Chanel's

tweed fabric. This combined with celebrity endorsements and cultural significance helped to establish them as iconic symbols of luxury fashion.

3. Maison Margiela Tabi Boots

The fashion house Maison Margiela was founded by a designer Martin Margiela and his partner Jenny Meirens in 1988 (Holzemer, 2019). The avant-garde design of the garments clearly signal Margiela's rejection of traditional fashion tropes. Tabi boots are undoubtedly one of the most famous items made by Maison Margiela. They have been a constant staple in each of the brand's collection.

The shoe made its first appearance in the first Margiela show in 1988, shocking everyone with its unusual, split-toe design (Foster, 2021). Traditionally the style of Tabis comes from Japan and the split between the toes was made to accommodate traditional sandals (Cox, 2012). Margiela's interpretation of the Tabis captures the essence of his brand. His version has a modern feature – a thick, cylindrical heel that gives the shoes height which adds a feminine touch (Fig. 1).



Fig. 1. Tabi boots with an 8 cm cylindrical heel

Source: <https://www.maisonmargiela.com/>

Margiela was challenging the norms of women's footwear by making heels that resembled animals' hooves. Besides the Tabi boots the brand created other versions of Tabis over the years such as ballerinas, Mary Janes, oxfords and even cowboy boots.

Tabi boots are often quoted as iconic and are a flagship item at Maison Margiela due to the cultural impact they made in the last few decades. Fashion editor, Kate Marin, points out the cult status of the shoe being comparable to a Birkin bag saying they are a grail piece for many women (Deleon, 2019). It is rare to find someone indifferent towards Tabis – people are usually either their fans or fiercely dislike

them. Some articles also mention that the shoes have something of the ‘uncanny valley’ (Deleon, 2019; Miller, 2023; Sicardi, 2018). It is clear that they are meant to provoke feelings, thoughts and emotions, whether are negative or positive. The iconic status of Margiela Tabis seems to come from the polarizing attitudes that people have about it. The unique split-toe design is shocking only to those who have never seen it before and are not aware of their important place in fashion. But to fellow fashion enthusiasts it becomes an emblem to be worn with pride. In this case, tabis might be seen as a way to communicate an individual’s grasp of avant-garde and subversive fashion.

Tabi shoes have been becoming more mainstream than ever thanks to their frequent appearances on social media (Miller, 2023). TikTok’s emphasis on trends has also amplified the recognition of Tabi boots, especially after a TikTok user posted about how her Mary-Jane tabis were stolen by her date (Brain, 2023). Many fashion magazines and websites posted articles about this unfortunate story (Hoste, 2023; Rodgers, 2023; Roy, 2023), which proves that TikTok is shaping fashion culture and influencing consumers’ behaviour.

4. Research Methodology

The literature review revealed a gap in the research on the consumer perception and attitudes towards Maison Margiela’s Tabi boots. To address this gap, the research questions and purpose were formed with the aim of understanding how consumers perceive this iconic product. The research problem can be summarised by the following research questions:

Q1: What is the consumer perception of iconic items?

Q2: How do tabis differ from other iconic products discussed in this paper?

Q3: How people perceive Maison Margiela Tabis?

Q4: How important are iconic products in branding and brand awareness?

The study’s main purpose is to investigate the Tabi boots phenomenon in terms of the impact of signature products on a brand, and provide valuable insights into product development, brand building and consumer engagement in the luxury fashion industry.

A quantitative method was selected for this study. The research tool used is a survey questionnaire which allows for easy collecting data used for the quantitative approach (Sukamolson, 2007). The sample was selected using the snowballing and purposive method, which resulted in a randomized sample of people from various backgrounds. Additionally, the questionnaire was posted on social media by a Polish influencer Liliana Grochowska (@lila.grochowska on Instagram). This encouraged people interested in fashion to fill out the questionnaire, therefore making the sample more tailored to the purpose of this study. The sample size was 230 respondents. The majority of the sample were young people aged 18-25. There is a significant gender imbalance in the sample, with women making up 94% of the respondents.

5. Research Findings and Discussion

Perception of Iconic Luxury Fashion Items

In the survey, respondents were asked to provide examples of iconic products without any prior suggestions, allowing for a genuine reflection of what products come to mind. The products that appeared most frequently are presented in Tab. 2.

Table 2. Iconic products mentioned more than 10 times

Brand	Product	Number of mentions
Hermès	Birkin bag	88
Maison Margiela	Tabi boots	61
Dior	Saddle bag	16
Christian Louboutin	Heels (overall)	16
Chanel	Bag (model not specified)	14
Burberry	Trench coat	12
Vivienne Westwood	Orb and Pearl necklaces	10

Source: own elaboration.

The Hermès Birkin bag stands out significantly with 88 mentions, indicating it holds an iconic status in the minds of respondents. Tabi boots by Maison Margiela take the second spot, being mentioned 61 times. Footwear and handbags appear much more often than clothing garments suggesting that it is easier or more common to find an iconic shoe or handbag.

The characteristics mainly associated with iconic items are timeless design, uniqueness and excellent craftsmanship (Fig. 2). These characteristics are crucial in defining a product's identity and making it memorable. Surprisingly the luxurious feel of an item as well as brand name and logo were not picked by many respondents, highlighting the fact that consumers might be looking beyond the logo and seeking deeper value in their purchases.

The respondents rated the selected cult products on a scale from 1 to 5 (5 – fits the respondent's vision of an iconic product very well, 1 – fits the respondent's vision of an iconic product very poorly). The results are shown in Tab. 3.

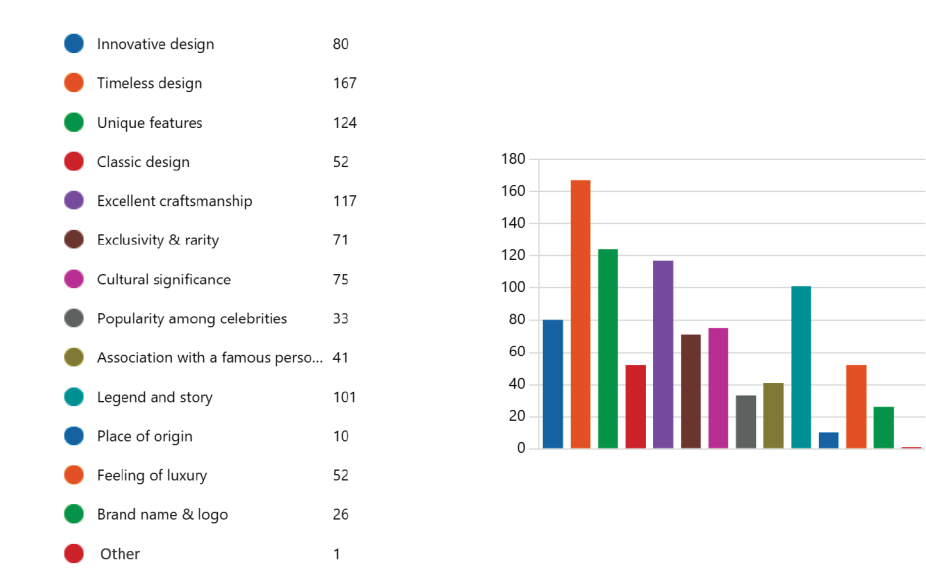


Fig. 2. Characteristics associated with iconic products

Source: own elaboration.

Table 3. Popular iconic products rated by respondents

Product	Average score
Chanel Tweed Suit	4.37
Christian Louboutin Red Soled Stilettos	4.25
Hermes Birkin Bag	4.12
Burberry Trench Coat	4.00
YSL Le Smoking Suit	4.00
Dior Saddle Bag	3.54
Balenciaga Triple S sneakers	2.07

Source: own elaboration.

The scores are analysed in the following way:

- 4.00 and higher – high alignment with the vision of the iconic product,
- 3.00 to 3.99 – moderate alignment with the vision of the iconic product,
- below 3.00 – low alignment with the vision of an iconic product.

Five out of seven products fit into the first category, which confirms that timeless yet innovative design and excellent craftsmanship are indeed some of the most important features that an iconic product should have. The product that received the lowest score of 2.07 were Balenciaga’s Triple S sneakers. This product

is by far the newest item among the rest, being designed for the Fall 2017 collection (Caramanica, 2018), therefore its 'newness' could be the primary reason for such a low score.

Role of Iconic Products in Shaping Brand Awareness

Exactly 50% of the respondents confirm they have discovered a brand thanks to an iconic product, which underlines their role in shaping brand awareness. To further analyse this topic, respondents were asked to indicate which iconic products led them to discover a brand. The brands which appeared most frequently are presented in Tab. 4.

Table 4. Iconic products that led to brand discovery

Brand	Number of mentions	Products with most indications
Hermès	24	Birkin bag
Maison Margiela	22	Tabi shoes
Chanel	10	Bags, tweed suits, no.5 perfume
Burberry	9	Trench coat
Vivienne Westwood	7	Jewellery
Christian Louboutin	7	Red-soled heels

Source: own elaboration.

Brands like Hermès, Maison Margiela, Chanel and Burberry are mentioned most often, which means that these brands have successfully created iconic products that significantly contribute to their brand discovery and overall brand recognition. 22 respondents stated that the reason they discovered Maison Margiela was Tabi boots. This proves Tabi's influence on Maison Margiela's recognition and their significance within the brand.

Maison Margiela Brand Awareness

While the majority of respondents have a high level of familiarity with Maison Margiela, there is still a big group that has never heard of the brand (see Fig. 3).

Additionally, 32% of the respondents would consider themselves a fan of Maison Margiela, which suggests that the brand has a solid following among the surveyed group. This group could also demonstrate a high level of brand loyalty, if they became customers of Maison Margiela. All of the respondents in this group are young individuals (aged 18-33). Five out of eight men (63%) consider themselves fans of the brand, while among women it is only 53 out of 172 (31%). Majority

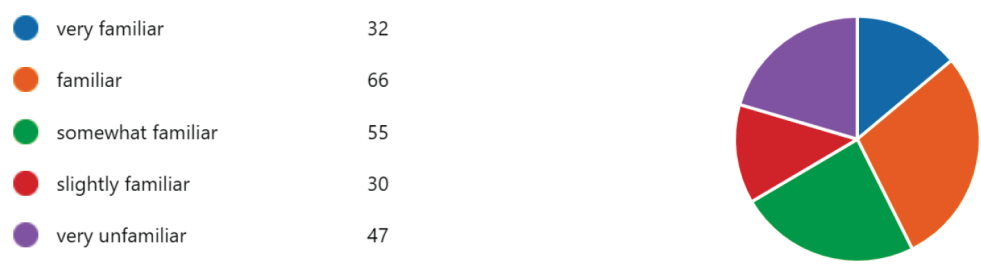


Fig. 3. Maison Margiela brand awareness among the respondents

Source: own elaboration.

of respondents who are fans of Margiela are students and full-time employees with a monthly income up to 6000 PLN.

Perceptions of Tabi Boots

205 respondents (89%) are familiar with the Tabi boots, which means they have either seen or heard about them. It is significant that such a large majority of the respondents are familiar with the Maison Margiela Tabi boots, which indicates the strong presence and recognition of this iconic product in the fashion sphere. Interestingly, 31 respondents who claim to be unfamiliar with the Maison Margiela brand recognise the Tabi boot citing a photo of them. The majority of the respondents (85%) first encountered Tabi shoes via the Internet and social media. Four respondents own Tabi shoes, and two of them own more than one pair which further underlines the huge appeal of Tabi.

The most common first impressions of this item among the respondents were “interesting” (picked by 66%), “unusual” (picked by 59%), and “weird” (picked by 56%). These impressions highlight the provocative nature of the Tabi shoes which tend to evoke strong reactions due to their unique split-toe design. This plays in favour of Maison Margiela as strong emotions make a lasting impression making the product and brand more memorable in consumers’ minds. On the aesthetic spectrum, 56 respondents (24%) described the Tabi shoes as “beautiful”, while 42 respondents (18%) considered them “ugly” (Fig. 4). This further highlights the polarizing nature of the design and how it challenges traditional ideas of what is attractive in footwear.

In the next part of the research about Tabi Boots, respondents were asked to evaluate them against 11 characteristic features associated with iconic products in luxury fashion. The results are presented in Tab. 5. The first 10 features are sorted from most to least important for the respondents based on this research’s previous findings.

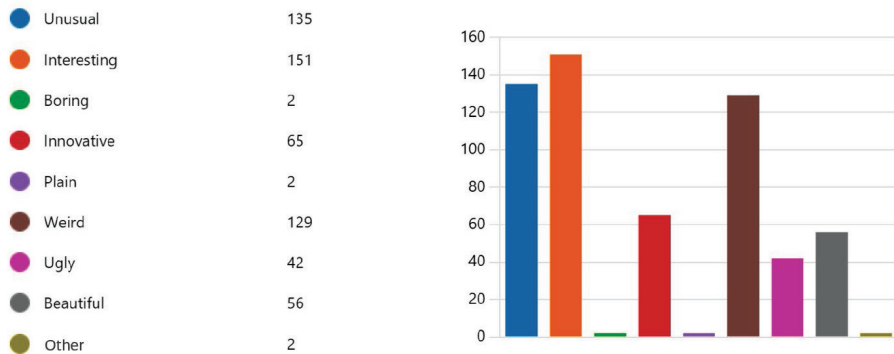


Fig. 4. First impressions about Maison Margiela Tabis

Source: own elaboration.

Table 5. Evaluation of Maison Margiela Tabis based on characteristics associated with iconic luxury products (in %)

Feature	Strongly disagree	Rather disagree	Neutral	Rather agree	Strongly agree
Timeless design	18	23	22	22	15
Unique	3	2	4	17	74
Excellent craftsmanship	3	4	30	33	30
Legendary	7	13	19	24	37
Innovative design	4	4	12	29	51
Culturally significant	8	15	27	21	29
Exclusive and rare	3	9	25	34	29
Classic design	32	26	18	15	9
Luxurious	6	8	23	38	25
Popular among celebrities	7	14	34	26	19
Trendy	6	9	20	36	29

Source: own elaboration.

Most respondents agree that Tabi boots are unique, innovative, and feature excellent craftsmanship – key features that define an iconic product. 65% respon-

dents view Tabis as trendy, reflecting their current popularity, and 61% agree they are legendary, showing broad recognition of their iconic status, even among those less familiar with luxury fashion. However, the boots received lower ratings for timelessness and classic design – 58% of respondents disagree with the statement that they are classic, and 41% disagree with the statement that they are timeless, probably due to their avant-garde split-toe design. Despite this, 75% of respondents believe Tabis are an iconic representation of Maison Margiela, while most agree they define the brand’s image, some express concern that relying too heavily on one product could overshadow other designs.

Consumer Behaviour Towards Tabi Boots

87 respondents (38%) confirm that they consider purchasing Tabis, which suggests that there is a good market potential for these shoes. 54% of those surveyed rate the price of Tabis as similar to other luxury fashion goods, while 22% think the price is slightly lower which, suggests the pricing strategy is in line with the rest of the market. 45% of the respondents who considered purchasing Tabis believe the price reflects their importance to the brand, which is consistent with previous findings. Only 16% of the respondents feel that the price does not accurately reflect their value within the brand.

62% of the respondents do not express the desire to purchase Maison Margiela Tabi shoes. Only 12% of this group of respondents believe that the price of Tabis accurately reflects their value and significance within the brand, 47% is not sure, while 41% do not believe the price represents Tabis value. This means that a significant proportion of these respondents either do not consider Tabis to be good value for the money or are unaware of their value.

Another consumer behaviour aspect that was studied was the likelihood of purchase of other Maison Margiela items (Fig. 5).



Fig. 5. Likelihood of further purchases from Maison Margiela

Source: own elaboration.

Figure 5 shows that a large proportion of respondents would be very likely (25%) or rather likely (39%) to purchase other goods of this brand. Four respondents who own at least one pair of Tabi shoes are very likely to make further purchases at Maison Margiela, which indicates strong brand loyalty and trust among their customers. It also suggests that Tabi boots are a great introduction to the rest of the brand's offer.

6. Implications for Maison Margiela and Other Luxury Fashion Brands

The findings presented in this paper highlight several key implications for Maison Margiela and other luxury fashion brands looking to create and market iconic products effectively. First, the research suggests that bags, shoes, and accessories are more appropriate iconic products than clothing. Consumers tend to buy these products, which suggests that it might be best for brands to focus on these categories.

According to the product levels model presented by Kotler and Keller (2016), luxury goods are augmented products, however iconic products should be stepping into the potential product category because they should be constantly evolving in order to stay relevant in the rapidly changing fashion industry. While developing new products, brands should focus on the full range of transformations that a product might undergo. This can be observed in how Margiela often creating new versions of Tabis (Tabi ballet shoes or Tabi cowboy boots) to adapt to current fashion trends.

Another crucial factor influencing the success of an iconic product is achieving a good balance between timeless and unique design. Iconic products should not be boring, but they should not be overly trendy either. This balance ensures that the product remains relevant and desirable over time, appealing to consumers who seek both innovation and enduring style. The study's findings indicate that timeless elegance combined with distinct features is highly valued by consumers. The unique design of the Tabi boots, for example, evokes strong reactions, making it a memorable and recognisable piece. Brands can leverage such reactions to enhance the product's appeal and market presence.

Additionally, iconic products play a big role in creating and maintaining brand awareness. A well-aligned iconic products can serve as excellent introductions to the brand. Products like the Tabi boots not only draw attention but also encourage consumers to explore more offerings from the brand. These signature items can enhance brand visibility and attract new customers contributing to the brand's overall growth and market presence.

By incorporating these insights, Maison Margiela and other luxury fashion brands can strategically create and market iconic products. The implication presented here can serve as a guide that brands could use to ensure their products resonate with consumers and improve their position in the luxury fashion market.

7. Conclusions

This study examines the impact of iconic products on branding and marketing strategies, focusing on the Maison Margiela Tabi boots. Through a survey, it analyses consumer perceptions, showing that iconic products such as Tabi boots can become a crucial element of branding strategies. Research proves iconic products play a key role in brand discovery and loyalty. These items are often associated with timeless or classic design, however they are also valued for their uniqueness, innovation, and cultural significance. Striking a good balance between mentioned features proves to be more important to consumers than brand logo and luxury status.

This research highlights that iconic items can enhance brand visibility and attract loyal customers. Based on the example of Tabi boots described in this paper, it can be said that Tabi boots are a perfect example of how an iconic product should possess certain features which are valued by consumers. While they may lack a classic or timeless design, they do have other features that are important for consumers and, what is more, they perfectly capture essence of the brand, which proves to be a key aspect when creating iconic products that will stand the test of time.

This research has some limitations, mainly in the sample composition. The vast majority of the respondents were young female students, therefore the sample does not represent the general population and the research findings may be skewed. The main direction recommended for future research on this topic is to ensure greater diversity of the sample. The second limitation could be attributed to the methodological choice of using a quantitative method. While it is a good method for gathering statistical data about patterns in the consumer perception and behaviour, it does not allow for an in-depth analysis. Interviews with consumers of different demographic and economic backgrounds could fill this gap and provide a more thorough and detailed experiences.

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Fenomen butów Tabi. Badanie wpływu kultowych produktów na markę na przykładzie Maison Margiela

Streszczenie: Niektóre produkty modowe wykraczają poza swoją funkcjonalność i stają się symbolami kulturowymi. W przemyśle mody luksusowej kultowe przedmioty mogą istotnie wpłynąć na markę. W artykule zbadano, jak firmy mogą korzystać z takich produktów i wykorzystać je w strategiach brandingowych i marketingowych. Autorka skupia się w szczególności na butach Tabi marki Maison Margiela. Jest to unikatowy produkt, który w ostatnich latach zyskał popularność w mediach. Analiza koncepcji brandingowych oraz przykładów kilku popularnych produktów modowych wykazała lukę w badaniach zwłaszcza na temat Tabi. Jako główny problem badawczy obrano zatem zbadanie percepcji konsumentów i ich zachowań, które można zaobserwować w odniesieniu do ikonicznych produktów, ze szczególnym uwzględnieniem marki Maison Margiela i butów Tabi. W badaniu wykorzystano metody ilościowe do zbierania danych za pomocą ankiety CAWI. Wyniki dostarczają cennych informacji na temat wpływu, jaki kultowe produkty mogą mieć na strategie brandingowe i marketingowe.

Słowa kluczowe: Maison Margiela, buty Tabi, kultowy produkt, moda luksusowa, strategia marki

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Relation between Leadership Style and Personality Type of Zillennials, Based on The Myers-Briggs Model

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Abstract: The paper examines the relationship between leadership styles and personality types among Zillennials, a microgeneration bridging Millennials and Generation Z. The primary goal is to determine whether a dominant personality type exists among Zillennials and to assess the presence of different leadership styles in their preferences. Additionally, the study explores whether individuals with similar personality traits tend to favour the same leadership style. To address these objectives, an online survey was conducted, which included demographic questions, statements about leadership styles rated on a Likert scale, and an externally sourced personality test based on the MBTI model. The findings suggest that leadership style preferences align more closely with generational characteristics than specific personality types. Transformational leadership emerged as the most preferred, while Autocratic and Laissez-faire styles received minimal support. The most common personality type identified was INFP, reinforcing Zillennials' emphasis on inclusivity, authenticity, and personal values. These insights contribute to understanding how personality and generational traits influence workplace dynamics, offering valuable implications for leadership development and organizational strategies.

Keywords: leadership style, personality type, Myers-Briggs, Zillennials

1. Introduction

This research examines the relationship between leadership styles and employee personality types, focusing on Zillennials, the microgeneration between Millennials and Gen Z. They are just entering the job market, so understanding them could be crucial to creating optimal future work environment for them. The study explores how personality type influences preferred leadership styles and aims to predict optimal leader-employee interactions. Through a theoretical analysis of leadership

styles, personality deconstruction, and a quantitative survey, the research seeks to identify dominant tendencies among Zillennials and the potential correlation between leadership preferences and personality traits to enhance collaboration and productivity.

2. Theoretical Background

2.1. Leadership Styles

Leadership is commonly defined as “the job of being in control of a group, country, or situation” (Cambridge University, n.d. b), or more broadly as “a process whereby an individual (leader) influences a group to achieve a common goal” (Cote, 2022). However, this process is more complex than these definitions suggest. To understand leadership better, it is essential to distinguish between styles, as each leader has a unique approach. This work focuses on six styles: transformational, transactional, laissez-faire, autocratic, democratic, and adaptive.

Transformational leadership. The main characteristic these leaders are that they seek to inspire their followers, inspire them to modify the beliefs and attitudes of the employees. They provide the employees with a vision and motivate them to achieve specific goals (Arenas, 2017). These goals relate to self-esteem and are often linked to higher needs. Leaders’ efforts are aimed at enabling employees to reach their full potential. Four precise behaviours of transformational leader can be distinguished:

- Idealized influence – transformational leaders act in ways that depicts them as role models to the people, who trust and respect them. The leader is accountable when it comes to high standards of ethical and moral conduct. Resolves to the power only in the necessity (Avolio & Bass, 2002).
- Inspirational motivation – this behaviour concerns the way leaders inspire and motivate those around them by challenging and giving meaning to their work, strengthening team spirit. They set clear targets, commit to shared goals, and act in accordance with the organization’s vision (Avolio & Bass, 2002). Leaders use three key triggers: motivation, evocation and transcendence. These are conveyed through effective communication, metaphors, vibrant rhetoric, and visionary thinking (Stewart, 2006).
- Intellectual stimulation is vital for leaders to foster innovation and creativity. They challenge assumptions, seek new solutions, and break traditional thinking patterns. A safe space for ideas, where mistakes are not criticized and diverse ideas are welcomed, is essential. Solutions are collaborative, and alternative approaches are embraced (Avolio & Bass, 2002). Key actions promoting intellectual stimulation include re-examining assumptions, seeking diverse perspectives, suggesting new methods, and rethinking previously unquestioned ideas (Arenas, 2017).

- Individualized consideration involves leaders acting as coaches or mentors, fostering learning and creating a supportive environment. Adjusting their approach, such as varying encouragement, autonomy, standards, or task structure, is key to this behaviour (Avolio & Bass, 2002).

Transactional leadership. This style was introduced together with the previously mentioned transformational style, mainly as an opposition. This type of leadership “is based on assumption that subordinates and systems work better under a clear chain of command” (Tavanti, 2007 p. 166) and occurs when the parties want to exchange valuable things that, in addition to punishment, are the main source of motivation, e.g. additional financial resources, support or perhaps some psychological values (Tavanti, 2007). As in previous case, the following dimensions of this leadership can be distinguished:

- Contingent reward that provides followers with resource and motivation to fulfil their obligations. The key aspect is clarification of effort-reward relationship. In the process, requirements are exchanged of and the expected reward is clarified when the required level of effort and performance is achieved (Camps & Torres, 2010).
- Management by-exception active – leader keeps checking on his followers’ performance and gives directions when necessary. With a broader perspective the leader helps reduce deviations and errors by bringing them to the attention of employees as they occur (Hasija, 2019).
- Management by-exception passive – the leader usually intervenes only when standards are broken or failure appears (Arenas, 2017).

Laissez-faire leadership style translates to ‘hands-off’ and represents the absence of active leadership. It is characterized by leaders who avoid engagement, fail to address organizational issues, and often skip meetings and responsibilities (Avolio & Bass, 2002). It can be viewed negatively, citing a lack of positive input. However, laissez-faire can also be seen as a form of respect, allowing subordinates autonomy in decision-making and fostering an environment of free expression and innovation. This non-involvement may be strategic, enabling introverted leaders to thrive in dynamic settings, especially with proactive workers, encouraging collaborative processes and reducing bureaucracy (Yang, 2015). **Autocratic leadership** centralizes decision-making, limits staff input, and maintains distance from subordinates. While leaders may occasionally seek input, they dictate methods, assume full responsibility, and expect strict obedience, sometimes resorting to threats or punishment. This lack of autonomy can stifle innovation and hinder long-term development. Autocratic leadership is effective for short-term issues or when quick decisions are needed, particularly in unstable groups or under knowledgeable leaders. However, over time, it may lead to high turnover, absenteeism, and reduced creativity, harming morale and growth. Inclusive HR practices are essential to counteract these drawbacks (Chukwusa, 2019).

Democratic leadership is about group decision-making, active group members involvement and honest praise and criticism (Gastill, 1994). The leader focuses on giving useful information to the members or on broadening their knowledge. It plays important role in stimulating group discussion and decisions (Choi, 2007). Three primary functions of this leadership can be distinguished:

- Distributing responsibility aims at maximizing involvement and participation by spreading responsibility among team members. Even if one person is formally in charge, democratic leadership, through shared responsibility, reduces that perception (Choi, 2007).
- Empowerment is a way to foster development, such as decision-making skills, by encouraging group members to take responsibility. The leader plays a crucial role in supporting this development both directly and indirectly. Ultimately, this evolution can transform members from followers into leaders themselves (Gastill, 1994).
- Aiding deliberation. Deliberation, defined as “careful thought or discussion before a decision” (Cambridge University, n.d. a) is key to the democratic process. It thrives on constructive participation, facilitation, and healthy relationships. Constructive participation involves problem-solving, analysing, and gathering diverse viewpoints to find the best solution. Facilitation guides the group’s thinking, reduces distractions, and clarifies complex ideas. Maintaining positive relationships is crucial, as it ensures a safe space for open discussion and effective deliberation (Gastill, 1994).

2.2. Personality Types

According to the American Psychological Association (n.d.), “personality refers to the enduring traits and behaviours that define a person’s unique adjustment to life, including major traits, values, and emotional patterns”.

Various theories attempt to explain personality by categorising it through models like the Big Five (openness, conscientiousness, extraversion, agreeableness, neuroticism), the HEXACO model, or DISC framework (Frolova & Mahmood, 2019). This work focuses on the Myers-Briggs Type Indicator (MBTI) due to its widespread use in professional and self-development settings. While not the most scientifically supported, it offers practical insights, especially in business and personal growth. MBTI is a model derived from Jung’s theory of psychological types. The tool focuses on four major areas in the form of dichotomy based on respondents self-reported behaviour, preferences, and value judgments. The model was first developed by Katharine Briggs and Isabel Briggs Myers in 1942 (Stricker & Ross, 1962). The first and most important dimension of the Myers-Briggs model consists of the following.

- Extraversion-Introversion (E-I). Extraverts focus on the external world of people and things, while introverts turn inward, focusing on ideas and concepts. Accor-

ding to Jung, extraversion is a positive movement toward objects, while introversion moves away from them.

- Sensing-Intuition (S-N) relates to how information is processed. Sensors focus on concrete details and present facts, while intuitive types explore possibilities, patterns, and future potential. The third pair,
- Thinking-Feeling (T-F), concerns decision-making. Thinkers rely on logic and objective facts, while feelers prioritise values, empathy, and personal considerations
- Judging-Perceiving (J-P), contrasts a preference for structure and planning (Judging) with a flexible, open-ended approach (Perceiving), allowing for adaptability to new information (Myers & Briggs Foundation, n.d. a).

The first letter (E or I) combines with the mental processes (S-N, T-F) to create the Dominant Process, which is the most developed and comfortable for individuals, forming the core of their personality (Myers & Briggs Foundation, n.d. b). This leads to eight dominant processes (Haas & Hunziker, 2006):

- **Extraverted Sensing (ESTP/ESFP):** people preferring this type of process focus on real-time data and experiences, drawing information from their environment. They thrive on sensory stimulation and practical action, excelling in hands-on tasks.
- **Introverted Sensing (ISTJ/ISFJ):** people representing this kind of process use detailed memories of past experiences to navigate current challenges. They bring with them structure, calmness, and valuable lessons from the past, which makes them reliable in professional environments.
- **Extraverted Intuition (ENFP/ENTP):** people using this process explore possibilities, connections, and patterns, often brainstorming and creating innovative ideas. They are great team players who can unite different perspectives.
- **Introverted Intuition (INFJ/INTJ):** people preferring this kind of process specialize in visionary thinking and internal brainstorming. Although the process can be difficult to explain, they excel at conceptualizing complex ideas.
- **Extraverted Thinking (ESTJ/ENTJ):** these people apply logic through external rules and try to organize their environment. They are strong decision-makers who thrive in structured settings but prefer established systems over innovation.
- **Introverted Thinking (ISTP/INTP):** people using this kind of process focus on internal logic and precision, solving problems systematically. They prioritise objective analysis and stability, often rethinking established ideas.
- **Extraverted Feeling (ESFJ/ENFJ):** people preferring this type of process harmonize with others by fostering interpersonal values and relationships, emphasizing the well-being of the group and understanding social norms.
- **Introverted Feeling (ISFP/INFP):** representatives of this kind of process strive for inner harmony aligned with personal values, valuing empathy and sensitivity. They prefer one-on-one relationships, helping others with authenticity, patience, and sincerity.

MBTI utility and scientific validation. The Myers-Briggs Type Indicator (MBTI) is widely used, with around two million tests administered annually, especially by Fortune 100 companies for team development and career planning (Stein & Swan, 2019). Research links MBTI types to career and academic success, such as ESFJs excelling in psychiatry and INFJs being common at Harvard (Diah Sari & Bashori, 2020). However, scientific validation of MBTI is limited. Its reliance on Jungian theory and anecdotal evidence lacks empirical support. The model's assumption of fixed preferences is questioned, as personality traits can evolve due to culture or life experiences. Additionally, the MBTI's dichotomies, especially Thinking-Feeling, often overlap, and its self-reported data may lead to inaccurate results. Despite these issues, MBTI remains useful for casual self-exploration but should not be relied upon for precise predictions (Stein & Swan, 2019).

2.3. Zillennials

Zillennials, born between 1995 and 2006, are entering the job market, often while still studying or right after graduation (Suresh, 2022). Zillennials are tech-savvy, value teamwork (Suresh, 2022), and benefit from training and knowledge-sharing with older peers. Seeking development and rapid career progression, they strive for managerial positions, though they are sometimes considered to lack essential business skills. While ambitious, Zillennials prioritise work-life balance and prefer flexible, relaxed environments. Companies adapt to meeting their needs, recognising Zillennials as the future workforce eager to do meaningful work in their own way (Moffet et al., 2023).

3. Research Design

The goal of the research in general is to deepen the understanding of the behaviours of the newest generation on the job market. Those mostly students, working part-time or having their first full-time job, bring new approach to the subject of working. The microgeneration called Zillennials probably brings necessity of adjustment in the working environment.

Research questions are the following.

RQ1: *Is there a dominant personality type or dominant function in the target group?* In the example of Harvard students (60), being rather specific group, one type of personality was the most common, so the goal of this research is to check whether it is the same for Zillennials group. In the more restrictive approach, there would be two most common types with fairly similar characteristics.

RQ2: *Are all the leadership styles relevantly present in the preferences of the target group?* Relevant means, whether each of the five leading styles will have some group of supporters. Minimal significant group of supporters would be about 10-15% of all respondents.

RQ3: *Are the leadership style preferences uniformly distributed among particular personality types or dominant functions?* If the results of the personality type test contain similar characteristics, the preferred leadership style would be the same.

Questionnaire design. The survey had two main components: a questionnaire assessing leadership style preferences and a personality test based on the MBTI model. Leadership preferences were measured using a Likert scale, with average scores determining the dominant style. The MBTI test included 60 statements scored on a 7-point scale, covering the dichotomies of Extraversion-Introversion, Sensing-Intuition, Thinking-Feeling, and Judging-Perceiving 16 Personalities (n.d.). Responses identified one of 16 personality types, presented with nicknames to simplify interpretation.

Demographic data such as age, sex, residence, education, and employment status (“studying”, “working and studying”, “working”, or “unemployed”) provided the context for linking leadership preferences to personality traits. The survey was distributed online via social media and student forums to reach a diverse audience.

As a research sampling method, non-probability sampling was used, it could be described as a combination of voluntary response and snowball sampling. The respondents were being searched through students forums on social media. Additionally, they were encouraged to share the survey with their peers.

Leadership styles items that were rated in the survey

Transformational Leadership (Jung & Sosik, 2002, pp. 331, 332):

- I prefer when my team leaders spend time teaching and coaching team members.
- It is important to have strong sense of purpose specified by my team leaders.
- It is important to have collective sense of mission created by my team leaders.
- I find it valuable that my team leaders set high standards.

Transactional Leadership (Mekonnen & Bayissa, 2023):

- I prefer when my team leader makes it clear what can be expected when performance goals are achieved.
- I find it valuable when my team leader expresses satisfaction when expectations are met.
- I prefer when my team leaders concentrate their full attention on dealing with mistakes, complaints, and failures.
- I find it important that my team leaders provide the team member with assistance in exchange for their effort.

Laissez-faire leadership (Skogstad et al., 2007, p. 84):

- I prefer when my team leaders avoid telling me how to perform my job.
- It is better when my team leaders steer away from showing concerns about work's results.
- I prefer when my team leaders avoid making decisions.

- I believe it is good practice for my team leaders to postpone answering urgent questions.
Autocratic leadership (Chukwusa, 2019; Syaiful Baharee Jaafar et al., 2021):
- I prefer not to be involved in decision-making process.
- I prefer when my team leaders tell me exactly what I must do and how it should be done.
- I tend to focus on team leaders' orders, and I am reluctant to discuss the topic.
- I prefer when decisions are made quickly, and efficiency is prioritised than building consensus.
Democratic leadership (own work):
- It is crucial for me to be involved in decision-making process.
- I prefer when my team leaders delegate tasks to me and I have some degree of autonomy in executing my them.
- I prefer when team leaders foster collaboration and involvement.
- I prefer when consensus is sought.

4. Research Results

To address the first research question, as presented in Tab. 1, INFP emerged as the dominant personality type, representing 17% of respondents. This single type surpassed the combined representation of any dominant function pair. Interestingly, the Introverted Feeling function, part of INFP's profile, had no independent representation. The next most common functions, Extraverted and Introverted Intuition, tied at 16%.

Overall, the research sample leaned strongly toward Intuition, with 70% (48 of 69 respondents) favouring this dichotomy. The Thinking-Feeling pair also showed diversity, with 61% identifying as Feeling types, emphasising empathy and interpersonal connections. The remaining pairs showed minor differences, indicating no significant inequalities.

The prevalent mental process, "Possibilities for people", highlights a group preference for fostering relationships, encouraging personal growth, and creating inclusive, welcoming environments. This is in accordance with results of the research by Widawska (2021, p. 361), that generally the inclusiveness and overall well-being is crucial for them, but in the end the nuances are what distinguish them from two neighbouring generations – Millennials and Generation Z.

The answer to the second research question: as presented in Tab. 2, not all leadership styles are equally or relevantly represented in the preferences of the target group. Transformational leadership dominates, with 56% of respondents favouring it and the highest average score of 4.21/5. Its low standard deviation suggests consistency in preferences across respondents. Democratic (23%) and Transactional (19%) leadership styles follow, though with different patterns.

Table 1. Personality types of respondents

No.	Answer	General	
		<i>n</i>	%
1	ENTP	5	7
2	ESFJ	4	6
3	ISFP	0	0
4	INFJ	8	12
5	INFP	12	17
6	ESFP	1	1
7	INTJ	3	4
8	ENFJ	5	7
9	ISTP	2	3
10	ESTJ	3	4
11	ESTP	3	4
12	ISTJ	2	3
13	ENTJ	6	9
14	ENFP	6	9
15	INTP	3	4
16	ISFJ	6	9

Source: own elaboration.

Table 2. Appearances of leadership style as dominant for the respondents

No.	Leadership style	<i>n</i> = 69	%
1	Transformational	39	56
2	Transactional	13	19
3	Laissez-faire	0	0
4	Autocratic	2	3
5	Democratic	16	23

Source: own elaboration.

Democratic leadership showed balanced results across its components but was not as critical to respondents, as indicated by its higher standard deviation. Transactional leadership, however, showed strong support for specific behaviours, particularly clarity and reward systems, indicating these are essential to Zillennials.

Laissez-faire and Autocratic leadership styles were the least preferred, with 0% and 2% dominance, respectively. While some Laissez-faire behaviours like granting autonomy were appealing, other aspects were rated poorly. Similarly, while specific

Autocratic behaviours like clear directions were valued, the style overall had low appeal, with preferences showing high variability.

In conclusion, not all styles are equally relevant. However, elements from less favoured styles, such as autonomy from Laissez-faire and clarity from Autocratic, could be integrated into adaptive leadership approaches to better meet employee needs.

The third question: leadership style preferences are not uniform across personality types, despite the dominance of Transformational leadership overall. No type with more than two representatives exhibited consistent preferences. For example, ISFJ respondents were mostly aligned with Transformational leadership, except one, while ENFJs showed 80% preference for Transformational and one for Democratic leadership.

Some assumptions were partially supported. For instance, Extraversion appeared linked to Transformational leadership in five out of eight cases, aligning with expectations. Similarly, the Democratic style was observed among introverted types, notably INFPs, whose traits as 'Mediators' align with fostering inclusion and understanding.

However, other assumptions were not confirmed. Sensing and Thinking types did not consistently prefer Transactional leadership, with only one ESTP showing this tendency. Autocratic leadership was rarely favoured and showed no consistent correlation with Judging types. Laissez-faire also showed weak and inconsistent patterns.

Overall, preferences varied significantly, reflecting a general tendency toward Intuition and Feeling over other traits. Low scores for Autocratic and Laissez-faire styles suggest these are less desirable across types.

5. Conclusions and Recommendations

Psychology plays a vital role in our lives, especially in the workplace, where understanding psychological models can significantly improve dynamics. Utilising personality insights improves communication and team building, as grouping complementary types fosters collaboration and success. Balanced teams outperform homogeneous ones, as different types excel in distinct tasks. The MBTI framework highlights strengths and areas for growth. Self-awareness allows individuals to harness their strengths and address weaker traits, boosting confidence and career direction. Employers can use this knowledge to align roles with employees' capabilities, supporting development. Generational traits also shape workplace interactions. Zillennials, represented by the dominant INFP type in this study, value empathy, inclusion, and authenticity. They thrive in collaborative environments where their voices are heard, and genuine relationships are prioritised. Their preference for intuition (70%) and feeling (61%) aligns with these characteristics, underscoring

their inclination toward inclusiveness. Leadership preferences reflect this ethos. Transformational, transactional, and democratic styles dominate, emphasizing inspiration, efficiency, and active participation. However, certain elements of less popular styles, like autonomy from laissez-faire or clear directives from autocratic, also resonate. The best approach may be adaptive leadership, combining preferred traits from multiple styles to suit diverse team needs. This flexibility ensures optimal team performance by tailoring leadership to varied preferences. The results cannot be generalised to the entire population, because the sample size was too small, and sampling method is unsuitable for making observations for the entire population.

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Relacja między stylem przywództwa a typem osobowości Zillenialsów na podstawie modelu Myers-Briggs

Streszczenie: Autor analizuje relację pomiędzy stylami przywództwa a typami osobowości wśród Zillenialsów – mikropokolenia łączącego Millenialsów i Pokolenie Z. Głównymi celami badania są ustalenie, czy wśród Zillenialsów dominuje określony typ osobowości, oraz ocena, czy preferencje dotyczące stylów przywództwa są równomiernie rozłożone. Ponadto badanie ma na celu sprawdzenie, czy osoby o podobnych zestawach cech osobowości skłaniają się ku tym samym stylom przywództwa. W celu uzyskania odpowiedzi na te pytania przeprowadzono ankietę internetową, która obejmowała pytania demograficzne, ocenę stylów przywództwa w skali Likerta oraz zewnętrzny test osobowości oparty na modelu MBTI. Wyniki wskazują, że style przywództwa mogą być silniej powiązane z ogólną charakterystyką pokolenia niż z konkretnym typem osobowości. Najczęściej wybieranym stylem

okazało się przywództwo transformacyjne, podczas gdy style autokratyczny i leseferystyczny cieszyły się minimalnym poparciem. Najczęściej występującym typem osobowości wśród respondentów był INFP, co podkreśla znaczenie inkluzywności, autentyczności i wartości osobistych dla Zillennialsów. Uzyskane wyniki pozwalają lepiej zrozumieć, w jaki sposób cechy osobowości i uwarunkowania pokoleniowe wpływają na dynamikę środowiska pracy, dostarczając cennych wskazówek dla rozwoju przywództwa i strategii organizacyjnych.

Słowa kluczowe: styl zarządzania, typ osobowości, Myers-Briggs, Zillennials

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Applications of Artificial Intelligence in Medicine. Analysis of Selected Case Studies

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Abstract: Artificial intelligence (AI) is a rapidly evolving field that has the potential to revolutionise industries, enhance human capabilities, and address complex societal challenges. This article provides an overview of the development of artificial intelligence. The article is divided into sections, focusing on literature review, technological foundations, legal and ethical dilemmas related to artificial intelligence, and practical aspects of artificial intelligence in medicine. Section 2 introduces artificial intelligence and provides an overview of technologies related to artificial intelligence. It also discusses ethical, economic, and technical perspectives. Section 3 explores the application of AI in medicine and healthcare institutions. The author's personal contributions include critical analysis of AI's technological principles, and a detailed discussion of its ethical dimensions. The author proposes tailor-made AI strategies for healthcare institutions, the aim of which is to maximise the quality of medical services and precise diagnostics while minimising the risks associated with the use of artificial intelligence.

Keywords: Artificial Intelligence (AI), AI in medicine, law and ethical AI, AI development trends

1. Introduction

Artificial Intelligence (AI) stands at the forefront of technological evolution, transforming every facet of human endeavour. The author's fascination with AI's potential to revolutionise industries, enhance human capabilities, and address complex societal challenges motivated him to delve into this field.

The primary purpose of this article is to provide an overview of AI's developments in the area of medicine. This article is organized into four sections in order to methodically examine the literature review, the technology fundamentals of the study issue, law and ethical AI dilemmas and practical aspects of the study subject, as well as provide managerial recommendations to real life business applications.

This work aims to demystify AI, outline its potential and pitfalls, and offer pragmatic insights into its practical applications in medicine.

The research methods employed in this article include literature analysis to build a theoretical foundation, comparative analysis of contemporary aspects, and case analysis to investigate AI's practical applications and reasoning. An extensive review of 18 literature and online sources was conducted to discover recent developments of AI in medicine, with main focus to practical applications in healthcare institutions and hospitals.

The article draws upon a diverse range of sources, including seminal works in AI, contemporary research papers, legal documents, and industry reports. These materials provided a multifaceted perspective on AI's evolution, ethical considerations, and commercial applications.

In summary, this article contributes to the field through analysis of AI's context, a critical examination of its technological principles, and a nuanced discussion of its ethical dimensions. Author proposed tailored AI strategies for healthcare institutions, aiming to maximize AI's benefits while mitigating its risks.

2. Introduction to Artificial Intelligence, Technology Fundamentals and Dilemmas

There are many definitions on artificial intelligence, and consensus on a common understanding of AI has been hard to reach. There are two major categories, definitions that come from AI experts, for example data or cognitive scientists, and definitions that are made by policymakers. In the first category, there are approaches that see AI in technical terms and delineate its precise functionality. In the second, the definitions often compare artificial to human intelligence and behaviour. The term 'artificial intelligence' was used for the first time in 1955 by a group of four computer and cognitive scientists, John McCarthy, Marvin Minsky, Nathaniel Rochester, and Claude Shannon (IAPP, 2023). This early definition of artificial intelligence looked at it as a replication of human intelligence, which the authors thought could be so precisely understood and described as to be reproduced by a computer.

As science evolved, so did the definition, which stopped considering human intelligence as the gold standard and saw computers improving beyond the capacity of human brains. The scientific branch of artificial intelligence had the goal to build artificial systems that will outperform humans on tasks that they currently do better, according to Rich and Knight (1991). The view of AI was based on the assumption that it no longer had to imitate human thinking and behaviour, but could reason better than humans. A relatively recent development is the call for dropping the idea of a performance race between humans and machines and focus on the way the two cooperate. This system known as human-in-the-loop sees human intervention as a necessary part of the machine learning process. Humans participate in the training

of models by labelling and structuring the data, essentially telling the computer what to do. Humans also evaluate Machine Learning (ML) models by assessing their output and rejecting errors; thus, a virtuous loop is created where ML algorithms are trained, tested, tuned, and validated. This approach generates the best of both worlds. The mathematical model continuously improves by receiving human feedback, in turn, humans improve their understanding of machine operations and real-world phenomena. Artificial Intelligence (AI) is a multidisciplinary technology that includes computer science, biology, psychology, sociology, philosophy, mathematics, and neuroscience. AI is a rapidly advancing technology in the fields of computer science and data science. It has had a global impact by creating intelligent machines and tools that have revolutionised various industries (Arora, 2025). AI encompasses the utilisation of expert systems, machine learning (ML), artificial neural networks (ANN) and deep learning (DL). Figure 1 illustrates a correlation between them.

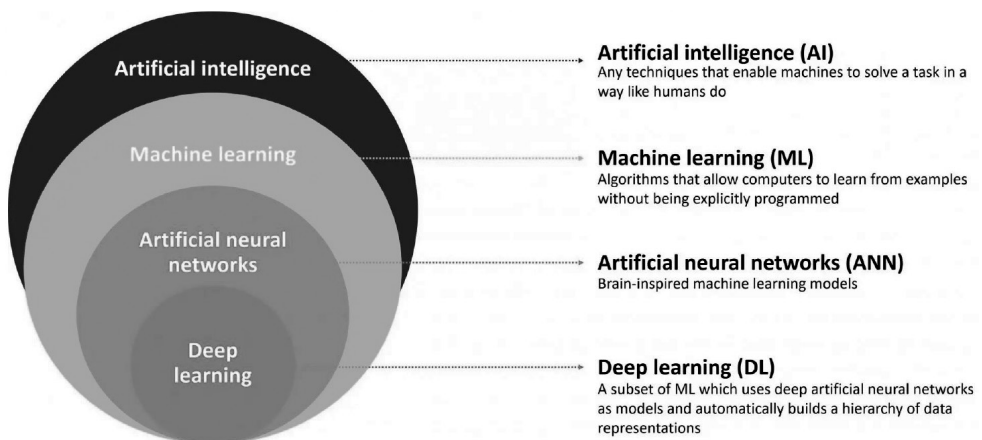


Fig. 1. Relationship between AI, ML, ANN, and DL

Source: (Mattab, 2019).

Natural Language Processing (NLP) includes various tasks such as sentiment analysis, speech recognition, and text translation (Tucci, 2024). A typical illustration of natural language processing (NLP) is spam detection, wherein the subject title and body of an email are analysed to identify the existence of undesirable content. Virtual assistants like Alexa and Siri demonstrate computer applications that assist individuals with their daily tasks. These assistants can acquire a limited number of questions from the user to figure out their needs, rather than analysing vast quantities of data in order to understand a request.

Algorithmic Bias and Fairness

An important advantage of AI is its ability to overcome human biases and limitations. Humans are prone to forming prejudices, harbouring hidden biases, and engaging in overt discrimination, whereas an AI system solely relies on data analysis. Nevertheless, it is risky and incorrect to assume that AI is necessarily unbiased. It can imitate or strengthen human prejudices, resulting in significant unfairness. Algorithmic bias is morally reprehensible and has detrimental effects on marginalised people. It has the potential to result in negative reactions from customers, and other individuals with an interest in the matter. Additionally, it could potentially result in legal proceedings.

A scientific study published in 2019 focused on a prominent academic hospital located in Boston (Obermeyer et al., 2019). Researchers discovered that the use of a care management algorithm resulted in systemic racial discrimination by directing patients of certain races to greater resources based on their high-risk status. The average black patient referred through this programme had nearly twice as many underlying conditions as the average white patient. In short, a black patient had to much sicker to receive the same standard of care. By modifying the methodology to include both white and black patients with similar levels of illness, the researchers observed a roughly threefold increase in the number of black patients who met the criteria. This problem is not isolated. Facial recognition systems have demonstrated lower accuracy rates when it came to identifying faces with dark skin. Similarly, hiring algorithms employed by corporations such as Amazon, which aim to predict job performance based on applications, have been proven to put women at a disadvantage.

There are multiple techniques available to explicitly include fairness requirements into the design of algorithmic systems or to evaluate whether they generate discriminating outcomes. Nevertheless, they are not perfect. First, it is important to note that there is no universally agreed-upon definition of fairness. Consequently, choices and compromises must be made. Systems that prioritise fairness may exhibit reduced levels of accuracy.

The General Data Protection Regulation in Europe includes an anti-bias requirement within the portions that address completely automated processing. The use of the concept is yet not fully understood. Various jurisdictions have put out a range of ideas for new legislation. The European Union has just implemented a significant new legislation on Artificial Intelligence, which has been the subject of a discussion paper. The US has put up suggestions for the Algorithmic Accountability Act, which mandates the use of bias-checking procedures. However, these approaches have not been widely implemented as of now.

Ethical Artificial Intelligence

Ethics are often discussed in the media, particularly when touching topics like abortion, euthanasia, or death penalty. However, ethics are not always applicable in everyday life, both in private and professional aspects. Norms, such as habits, customs, and religions, are the first forms of regulation of interpersonal relations and codes of conduct (Nguyen et al., 2023). These norms can manifest in different formats, such as decrees, orderings, and imperatives, and primarily serve the purpose of fulfilling a duty and prescriptive function in governing social life.

Societal evolution entails the gradual expansion of punishments over time, transforming them into religious rules that persist beyond death. Legal norms have a greater sense of urgency but may lack fairness, and they have the potential to intersect and reinforce one another. Ossowska (1985) argues that the categorization of norms is flexible, where a standard that prohibits certain actions, such as lying or deceiving, can be classified as either a legal norm or a moral norm depending on the accompanying emotion. For instance, honesty is a one-sided order, while integrity is a legal norm. When examining norms, it is crucial to distinguish between individual standards and collective norms that encompass entire social groups. An individual cannot exist in isolation from society, generating fresh viewpoints and responsibilities. According to Witwicki (1957), moral behaviour is crucial in minimising conflicts and ensuring the smooth functioning of society without disrupting social order. Normative ethics is a reasonable framework that provides guidelines for the use of this 'lubricant'.

The topic of ethical intelligence has been extensively examined by Bruce Weinstein (2011), who is also recognised as The Ethics Guy. According to him, ethical intelligence is based on five fundamental concepts: do no harm, make things better, respect others, be fair, and care. These principles represent not only academic meanings but also real consequences in our everyday existence. Weinstein demonstrates that possessing ethical intelligence not only has positive effects on our well-being, but it also improves our physical health, overall happiness, and financial achievement. In the end, ethical intelligence is a significant type of intelligence that plays a crucial role in determining our professional performance, the quality of our interpersonal connections, and our self-perception (Floridi & Cowls, 2019). The goal is to enhance our ethical intelligence in all aspects of our lives.

3. Artificial Intelligence in Medicine

With the increasing adoption of artificial intelligence, the application of this technology across various industries is also expanding. Currently, researchers do not anticipate that AI will replace health care personnel in the near future. Instead, they perceive it as reinforcement and improvement the efforts of healthcare practitioners and experts in the near future.

Advanced AI Tools to Support Clinical Brain Scans Analysis – Diagnose Diseases

Hospitals around the world perform millions of brain magnetic resonance imaging (MRI) scans every year. They have the potential to fundamentally change our knowledge of numerous neurological disorders, but their analysis has not yet been possible due to their anisotropic resolution:

AI can support transforming brain scans for advanced analysis. The AI tool called SynthSR can convert clinical brain scans into high-resolution T1-weighted images. T1-weighted images are produced by using short Time to Echo (TE) and Repetition Time (TR) times. The contrast and brightness of the image are predominantly determined by T1 properties of tissue (Iglesias et al., 2023) – see Fig. 2.

This technological innovation resolves the problem of inconsistent scan quality that previously limited the use of numerous scans in advanced research. SynthSR simplifies the process of generating comprehensive 3D brain renderings by converting these scans into T1-weighted pictures which are renowned for their excellent contrast and accurate depiction of brain structure.

The experiments conducted with the use of SynthSR show strong correlations between observed volumes at both the scan and subject levels, indicating that SynthSR generates images that substantially match those produced by high-resolution T1 scans.

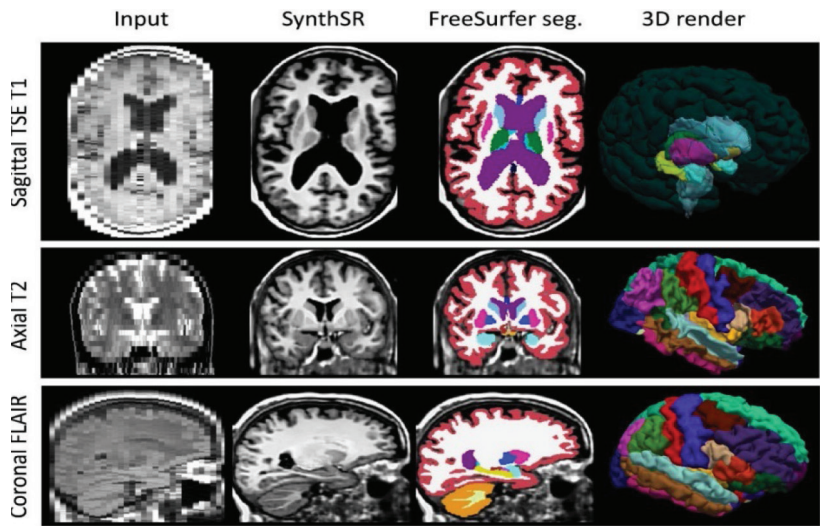


Fig. 2. Examples of inputs and outputs of SynthSR

Source: (Iglesias et al., 2023).

SynthSR is publicly available and can be used by any hospital around the world. The tool is still trained on new data coming from different research sources, mainly

from the Massachusetts General Hospital (MGH) dataset (including MRI scans, ages, and genders) available at the public server of the Martinos Center for Biomedical Imaging (Iglesias et al., 2023).

Artificial Intelligence Algorithms to Support Identification and Treatment of Glaucoma – Precision Medicine

Glaucoma, which is the primary reason for permanent blindness on a global scale, is a group of eye diseases caused by the optic nerve damage that necessitates timely identification and ongoing treatment in order to maintain vision.

Advanced algorithms can analyse retinal pictures, and machine learning models can combine risk factors to identify high-risk individuals who require diagnostic workup and careful follow-up for increased screening. In order to enhance the accurate identification of glaucoma, deep learning methods are used to identify certain patterns associated with the disease. These patterns are detected by analysing data from optical coherence tomography, visual field testing, retinal photography, and other types of ocular imaging. AI-based platforms also enable continuous monitoring, and use algorithms that examine longitudinal data to notify physicians of rapid illness advancement (Zhu et al., 2024). AI can advance precision medicine for glaucoma by using predictive analytics and patient-specific factors to make personalised treatment choices.

The company called Miranza developed a virtual assistant designed to aid professionals in making decisions regarding the treatment of glaucoma. This programme integrates cutting-edge advancements in artificial intelligence and big data to deliver personalised therapy recommendations for the most effective glaucoma treatment tailored to each individual patient. Additionally, it forecasts the intraocular pressure of patients, which is a crucial factor in glaucoma. The assistant can suggest entirely personalised treatment by selecting these criteria which are exclusive to each patient (Equipo Miranza, 2023). In addition it ‘learns’ from its interactions and gradually improves its performance in diagnostic tasks through usage.

Another example of practical application of AI in the treatment of glaucoma is the product called The Eagle created by Belkin Vision from Israel. Belkin Vision has developed an innovative laser platform to tackle the various difficulties involved with employing SLT (Selective Laser Trabeculoplasty) as the main treatment for mild glaucoma and ocular hypertension. The Eagle emits 120 pulses, each with an energy of 1.8 millijoules, in a systematic and continuous circular pattern (Radcliffe, 2022). The treatment process involves preparing the patient and fine-tuning the objective, while the AI algorithm takes care of the remaining tasks with a simple button press (Fig. 3). The laser is integrated with AI eye-tracking technology called SureTrac, which ensures precise targeting of the specified treatment area with every use. Currently, there are two devices in Europe, and one of them being used at the District Railway Hospital in Katowice (Okuliści w Katowicach..., 2024).

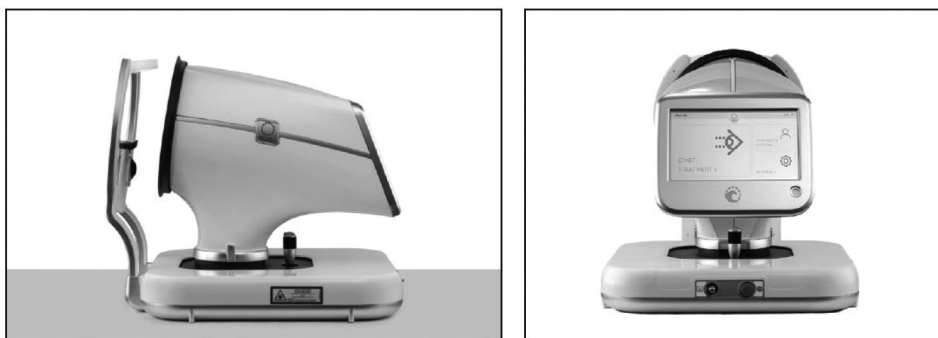


Fig. 3. The Eagle from Belkin Vision

Source: (Radcliffe, 2022).

Thanks to the application of AI the laser treatment is fully automatic and takes 2-3 seconds, while traditional solution laser treatment takes 5-10 minutes and is strongly dependent on a human operator.

CT PANDA and Other Research on Diagnostic Artificial Intelligence Use Cases

Here are couple of examples how AI can support researchers in diagnosis.

Pancreatic ductal adenocarcinoma (PDAC) is an extremely deadly cancer, frequently diagnosed at a stage where surgical treatment is no longer possible. Screening for PDAC in adults without symptoms is difficult because of its low occurrence and the potential for incorrect positive results. A Chinese research team has recently created PANDA (Pancreatic Cancer Detection Using Artificial Intelligence), an advanced AI model that can effectively identify and categorise pancreatic lesions in X-ray images. PANDA outperformed the average radiologist in sensitivity by 34.1% and in specificity by 6.3% during validation testing (Fig. 4). PANDA was evaluated in the study with a substantial number of participants – about 20,000. The results showed that PANDA had a sensitivity of 92.9% and a specificity of 99.9% (Cao et al., 2023).

Breast cancer. A comprehensive literature evaluation was conducted by searching six databases (medRxiv, bioRxiv, Embase, Engineer Village, IEEE Xplore, and PubMed) for articles published between 2012 and September 30, 2022. Studies were qualified if they used actual screening mammography examinations to authenticate artificial intelligence (AI) algorithms for prospective risk estimation alone based on pictures or in conjunction with clinical risk indicators. An evaluation was conducted to determine the quality of the investigations, and the accuracy of predictions was measured using the area under the receiver operating characteristic curve (AUC) (Schopf et al., 2024). Preliminary attempts to forecast future breast cancer risk using only mammography pictures exhibit similar or superior

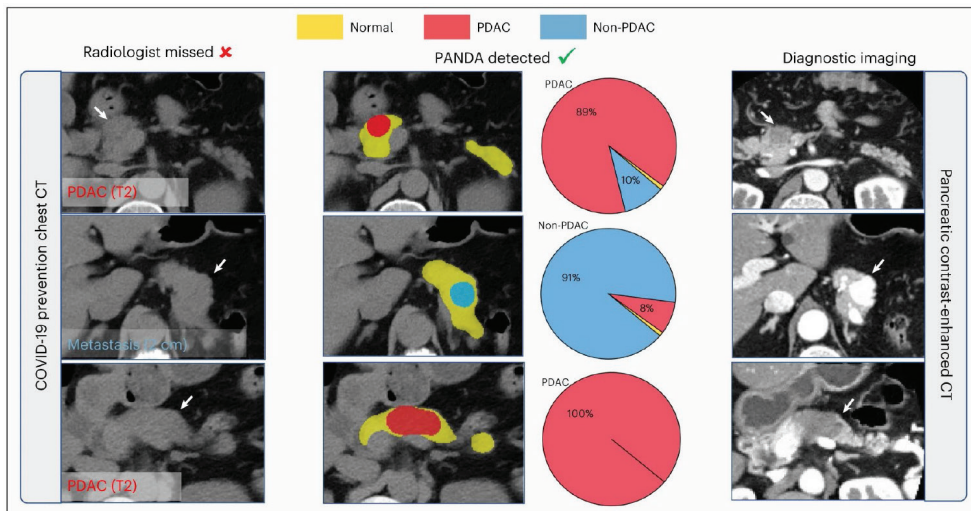


Fig. 4. PANDA detects early-stage PDACs and metastatic cancer

Source: (Cao et al., 2023).

precision compared to conventional risk assessment methods, with minimal or no enhancement when incorporating clinical risk factor data. Shifting from using clinical risk factors to utilising AI image-based risk models can result in more precise and individualised screening methods based on risk assessment.

X-ray interpretation. Artificial intelligence (AI) systems for automated chest X-ray interpretation have the potential to standardise reporting and reduce delays in health systems due to shortages of trained radiologists. Performance achieved by AI X-Raydar tool are similar to historic clinical radiologist reporters for multiple clinically important findings (Cid et al., 2024). The open-sourced neural networks can serve as foundation models for further research and are freely available to the research community and any hospital interested in such tools.

The broad adoption of AI highlights a clear message for professionals in all industries: accepting and utilising AI is crucial for achieving growth and success. Adopting AI is essential for maintaining a competitive edge in any industry, including data science, healthcare, education, or business leadership.

4. Conclusions

As we approach a new era in artificial intelligence, it is crucial that we consider the path that has led us to this point. As the primary goal of the article, the author has explored the vast expanse of AI in medicine and its potentials in healthcare institutions and hospitals. The article has thoroughly analysed the development

progress, technology, ethical dilemmas, and pragmatic uses of AI in medicine, offering an in-depth examination of its advancement.

This article confirms the profound impact of AI on our daily life and emphasises the need for a careful and knowledgeable approach to its integration. In the future, AI is expected to progress rapidly, driven by developments in quantum computing, neuro-symbolic AI, and autonomous systems. The integration of AI with other emerging technologies, like as blockchain and the Internet of Things (IoT), holds the potential to generate innovative synergies and prospects.

In the end, the future of AI is determined by the decisions and actions we make now, which collectively form a complex and interconnected web. The future is full of great potential and significant obligations. As we progress, let us do so with excitement, self-respect, and a constant commitment to the improvement of civilization.

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Zastosowania sztucznej inteligencji w medycynie. Analiza wybranych studiów przypadków

Streszczenie: Sztuczna inteligencja (AI) to szybko rozwijająca się dziedzina, która może zrewolucjonizować przemysł, zwiększyć możliwości ludzkie i sprostać złożonym wyzwaniom społecznym. Autor wprowadza w świat sztucznej inteligencji i dokonuje przeglądu wybranych technologii z nią związanych. Następnie przedstawia zastosowanie sztucznej inteligencji w medycynie, analizując aktualne trendy na rynku sztucznej inteligencji i podając praktyczne przykłady jej zastosowań w instytucjach opieki zdrowotnej. Wykorzystuje różnorodne źródła literaturowe, w tym przełomowe prace dotyczące sztucznej inteligencji, współczesne artykuły badawcze, dokumenty prawne oraz raporty branżowe. Dokonuje dogłębnej analizy kontekstu sztucznej inteligencji, krytycznej analizy jej zasad technologicznych oraz prowadzi dyskusję na temat jej wymiarów etycznych. Autor proponuje ponadto sztywne na miarę strategię AI dla instytucji opieki zdrowotnej, mające na celu poprawę jakości usług medycznych, precyzyjną diagnostykę i minimalizację ryzyka związanego z zastosowaniem AI.

Słowa kluczowe: sztuczna inteligencja (AI), AI w medycynie, prawo i etyka AI, trendy rozwoju AI

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Brand Identity in Luxury Fashion: Tommy Hilfiger Case Study

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Abstract: A significant aspect of the luxury fashion market is brand identity, which is important to relations with consumers. Despite its importance, brand identity in the luxury fashion industry is under-researched. Most studies focus on broader marketing techniques and financial performance, overlooking the importance of creating a corporate identity. This article defines luxury in historical, psychological, and economic terms. The author also focuses on consumer behaviour and market segmentation, referring to major players such as LVMH and Chanel, and examines market segmentation. She explores consumer loyalty and the role of brand identity in shaping perceptions through symbolism, heritage, and exclusivity. The study covers three topics: consumer understanding of brand identity, its impact on perception of luxury brands, and on customers. The qualitative approach, which included interviews with a sales representative and customers in the fashion industry, revealed that consumers have little understanding of brand identity and are unable to describe it. The results show that a strong brand identity fosters emotional bonds, loyalty, and support, thus influencing customer expectations and satisfaction. The availability of luxury consumer and retail outlets in Poland is very limited, which is why the study included participants from both Poland and the UK.

Keywords: brand identity, luxury fashion, consumer perspective, brand identity strategies

1. Introduction

The luxury fashion market, known for its exclusivity, high quality, and distinction, holds a significant place in the global market. A key element of this sector is brand identity, which distinguishes premium brands from the competition and strengthens emotional bonds with customers. Brand identity encompasses visual, aural, and experiential elements that shape consumer perception and behaviour. Despite its importance, the topic of brand identity in luxury fashion is poorly researched, usually focusing on broader marketing strategies, customer behaviour, or financial performance. Additionally, sustainability and ethical concerns are increasingly

influencing consumer choices, pressuring luxury fashion firms to be more transparent and accountable. However, there is a notable lack of transparency about their ecological and ethical policies, complicating consumers' buying decisions.

The review begins by defining luxury in a historical context and exploring the psychology of luxury consumption. It traces the history of luxury fashion from Europe's affluent courts to its current global relevance, examining factors motivating consumers to seek luxury items, such as self-concept, status signalling, and the pursuit of uniqueness. The contemporary luxury fashion market is then analysed, identifying major brands like Louis Vuitton Moët Hennessy (LVMH) and Chanel, and discussing market segmentation and consumer targeting strategies.

The research defines the typical luxury fashion consumer and examines various levels of customer loyalty, considering demographics, wealth, lifestyle, and cultural influences. It explores how luxury fashion firms build and maintain distinct identities through symbolic meanings, heritage, craftsmanship, and exclusivity, emphasising the role of brand identity in differentiating luxury brands and fostering strong emotional connections with customers. The review also covers marketing and branding techniques, highlighting the importance of storytelling, personalised experiences, social media engagement, brand collaborations, limited editions, and experiential marketing.

Based on the literature review, the following research questions were formulated:

RQ1. What is the understanding of brand identity among customers?

RQ2. What is the impact of brand identity on the perception of luxury fashion brands?

RQ3. What influence does brand identity have on customers?

To answer these questions, a qualitative research approach was chosen, involving interviews with six individuals: one salesperson from a premium clothing company and five clients of high-end fashion brands. The study aims to understand brand identity in luxury fashion from the perspectives of clients and staff and its impact on the company.

Structured interviews were conducted to gather participants' opinions on brand identity and exclusivity in luxury fashion. The data was analysed using thematic analysis, identifying recurring themes on exclusivity and brand identity. The article covers the scope of brand identity, focusing on luxury fashion brands with a case study of Tommy Hilfiger, conducted between April and June 2024. The article structure includes a review of luxury fashion, brand identity, research methodology, findings and discussion based on client interviews, and a case study of Tommy Hilfiger.

2. Literature Review

The research focuses on the diverse nature of luxury, looking at it from different perspectives, including social, economic, and subjective. Luxury is difficult to define, in the case of luxury fashion it is not a material object, but a concept inextricably

linked to society values and human goals (Anderson, 2015, p. 574). Luxury is socially perceived as a status symbol and a way of signalling money and power (Kim et al., 2018; Nave et al., 2018; Walasek et al., 2018). Economically, luxury is considered in terms of its significance in market differentiation (Faccioli et al., 2023) as well as its capacity to command premium pricing due to perceived exclusivity (Som & Blanckaert, 2015). The psychological components of luxury impact how luxury items meet emotional requirements such as the desire for individuality, self-expression, and personal fulfilment (Nave, 2018). One of the primary arguments is the subjective nature of luxury. What is considered luxurious varies greatly depending on individual preferences and cultural circumstances. This subjectivity makes luxury a complex and dynamic notion that is constantly redefined by consumers and the market.

Brand identity is an important component of a luxury brand's strategy, acting as the foundation for the brand's image, values, and consumer perceptions. Kapferer (2003) provided a more precise definition of brand identity. His Brand Identity Prism proposes that each brand should build its identity in six dimensions: physical appearance, personality, culture, relationship, customer reflection, and customer self-image.

Physique encompasses the brand's tangible features, such as its colour palette, design, packaging, and logo. These characteristics constitute the core of the brand's identity and are inextricably linked to its archetype, which communicates the brand's excellence.

Personality describes a brand's character or personality features, which are typically human-like. A brand's personality is shaped by its communication, which serves as the means for conveying information about its products or services, frequently personifying them in human terms. In brand identity, these characteristics develop from within the brand. Brand personality and customer self-image are inextricably intertwined, as customers frequently identify with a brand section that represents these characteristics.

Culture shows the values, beliefs, and standards that the brand supports and promotes. Brand culture serves as a company's ethical guide, that influences the way it provides meaningful experiences to employees and customers. It also influences the values behind all brand expressions, customer interactions, and internal decisions. Culture is critical to distinguishing brands from competitors and ensuring a brand's distinctiveness, as it embodies the basic concepts that characterise its products and services. This dimension displays a brand's history, core values, and underlying beliefs, making it easier to identify the strongest companies.

Relationship describes a brand's emotional connection with its customers, as well as how it communicates and interacts with them. A company's marketing culture is crucial since it is strongly ingrained in the company's entire culture and manifests itself through customer interactions. Some customers may link to a brand primarily through economic variables such as cost and income, whilst others may connect with a brand by values such as care, trust, and partnership.

Customer reflection describes how consumers perceive themselves in relation to the brand and the impression they make when using or associating with it. Customer reflection is frequently confused with the target market (Kapferer, 2003). However, it focuses on how buyers picture themselves using a certain product. Consumers use distinct brands to define and express themselves. For example, consumers may look for a product that they believe will raise their social status.

Customer self-image describes the ideal self-perception that a brand wants its customers to have when they interact with it or use its products. Understanding customer self-image necessitates identifying the characteristics with which consumers identify and the qualities they want to see reflected in the company and its products. Self-image is a collection of personal ideas, thoughts, and feelings about oneself as they relate to other objects within socially determined bounds (Onkvisit & Shaw, 1994).

Brand identity is a crucial component of luxury fashion; therefore, multiple methods of conveying brand identity to customers have been created. An example of such practice is price anchoring which is very effectively used by Hermès to create the sense of scarcity and make the product more appealing resulting in a higher price. Luxury brands are made of “time, space and blood” (Kapferer, 2008), the essence of a perfect luxury brand. Heritage and craftsmanship are essential to brand image and its cultivation, and the consistency in representation of the brand creates a strong brand image. Celebrity branding has become increasingly popular over the years (Khatri, 2006). Advertisers use celebrities to promote a positive image of the brand and increase the campaign’s reach (Johnson et al., 2023). Marketing experts use celebrity endorsements to create a unique brand identity and increase brand awareness. While this strategy can be costly, it is now viewed as a powerful strategic tool to maximise profit. Iconic products are another strategy used by companies use – creating one involves delivering a highly popular item to a certain audience, such as our luxury fashion customers. Iconic products are typically characterised by exceptional performance, innovative design, excellent quality, and distinctive features that appeal to their target market. They frequently create a sense of devotion and unity in their fans, who passionately advocate for the product. Brand extensions are a marketing tactic when a company uses a well-known brand name for a new product in the same or different industry. Launching a new product under a well-known corporate brand may get support from its current, loyal customers (Voyer, 2023). This technique, also known as ‘brand stretching’, conforms to the ideals of the parent brand or established business, serves a similar customer base, and attracts new business by entering a new market. Brand extension provides organizations with access to new markets and consumer segments. Luxury retailers are increasingly focusing on creating memorable brand experiences to meet consumer demand (Klein et al., 2016). Pop-up brand stores are temporary locations that are often open only for a few weeks, with the objective of giving consumers more affordable access to luxury brands (Bianchi, 2023). Their objective

is to provide customers with unforgettable brand experiences through hedonic purchasing value, a unique retail concept, and a pleasant environment. In fact, one of the primary distinguishing features of pop-up brand stores is their mission: by emphasising the creation of consumer experiences, luxury brands hope to increase brand awareness among both current and potential customers by encouraging word-of-mouth referrals rather than selling merchandise.

3. Research Methodology

A qualitative research approach was used to acquire in-depth insights into client perceptions of luxury and brand identity. The methodology section describes the process of conducting structured interviews with six people: five luxury brand customers and one sales representative. The decision to apply qualitative approaches, particularly thematic analysis, is explained as necessary for investigating the complicated and subjective character of luxury brand identity.

In the first phase of the research, a critical literature study was conducted to investigate several characteristics of luxury fashion brands, such as psychological aspects, market dynamics, brand identity, and differentiation strategies. After identifying research gaps and developing research challenges and objectives, a qualitative research technique was created. The next step was to prepare and conduct interviews with carefully designed questions that addressed the research objectives. Following the interviews, comments were recorded, and the research was written, culminating in the presentation of findings, contributions, study limits, and future research objectives.

A qualitative research approach was chosen over a quantitative one in order to acquire a thorough understanding of how customers perceive luxury, the reasons for their purchases, and the strategies used by luxury fashion firms to engage them. The emphasis was on acquiring interpretive knowledge rather than simply learning facts. Purposive sampling was applied to choose a diverse sample of six participants, including one luxury fashion sales professional and five clients with varying levels of interest in high-end clothing. Structured interviews were conducted to obtain precise information about brand identification and exclusivity in luxury fashion. The obtained data were analysed thematically to uncover patterns and topics linked to brand identification and exclusivity.

4. Findings

The answer to the question of what is the understanding of brand identity among customers is that most customers understand the fundamentals of brand identity instinctively; they realise that each brand is unique and can perceive how the brand displays itself as a specific look. However, when asked about their favourite brand,

they acknowledge its uniqueness but struggle to articulate why. Interviews revealed that customers do not fully realise that part of a brand identity is how they perceive themselves when using the brand's products. One respondent suggested they would like their body type represented by the brand they purchase from, implying that a lack of representation may drive customers away. Consumers have difficulty understanding parts of a brand's identity that relate to its self-image and reflection, despite understanding the cultural aspect.

When it comes to the influence of brand identity on the perception of luxury fashion brands, luxury fashion brands are distinguished by their high prices and exclusivity. Brand identity is critical in determining the perceived worth and quality of these brands. Elements such as logo design, packaging, marketing materials, and in-store encounters convey a sense of high quality and craftsmanship. According to a sales associate, brands use specific procedures to create an exclusive client experience, and strong brand identification is typically used to represent the exclusivity that premium brands require. Effective techniques include limited editions, celebrity endorsements, and exclusive events to increase a brand's attractiveness and status. Luxury fashion brands with engaging identities can elicit powerful emotional responses, such as enjoyment and confidence, resulting in deeper connections with customers. Storytelling, history, and brand values help engage customers and strengthen their connection with the brand. Luxury companies can stand out in a competitive market by using unique design elements, consistent branding, and memorable advertising. Positive brand identity increases loyalty and word-of-mouth advocacy, which improves overall market perception. Brands with strong identity, such as Maison Margiela, are seen as leaders and innovators, gaining a loyal following and increasing their position as trendsetters in luxury fashion.

Finally, to answer the question of what impact brand identity has on customers, a strong brand identity generates an emotional bond with customers, making them feel part of the brand. This intimate connection can lead to long-term loyalty and engagement. Even if buyers are unaware of the concept of brand identity, it shapes their expectations for the brand experience. Consistent and positive brand experiences reinforce these expectations, leading to greater customer satisfaction. Furthermore, brand identity conveys dependability and integrity, providing the appearance of trust. Most importantly, as noted several times throughout the research, it fosters loyalty, which is critical for businesses seeking to establish a deep emotional bond with their customers. Consumers make better purchasing decisions when they understand the identity being communicated to them. As a result, customer happiness with the purchase leads to loyalty and an emotional tie with the brand.

Additionally, participants have differing opinions on what constitutes luxury. Some associate it with high pricing and exclusivity, while others emphasise quality, craftsmanship, and tradition. This variance highlights the subjective character of

luxury, which was covered in the literature review. The key motivators for new purchases are the product's visual appeal, the desire to own it, and the need to replace existing products. While most consumers feel satisfied with their purchases, some feel no emotions at all or even negative ones, such as worry. Only a small percentage of participants were identified as loyal customers. Interviewees emphasised the relevance of brand identity in purchasing decisions. Social media was identified as an important tool for staying current on trends. However, participants voiced concerns about product quality and loyalty, with scandals potentially driving them away from their preferred brands. Most clients care about ethical concerns, social issues, and environmental sustainability.

Unique designs, brand image, innovation, and craftsmanship were all regarded as important aspects of brand identity. Effective branding strategies include appealing models, images, and event-based marketing. Participants were divided on whether brands should attract new audiences or stay loyal to their core clients, as well as on the concept of brand expansions. Heritage and craftsmanship indicate quality, and consumers believe that brand identity should be constant over time. Brand associations were seen positively if they aligned with the brand's values. Participants also stated they are willing to buy cheaper products if they are of good quality, and many believe that luxury fashion products are frequently overpriced and require justification. Visual appeal and quality are important elements in purchase decisions, and while cult products are sometimes beneficial, some people avoid them to maintain their individuality.

The typical buyer for premium and luxury fashion labels is aged 30-60, with disposable income. Employees at the studied brand are trained to successfully communicate the brand's identity to clients. This training, combined with communication through multiple media, helps the brand connect with its customers. Loyal clients seek classic, timeless goods that reflect both the brand's and their own identities. Sales representatives adhere to a standardised method to enhance the customer experience, creating a sense of exclusivity and luxury. The store environment is designed to clearly communicate the brand's identity, allowing even new customers to understand what the brand represents.

To retain exclusivity, the company restricts its sale offerings and employs a membership club to reward loyal consumers with incentives such as birthday discounts, early access to promotions, and personalised offers. Sales personnel are trained to respond to any price or quality complaints, assisting clients in understanding the value of the brand's pricing. Celebrity endorsements have proven to be highly effective in strengthening brand identity. These endorsements, combined with high-quality craftsmanship, expensive materials, limited availability, and positioning products as status symbols, make up the most successful branding strategies. Pop-up events are extremely popular, allowing customers to connect with the brand. Partnering with organizations that promote ethical and sustainable practices gives the impression of transparency, which appeals to customers. Certain

popular items are republished annually, generating a consistent income stream. The most loyal consumers are identified by their regular, repeat purchases which are bolstered by the membership club, promoting a sense of belonging and community.

Most customers do not pursue studies related to business or economics, so it is unfair to expect everyone to understand business concepts. However, even without formal knowledge, they subconsciously grasp brand identity through their experiences with the brand.

5. Conclusions

The research emphasises the complexities of the luxury market, where brand identity is more than simply a marketing tool; it is an essential component of what makes a business really luxurious. The study adds to the scholarly dispute on luxury branding by examining how brand identity influences consumer perceptions and behaviours in this industry.

The study included interviews with an industry professional and luxury fashion consumers to gain knowledge of brand identity from the viewpoints of customers and personnel. The findings show that most buyers intuitively grasp brand identity but fail to describe what distinguishes each brand. They also fail to recognise how brand identity mirrors their self-image. The study verified the importance of brand identity in producing value and building consumer relationships, with variables such as logo design, packaging, and marketing methods influencing perceptions of quality and exclusivity.

Luxury companies with strong identities create pleasant emotions like contentment and confidence, increasing consumer engagement. Strong brand identities help these companies stand out in a crowded market, increasing loyalty and advocacy. A strong brand identity fosters an emotional connection with customers, resulting in long-term loyalty and increased satisfaction. Consistency in brand identity increases trust and credibility, making it easier for people to choose and stick with a company.

The study also revealed significant limitations, such as the limited availability of luxury consumers in Poland and the requirement to include people from the United Kingdom. Future research should delve deeper into the complexity of brand identification, such as its influence on consumer behaviour and loyalty, as well as transparency in sustainability and ethical standards in luxury apparel. Addressing these gaps could provide significant insights into academic and commercial practices.

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Tożsamość marki w modzie luksusowej: studium przypadku firmy Tommy Hilfiger

Streszczenie: Istotnym aspektem rynku mody luksusowej jest tożsamość marki, za czym idą relacje z konsumentami. Pomimo znaczenia, tożsamość marki w branży odzieży luksusowej jest niedostatecznie zbadana. Większość badań koncentruje się na szerszych technikach marketingowych i wynikach finansowych, pomijając istotność kreowania tożsamości firmy. W niniejszym artykule zdefiniowano luksus w kategoriach historycznych, psychologicznych oraz ekonomicznych. Autorka skupia się również na zachowaniach konsumentów i segmentacji rynku, odnosząc się do dużych graczy, takich jak LVMH i Chanel, oraz bada segmentację rynku. Analizuje lojalność konsumentów i rolę tożsamości marki w kształtowaniu percepcji poprzez symbolikę, dziedzictwo i ekskluzywność. Badanie obejmuje trzy zagadnienia: rozumienie przez klientów tożsamości marki, jej wpływ na postrzeganie marek luksusowych oraz oddziaływanie na klientów. Podejście jakościowe, które obejmowało wywiady z przedstawicielem handlowym i klientami z branży modowej, pokazało, że konsumenci rozumieją tożsamość marki w niewielkim stopniu i nie potrafią jej opisać. Wyniki pokazują, że silna tożsamość marki sprzyja więziom emocjonalnym, lojalności i wsparciu, wpływając w ten sposób na oczekiwania i satysfakcję klientów. Dostępność w Polsce luksusowych konsumentów i placówek handlowych jest bardzo mała, dlatego w badaniu uwzględniono uczestników zarówno z Polski, jak i z Wielkiej Brytanii.

Słowa kluczowe: tożsamość marki, moda luksusowa, perspektywa konsumenta, strategie identyfikacji marki

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The Role of Personal Branding in the Marketing Strategy of the Companies Operating in the Beauty and Fashion Industry

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Abstract: The article examines the strategic role of personal branding in the marketing efforts of companies within the beauty and fashion industries. By analysing case studies of outstanding figures like Chiara Ferragni, Molly-Mae Hague, David Beckham, Kim Kardashian, and Matilda Djerf, the study highlights how personal branding influences consumer behaviour, shapes brand perception, and drives market success. The findings suggest that personal branding, when effectively managed, can enhance corporate identity, foster consumer loyalty, and lead to greater market differentiation. The research underscores the importance of integrating personal branding into marketing strategies, particularly in industries where visual appeal and personal connection are paramount.

Keywords: personal branding, marketing strategy, beauty industry, fashion industry, consumer behaviour

1. Introduction

The beauty and fashion industries are dynamic areas where brand identity is crucial to market success. As these industries continue to evolve, the importance of distinguishing a brand in a marketplace has never been more important. In recent years, personal branding has emerged as a significant aspect of marketing strategies within these industries. Unlike traditional branding, which focuses solely on the company or product, personal branding integrates the persons of individuals (be they influencers, celebrities, or entrepreneurs) into the brand's narrative. This approach extends beyond individual self-promotion to become a tool for companies aiming to create a unique identity and connect deeply with their audience.

Personal branding leverages the power of personal narratives, emotional connections, and authenticity to create a brand that resonates on a personal level with consumers. In an era where consumers increasingly seek authenticity and relatability, personal branding offers companies a strategic advantage by making their brand more relatable and trustworthy. As a result, companies in the beauty and fashion industries are increasingly adopting personal branding as a core component of their marketing strategies, recognizing that the personalities behind the brands can be as influential as the products themselves.

Given the growing significance of personal branding, this article explores its role in shaping marketing strategies within the beauty and fashion industries. To provide a comprehensive perspective, it first examines the theoretical foundations of personal branding, outlining its evolution and key academic perspectives. Next, it presents the research methodology applied in this study, followed by an analysis of selected case studies featuring Chiara Ferragni, Molly-Mae Hague, David Beckham, Kim Kardashian, and Matilda Djerf. By evaluating their branding approaches, the article highlights how effectively managed personal brands influence consumer behaviour, shape brand perception, and drive market success. Finally, the discussion synthesises the findings, offering conclusions and strategic recommendations for businesses and marketers looking to integrate personal branding into their corporate strategies.

2. Theoretical Background

2.1. The Evolution and Concept of Personal Branding

Personal branding is a specific area of branding and refers to the practice of people marketing. When dealing with products related to individuals or organizations, the branding process is usually straightforward. People or organizations in these categories often have well-defined images that are easily comprehensible and either liked or disliked by others. This is especially true for public figures as they are all engaged in a form of competition for public approval and acceptance, benefiting significantly from conveying a strong and desirable image.

The concept of positioning oneself as a brand was initially explored by Ries and Trout (1981), when they broadened the definition of 'brand' to include individuals. However, it was not until the late 20th century that personal branding gained widespread traction. Peters' (1997) seminal article *The Brand Called You*, was a turning point in personal branding theory. Peters urged individuals to manage their careers similarly to how companies manage their brands, emphasizing the need for consistent messaging, a clear value proposition, and differentiation from others in the marketplace to achieve personal success.

The concept of personal branding evolved rapidly as it resonated across various sectors. The idea that one's career could be treated as a brand laid the

groundwork for a broader understanding of personal branding, encompassing not just self-promotion but also the strategic positioning of individual personas within entrepreneurial contexts. This shift reflects the growing recognition of the individual as a powerful brand asset, capable of influencing consumer behaviour, shaping brand perception, and driving business success.

The emergence of digital technologies has had a significant influence on the development of a personal brand. . The rise of social media has amplified the impact of personal branding by providing individuals and organizations with the tools to build and manage their brands on a global scale. The democratization of branding through digital media has fundamentally transformed the landscape, embedding personal branding principles deeply into marketing strategies, particularly in image-driven industries such as beauty and fashion.

Research by Khamis, Ang, and Welling (2017) highlights the critical role that digital and social media play in the development and dissemination of personal brands. They argue that these platforms enable individuals to create and broadcast their identities to a global audience, reinforcing the importance of personal branding in industries where appearance and personal storytelling are crucial. Schawbel (2009) expanded on this by highlighting the role of personal branding in career success, encouraging individuals to create distinct online presences.

Gandini (2016) further argued that social media has democratized the branding process, enabling individuals from all areas to develop personal brands with global reach. This perspective is echoed by Labrecque et al. (2011), who found that even lesser-known individuals can build substantial brand value. Khamis, Ang, and Welling (2017) similarly emphasized the vital role of digital platforms in developing and promoting personal brands, noting how these tools allow individuals to create and broadcast their identities to a global audience.

2.2. Sources and Perspectives on Personal Branding

Building on Peters' foundational work, the academic exploration of personal branding has expanded, offering various perspectives on its key elements and importance. Montoya (2002) is one of the early scholars who further elaborated on the concept by emphasizing the role of authenticity in personal branding. He argues a personal brand must offer a unique value that resonates with a target audience. Authenticity involves a clear articulation of one's skills, experiences, and personality traits, presented in a way that differentiates them from others in the marketplace. This focus on authenticity is increasingly vital in today's consumer landscape, where there is a growing demand for genuine and relatable brand narratives.

Kaputa (2003) further developed the idea of personal branding, stressing the importance of differentiation. Kaputa's work aligns with Keller's (2003) assertion that personal brands must work closely with their audience to foster deeper connections. The need for authenticity and differentiation is crucial in industries,

where personal and corporate brands often merge, and public figures frequently become synonymous with the brands they represent.

Lair et al. (2005) presented a critical perspective on personal branding, suggesting that the commodification of the self could raise ethical concerns, particularly in image-driven industries like fashion and beauty. They argue that while personal branding can be empowering, it also risks reducing individuals to mere marketable commodities, driven by external validation rather than intrinsic values. This critique highlights a tension between authenticity and commodification, particularly in industries where appearance and self-promotion are essential to success.

The role of digital media in personal branding has also been widely discussed. Labrecque et al. (2011) explored how social media platforms have revolutionized personal branding, enabling individuals to create and manage their brands on a scale previously unimaginable. This democratization of branding has levelled the playing field, allowing even those without significant initial fame or resources to develop a global brand. In beauty and fashion, social media influencers have capitalized on this shift, using platforms like Instagram and YouTube to build loyal followings and influence consumer behaviour.

Khamis, Ang, and Welling (2017) provided further insights into the role of digital and social media in personal branding, emphasizing how these platforms allow individuals to curate and broadcast their personal identities to a global audience. This trend is particularly as influencers have become central figures in shaping public perception and driving purchasing decisions.

2.3. Importance of Personal Branding in the Beauty and Fashion Industries

“Personal brand and the strategy of its building can be considered a modern marketing concept” (Zabojnik, 2018, p. 159). It is worth noting that a personal brand not only competes with other personal brands but also strives to establish its position among well-known brands belonging to various corporations. Regardless of the field, a personal brand should embody the values associated with the specific industry, serving as an integral marketing strategy. The process of building a personal brand encompasses a comprehensive set of elements that form a cohesive strategy, integrating image-related actions with marketing activities and personal development. The practice of creating and maintaining a positive image of a personal brand through communication channels is crucial for the development of personal branding (Malinowska-Parzydło, 2015).

Personal branding holds particular significance in the beauty and fashion industries due to their inherently visual and personality-driven nature. These industries are not just about products; they are about creating and promoting aspirational lifestyles and identities, often embodied by individuals who serve as the public face of the brand. According to Riel et al. (2004), these industries place a premium on brand image and consumer perception, making personal branding

a crucial component of strategy. The success of many fashion and beauty brands is closely linked to the personal brands of their founders or key influencers, who often become synonymous with the brand itself.

The significance of personal branding in these industries is further underscored by Aaker's (1997) "Brand Personality Framework" which posits that brands, like individuals, possess distinct personalities that can significantly influence consumer preferences and behaviours. Aaker suggests that a brand's personality traits – such as sincerity, excitement, competence, sophistication, and ruggedness – can align with the personal brands of key figures associated with the brand, thereby enhancing its overall appeal. This framework is particularly relevant in beauty and fashion, where brands are often aligned with specific lifestyles or aspirational qualities. For instance, a brand might be positioned as youthful and adventurous or elegant and sophisticated, based on the personality traits it aims to convey. Effective personal branding helps establish a strong, relatable identity that resonates with target consumers, driving brand loyalty and market success.

Moreover, integrating personal branding into marketing strategy allows companies to forge deeper connections with their audiences. As consumers increasingly value authenticity and relatability in their purchasing decisions, brands that effectively leverage personal branding are better positioned to stand out in the competitive markets. According to Thomson (2006), emotional connections fostered by personal branding create consumer loyalty, further solidifying the influencer's role in marketing strategies. By aligning the personal brand of a key individual with the brand's overall image and values, companies can create a cohesive and compelling brand narrative that appeals to consumers on both rational and emotional levels.

The importance of personal branding is also reflected in the growing trend of influencer marketing. Influencers, who often start by building their personal brands on social media, have become central figures in these industries. Their ability to connect with audiences on a personal level makes them valuable partners for brands looking to enhance their visibility and credibility. Some researchers state that influencer marketing operates at the intersection of marketing, content, PR, and social media. This is why the influencer channel has brought about significant disruption, opportunities, and challenges in the personal branding. The success of these collaborations further illustrates how personal branding can drive consumer engagement, influence purchasing decisions, and ultimately contribute to the success of a brand in the highly competitive beauty and fashion markets.

3. Research Methodology

The research employs a multiple-case study approach to thoroughly assess the impact of personal branding on marketing strategies within the beauty and fashion industries. This methodology is particularly well-suited for exploring complex phenomena in real-world contexts, as it allows for an in-depth examination of

individual cases while also facilitating cross-case analysis. By selecting prominent figures such as Chiara Ferragni, Molly-Mae Hague, David Beckham, Kim Kardashian, and Matilda Djerf, the study can explore a diverse range of personal branding strategies across different segments.

The selection of these five individuals is based on their significant influence in their respective fields and their successful use of personal branding to enhance their professional endeavours. Each of these individuals represents a unique approach to personal branding, reflecting different strategies and outcomes. Chiara Ferragni transitioned from being a fashion blogger to a globally recognized entrepreneur, leveraging her personal brand to build a multimillion-dollar business. Molly-Mae Hague, on the other hand, gained fame through reality television and has since established herself as a key influencer in the fashion industry. David Beckham's journey from a football icon to a fashion and lifestyle brand showcases the seamless integration of personal branding across different industries. Kim Kardashian's brand is built on her media presence and entrepreneurial ventures, making her one of the most influential figures in contemporary pop culture. Matilda Djerf represents a more recent trend, where sustainability and ethical fashion are central to her personal brand, resonating with a global audience that values these principles.

The research adopts a qualitative analysis approach, utilizing content analysis to gain a comprehensive understanding of how personal branding is applied in practice. Social media is a critical tool for personal branding, particularly in the beauty and fashion industries, where visual content plays a significant role in brand communication. By analysing social media content of selected individuals, the study aims to identify key elements of successful personal branding, such as authenticity, consistency, and audience engagement.

4. Research Findings

In the beauty and fashion industries, personal branding plays a pivotal role in shaping public perception, driving consumer engagement, and ensuring market success. The following case studies illustrate how prominent figures have leveraged their personal brands to build and expand their influence within these sectors, demonstrating different facets of effective personal branding.

Chiara Ferragni, an Italian entrepreneur and fashion influencer, exemplifies how a well-crafted personal brand can transform a digital presence into a thriving business empire. Her brand, *The Blonde Salad*, began as a modest fashion blog in 2009, offering her personal take on fashion trends and lifestyle tips. Over the years, Ferragni's blog evolved into a comprehensive fashion and lifestyle platform, incorporating e-commerce, editorial content, and collaborations with major fashion houses. Ferragni's success can be attributed to her strategic approach to personal branding, where she consistently aligns her brand with her personal values, fashion sense, and entrepreneurial spirit. By sharing her life and style authentically across

social media platforms, Ferragni has cultivated a global community of followers who not only admire her fashion choices but also aspire to her lifestyle. This deep connection with her audience has translated into significant commercial success, with *The Blonde Salad* evolving into a multimillion-dollar enterprise that includes her own fashion line, Chiara Ferragni Collection. Ferragni's ability to maintain a cohesive and relatable brand image across various platforms has not only solidified her status as a successful businesswoman but also made her personal brand inseparable from her commercial ventures. This case illustrates the potential of personal branding to create a lasting and impactful presence in the highly competitive fashion industry, where authenticity and audience engagement are key drivers of success.

Molly-Mae Hague, a British social media influencer and former reality TV star, serves as another example of how personal branding can propel a career in the fashion industry. After reality show *Love Island*, Hague cultivated a personal brand based on her relatable persona and style. Her brand resonates strongly with a young, fashion-conscious audience who values authenticity and transparency. Hague's approach to personal branding is centred on maintaining an authentic connection with her followers. She regularly shares personal insights, fashion tips, and behind-the-scenes glimpses into her life, which helps her followers feel a personal connection with her. This authenticity has been instrumental in building a loyal following that actively engages with her content and supports her various business ventures. By staying true to her personal brand, Hague has successfully navigated the competitive landscape of the fashion industry, securing lucrative collaborations with major fashion brands such as PrettyLittleThing, where she now holds the position of Creative Director. Her journey underscores the importance of authenticity in personal branding, particularly in the social media age, where audiences are increasingly discerning and value genuine connections. Hague's success demonstrates that staying true to one's personal brand, while strategically leveraging it to create new opportunities, can lead to sustained success in a competitive industry.

David Beckham's personal brand exemplifies how a character can transcend their original field of expertise to become a global icon. Initially known for his illustrious career as a footballer, Beckham has successfully expanded his brand into fashion and beauty, making him a coveted figure for luxury brands and a household name worldwide. Beckham's brand is synonymous with elegance, family values, and global appeal. His transition from sports to fashion and beauty was not merely a result of his fame but rather the outcome of a managed personal brand strategy. This strategy involved aligning himself with high-profile fashion brands like Armani and H&M, launching his own fragrance line, and establishing a grooming line under his name, which solidified his presence in the beauty industry. Additionally, his collaboration with his wife, Victoria Beckham, on various fashion and beauty ventures have further enhanced his brand's influence. The seamless expansion of Beckham's brand into various domains, including beauty, is a testament to the

power of a well-curated personal brand that resonates with a broad audience. His ability to remain relevant and influential across different industries highlights the importance of adaptability and strategic brand management in achieving long-term success. Beckham's brand evolution illustrates how personal branding, when managed effectively, can facilitate a smooth transition between different career phases and industry sectors, ensuring continued relevance and market impact.

Kim Kardashian's personal brand is arguably one of the most globally recognized and influential, built on her public persona, media presence, and sharp business acumen. Kardashian first gained widespread attention through the reality TV show *Keeping Up With the Kardashians*, but she has since leveraged her fame to create multiple successful businesses, including KKW Beauty and Skims. Kardashian's brand is closely tied to her identity as a celebrity, with her business ventures often mirroring her personal style, preferences, and public image. Her success in creating and marketing products that reflect her personal brand has been instrumental in building a loyal customer base that identifies with her image. Kardashian's ability to connect with her audience on a personal level – through social media, her reality show, and public appearances – has been a critical factor in her brand's success. Her case exemplifies the potential of personal branding to drive substantial commercial achievements, especially when the brand is deeply intertwined with the individual's identity and public persona. Kardashian's brand strategy highlights the importance of consistency, market awareness, and the ability to leverage personal influence to build successful businesses in the beauty and fashion industries. Her story underscores the significance of a strong personal brand in creating and sustaining a business empire in today's highly competitive market.

Matilda Djerf, a Swedish fashion influencer and entrepreneur, has successfully crafted a personal brand that combines a laid-back, Scandinavian aesthetic with a strong emphasis on sustainability. Her brand, Djerf Avenue, reflects her personal values and style, resonating with a global audience that prioritises ethical fashion and sustainable practices. Djerf's success is rooted in her ability to create a brand that authentically represents her lifestyle and values. Unlike many influencers who focus solely on fashion trends, Djerf has positioned her brand around the principles of sustainability, slow fashion, and ethical production. This alignment with emerging consumer values has allowed her to differentiate her brand in a crowded market and build a loyal following that supports her business not just for its products but for the values it represents. The rapid growth of Djerf Avenue, which has become synonymous with Matilda Djerf's image and lifestyle, underscores the effectiveness of a personal brand that aligns closely with contemporary consumer values. Her success story highlights the growing importance of sustainability and authenticity in personal branding, particularly in the fashion industry, where consumers are increasingly conscious of the ethical implications of their purchasing decisions. Characteristics of described celebrities are summarized in Tab. 1.

Table 1. Summary of findings

Influencer	Key personal branding strategy	Platform	Market ,impact
Chiara Ferragni	Authenticity and visual appeal	Instagram, blog	Global brand, entrepreneurial success
Molly-Mae Hague	Relatability and transparency	Instagram, YouTube	Young audience, brand loyalty, partnerships
David Beckham	Elegance and global appeal	Instagram, endorsements	Luxury fashion and beauty, global icon
Kim Kardashian	Celebrity and media presence	Instagram, TV shows	Multi-billion businesses (KKW beauty, Skims)
Matilda Djerf	Sustainability and ethical fashion	Instagram, brand website	Niche audience, sustainability-driven market

Source: own elaboration.

As these cases show , the key elements of successful personal branding include authenticity, consistency, alignment with personal values, and the ability to connect with a target audience on a personal level. These factors are essential for building a personal brand that resonates in the beauty and fashion industries, where consumer trust and engagement are paramount.

5. Conclusions and Recommendations

Personal branding has increasingly become a crucial strategic asset for companies in the beauty and fashion industries. This approach go beyond a mere trend, and, instead represents a fundamental shift in how brands connect with their audiences and establish themselves in a crowded marketplace. Effective personal branding helps companies create a distinctive identity, differentiate from competitors, and forge deeper emotional connections with consumers. By establishing a unique and relatable personal brand, companies can significantly enhance brand loyalty and market success. The case studies highlight that when personal branding is executed thoughtfully, it can substantially boost customer engagement and brand recognition.

To fully leverage the power of personal branding, companies should integrate it into their overall corporate strategy. This involves aligning personal branding efforts with the company’s core values, mission, and market positioning. Personal branding should not be a standalone initiative but rather a cohesive element of a broader marketing strategy. This integration ensures that personal branding activities are in harmony with the company’s identity and strategic goals, creating a unified and compelling brand narrative that resonates with both existing and potential customers.

Social media plays a pivotal role in modern personal branding, offering dynamic platforms for brands to engage with their audience. Companies should invest in producing engaging content that reflects the personal brand's identity and values. By using a mix of visual storytelling and interactive elements, brands can enhance their online presence and foster a stronger connection with their audience. Regular updates and genuine interactions with followers are essential for maintaining a vibrant and relatable personal brand. Collaborations with influencers and industry leaders on social media can also amplify the brand's reach and credibility, further strengthening its market position.

In addition to using social media, companies must stay vigilant in monitoring emerging trends in personal branding. The landscape of personal branding is constantly evolving, and staying ahead of these changes is crucial for maintaining a competitive edge. Companies should invest in market research and trend analysis to anticipate shifts in consumer preferences and branding techniques. By adapting to new trends, companies can ensure their personal branding strategies remain relevant and effective.

Authenticity and transparency are critical components of successful personal branding. Companies should ensure that the personal brands they develop or endorse are genuine and align with their true values and mission. Authenticity fosters trust and builds long-term relationships with consumers, while transparent communication about brand practices and values enhances credibility and loyalty. Maintaining a genuine and open approach is essential for sustaining a positive brand reputation.

Regular evaluation of personal branding strategies is also vital. Companies should establish clear metrics to assess the performance and impact of their branding efforts, such as engagement rates, brand sentiment, and customer feedback. This ongoing evaluation allows companies to identify areas for improvement and adapt their strategies accordingly. Continuous refinement and flexibility in personal branding initiatives will help companies stay ahead of competitors and effectively meet changing market demands.

In summary, personal branding is an indispensable aspect of contemporary marketing strategies, particularly within the beauty and fashion industries. By integrating personal branding into corporate strategies, harnessing the power of social media, staying updated on trends, fostering authenticity, and regularly evaluating strategies, companies can achieve sustained success and build meaningful connections with their audience.

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Rola personal branding w strategiach marketingowych firm z branży kosmetycznej i modowej

Streszczenie: Autorka bada strategiczną rolę personal branding w działaniach marketingowych firm z branży kosmetycznej i modowej. Analizując studia przypadków znanych osobistości, takich jak Chiara Ferragni, Molly-Mae Hague, David Beckham, Kim Kardashian i Matilda Djerf, ukazuje, w jaki sposób personal branding wpływa na zachowania konsumentów, kształtuje percepcję marki i przyczynia się do sukcesu rynkowego. Wyniki sugerują, że personal branding, gdy jest skutecznie zarządzany, może wzmocnić tożsamość korporacyjną, zwiększyć lojalność konsumentów oraz prowadzić do większej różnorodności na rynku. Badania podkreślają znaczenie integracji personal branding ze strategią marketingową, szczególnie w branżach, w których kluczowe znaczenie ma atrakcyjność wizualna i osobiste zaangażowanie.

Słowa kluczowe: personal branding, strategia marketingowa, przemysł kosmetyczny, przemysł mody, zachowania konsumentów

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The Operational Strategies of a Manufacturing Company: The Case of Italmetal

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Abstract: The article examines strategies to increase operational efficiency at Italmetal, a manufacturer of cold-stamped metal components for the automotive and household appliance sectors. The analysis identified key issues such as low overall equipment effectiveness (OEE), extended changeover times, and supply chain management inefficiencies. A combination of quantitative (KPI, OEE, backlog analysis) and qualitative (SWOT, benchmarking, interviews) methods was used to identify the primary sources of inefficiency. In response to the diagnosed challenges, a comprehensive improvement plan was implemented based on Lean Management, Six Sigma, Total Quality Management (TQM) and Business Process Reengineering approaches. Key actions include waste elimination, process standardisation, capacity planning, preventive maintenance and digital integration using IoT technologies and ERP systems. Particular emphasis was also placed on the development of human capital, systematic training and interdepartmental cooperation as the foundation for lasting organizational changes. The case study presents the implemented improvements in three strategic pillars: processes, human resources, and technology. The use of operational tools such as Power BI, Kanban and FIFO logistics supports real-time decision-making and contributes to increased efficiency. The results obtained indicate a significant improvement in productivity, quality and operational flexibility, allowing Italmetal to maintain its competitive advantage and ensure long-term, sustainable development.

Keywords: Lean Manufacturing, operational efficiency, Ishikawa, PDCA, digitalisation

1. Introduction

This article analyses strategies to enhance Italmetal's operational efficiency in cold metal stamping. The study investigates key challenges, such as low OEE, long setup times, and supply chain inefficiencies, affecting productivity and competitiveness. Using KPIs, SWOT, and Ishikawa analysis, the research identifies critical weaknesses and proposes improvement strategies based on Lean, Six Sigma, and digitalisation to optimize processes and resource management.

2. Operational Strategies – Theoretical Background

To improve organizational processes and product quality, various strategies are implemented.

Lean Thinking is a methodology that focuses on reducing waste and creating efficient, standardized processes at low cost. This strategy, derived from the Toyota Production System (TPS), aims to eliminate non-value-added activities, improve efficiency, and empower employees in the process of continuous improvement (Womack & Jones, 2003).

Six Sigma is a data-driven methodology that uses statistical tools to identify and minimize defects, errors, and variability in organizational processes. The primary goal is to improve overall performance by reducing variation and ensuring a stable, predictable process. This approach includes tools like DMAIC (Define, Measure, Analyse, Improve, Control) which allow for systematic process improvement (Antony, 2006).

Total Quality Management (TQM) is a comprehensive management approach aimed at improving quality at all levels of the organization. TQM focuses on continuous improvement, employee involvement, and meeting customer expectations. By monitoring and improving all production factors in alignment with customer needs and technical standards, TQM ensures that quality is built into every aspect of the product and service (Juran, 1999).

Quality Function Deployment (QFD) is a method used to design production processes that align directly with customer requirements. By incorporating the 'voice of the customer' into every stage of product development and manufacturing, QFD helps prevent the need for post-production adjustments and ensures the final product meets customer demands (Akao, 1990).

Business Process Reengineering (BPR) involves a radical redesign of business processes to achieve substantial improvements in cost, quality, and speed. BPR seeks to optimize processes by eliminating redundant steps and automating procedures. The approach is based on a deep understanding of the existing processes and a strategic focus on eliminating inefficiencies (Hammer & Champy, 1993).

Capacity Planning plays a vital role in optimizing resource availability to meet service-level agreements (SLAs) and production requirements. It involves determining the required resources for various processes, such as workforce, production tools, and equipment, to ensure efficient service delivery (Chase et al., 2006).

Inventory Management is another key strategy for resource optimisation. It involves minimising inventory costs while maintaining enough stock to meet customer demand. Approaches like Just-in-Time (JIT), Material Requirements Planning (MRP), and Economic Order Quantity (EOQ) are used to ensure efficient inventory control and minimise storage costs. JIT, in particular, seeks to reduce inventory by delivering materials only when needed in the production process, thus reducing waste (Heizer & Render, 2009).

Supply Chain Management (SCM) encompasses all activities involved in sourcing, production, and distribution. It ensures the timely and cost-effective delivery of products to customers. SCM can be divided into two main components: Supply Chain Planning and Supply Chain Execution. Supply Chain Planning involves activities such as sales forecasting, demand planning, production planning, and procurement. Supply Chain Execution focuses on the actual movement of materials, production processes, and the fulfilment of customer orders (Simchi-Levi et al., 2003).

The Theory of Constraints (TOC) emphasizes identifying and managing bottlenecks within a system to improve overall system performance. The TOC process includes five critical steps: identifying the constraint, exploiting it, subordinating everything to it, elevating it, and avoiding inertia. By focusing on the most limiting constraint, TOC helps organizations enhance their performance and maximise throughput (Balderstone & Mabin, 1998).

3. The Case Study

3.1 Performance Improvement Analysis

This analysis focuses on enhancing Italmetal's operational strategy and performance by identifying key challenges and proposing targeted improvements in processes, workforce skills, and technology adoption, aiming to prevent future profitability issues and support sustainable long-term growth.

The focus is on optimising business operations, with particular attention to three key areas: processes, people, and technology. Each area is examined and improved to achieve strategic objectives related to quality, speed, reliability, flexibility, and cost control:

- **Processes** – operational efficiency is enhanced through the introduction of lean methodologies, standardization of procedures, and automation of production flows. These interventions reduce waste, production times, and improve resource utilization.
- **People** – investment in training and skill development is essential to improve collaboration among teams and foster a continuous improvement work environment. Additionally, leadership and interdepartmental management will strengthen the organization's agility.
- **Technology** – the adoption of advanced technologies, such as the Internet of Things (IoT) and ERP software, will improve process monitoring and resource planning, enabling faster decisions and increasing the ability to respond to market demands.

This overall strategy aims to maximize productivity, improve quality, and reduce costs, enabling Italmetal to successfully face future challenges and sustain its growth in the long term.

3.2. Tools Used for Analysis

The case study employed a combination of qualitative and quantitative tools to analyse and improve business operations, with a particular focus on collecting and analysing both numerical and non-numerical data.

Quantitative Tools. Tools such as OEE (Overall Equipment Effectiveness) were used to assess the overall efficiency of machines and identify areas for improvement in terms of availability, performance, and quality. In addition, the FIFO (First In, First Out) system was applied to optimize inventory management, reducing waiting times and improving material turnover. The customer backlog was also analysed, serving as a crucial indicator to monitor delivery delays and optimise order management.

Qualitative Tools. The SWOT analysis was fundamental in identifying the strengths, weaknesses, opportunities, and threats related to business operations. This allowed for a focus on strategic areas for continuous improvement. Benchmarking was used to compare Italmetal's performance with that of key competitors and identify best practices that could be adopted to gain a competitive edge. Furthermore, financial analysis helped assess the economic sustainability of the proposed changes and monitor operating costs, enabling informed decisions regarding technological investments and resource allocation for improvements.

Interviews. Another important qualitative tool was the interviews conducted with production managers, operators, and department heads. These interviews provided direct insight into daily issues, perceived inefficiencies, and improvement opportunities that were not evident from the numerical data. The responses allowed for integrating previous analyses with real-world information, enriching the understanding of business dynamics and offering concrete suggestions for process optimisation.

Tool Evaluation. Each tool used was evaluated to ensure it was reliable, meaning it produced consistent results over time, valid, meaning it measured what it was intended to, and generalizable, so it could be applied at a company-wide level to identify trends and areas for improvement on a larger scale.

4. Analysis of the Company's Current Operations

Italmetal, part of the Girardini Group, has been operating in the Polish market since 2004. Located in Jelcz-Laskowice, the company manufactures metal components for the automotive and household appliance sectors, with a focus on cold stamping of steel.

Italmetal manages the entire production cycle, from customer order to final product delivery, through a structured and efficient organization.

Customer Order Management – Italmetal ensures high accuracy and responsiveness in order management through the integration of EDI (Electronic Data Interchange) systems and Microsoft Dynamics 365 (Microsoft, n.d.). These tools

enable the exchange of automated data with customers, reducing errors and processing times. Advanced order management allows for real-time monitoring of production status and deliveries, enhancing customer satisfaction and service reliability.

Supplier Selection and Management – the company follows a structured process for supplier qualification and monitoring, evaluating them based on customer technical specifications or corporate strategies. Key parameters such as quality, on-time delivery, and cost competitiveness are analysed. Supplier relationships are managed through a collaborative and data-driven approach, ensuring operational continuity and minimising supply chain risks.

Supply Chain Management – Italmetal optimises the entire procurement and logistics management process by combining various digital tools and lean strategies:

- **Production Planning:** the Gantt software provides a visual and dynamic management of the production phases, ensuring the optimal allocation of resources and materials.
- **Purchase Order Management:** Microsoft Dynamics MRP (Nishad & Sahu, 2015) is used for managing purchasing agreements and call-off orders, ensuring a continuous flow of raw materials and components in line with production needs.
- **Inventory Management:** through JIT (Just-In-Time) and Kanban methodologies, the company maintains an optimal inventory level, avoiding excess stock without compromising production.
- **Inventory Monitoring:** with Power BI, Italmetal has access to real-time updated data on stock levels and material values, enabling quick and strategic decisions for resource optimisation.

Production Management – the production department is organized to ensure efficiency and operational continuity. Shift planning and material management are optimised to reduce machine downtime and maximize productivity. The adoption of digital tools for production monitoring enables constant performance control, supporting quick decisions aimed at continuous improvement.

HR Management – human capital is a strategic resource for Italmetal. The company fosters a work environment based on efficiency, safety, and inclusion, with continuous training programs aimed at enhancing employee skills. HR policies focus on talent development, employee motivation, and adherence to workplace safety standards.

Quality and Certifications – Italmetal operates under a rigorous IATF 16949 certified management system, specific to the automotive sector. The approach to quality is based on defect prevention, continuous process improvement, and constant monitoring of production performance.

Maintenance – the maintenance department uses a data-driven approach to ensure the reliability and operational continuity of the equipment. Performance monitoring is based on key KPIs such as OEE (Overall Equipment Effectiveness), MTBF (Mean Time Between Failures), and MTTR (Mean Time to Repair). The strategies adopted include:

- Routine Maintenance, to ensure the proper functioning of the equipment.
- Preventive Maintenance (Wu, 2011), based on periodic programmes to reduce the risk of equipment failures.
- Predictive Maintenance, based on the use of advanced technologies such as IoT sensors, real-time data analysis, and machine learning algorithms to continuously monitor the condition of machines. Data collected from sensors (e.g., vibration, temperature, pressure, etc.) are analysed to identify patterns or signals that may indicate potential malfunctions or excessive wear of components.
- TPM (Singh et al., 2013) (Total Productive Maintenance), to involve the entire team in the efficient management of machines.

5. Strategies for Improving Operational Performance

5.1. Interviews

Quality

1. Question 1 regarding the main quality objectives – the main quality objectives are customer satisfaction and reducing non-quality costs, with KPIs integrated into the PBSC. The IATF sets process regulations.
2. Question 2 regarding the alignment of objectives between those of the company and those of the department – the company's objectives align with its policy, mission, and strategy, covering sustainability, health and safety, information security, quality, environment, and ethics.
3. Question 3 regarding the main challenges of quality assurance – the company aims to reduce human error and customer claims by installing cameras for product verification and defects, along with adopting visual management, machine learning, and digitalisation.
4. Question 4 regarding the possibility of reducing waste and customer complaints – the strategy to reduce waste and complaints starts with product development and FMEA analysis. Technology for defect detection is planned, and if defects persist, the company negotiates compromises with customers due to technological limits.

Production

1. Question 1 regarding the main objectives of the department – maximising efficiency, ensuring quality, reducing waste and raw material consumption, increasing capacity, improving flexibility, ensuring health and safety, and staff development.
2. Question 2 regarding the alignment of objectives between those of the company and those of the department – achieving financial milestones, involving

production in strategy, setting SMART objectives, promoting collaboration, and fostering a culture of operational efficiency.

3. Question 3 regarding the possibility of reducing scraps and customer complaints – reducing scraps is a priority, with visual management tools like monitors showing instructions, and scrap reduction being a shared responsibility, not just the quality department's.

Maintenance

1. Question 1 regarding the responsibilities of the department – maintaining equipment for cold metal stamping, resolving failures quickly to minimize interruptions, and upgrading technology to improve productivity and quality. Regular preventive maintenance ensures efficiency and prevents unexpected issues.
2. Question 2 regarding the alignment of objectives between those of the company and those of the department – the goal is to minimize downtime and waste by ensuring presses are well-calibrated, preventing mold breakages and component failures, which improves product quality.
3. Question 3 regarding the continuous improvement of the department – maintenance uses weekly, monthly, and quarterly analyses, Pareto charts, and the PDCA cycle. Key indicators are MTTR and MTBF, with TPM methodology for equipment upkeep.

Logistic

1. Question 1 regarding the responsibilities of the department – the management includes inventory control, production and shipment planning, transportation optimization, warehouse organization, traceability systems, supplier and logistics partner management, and ensuring safety and compliance.
2. Question 2 regarding the integration of the department within the company – and its impact on overall operational efficiency.
3. Integrating the logistics department has improved supply chain synchronization, reduced costs, and enhanced collaboration, resulting in faster responses, shorter delivery times, and better overall performance.
4. Question 3 regarding the reduction of losses due to material flow – regular inventories, waste reduction, optimized transportation, minimized warehouse idle times, and RFID use in the Kanban warehouse are key practices for efficiency.

Management Board

1. Question 1 regarding how the board of directors monitors and evaluates company performance – key KPIs include financial performance, customer feedback, benchmarking, and measurable objectives. Regular performance helps create a culture where success is rewarded and underperformance addressed.

2. Question 2 regarding the KPIs used to monitor the company – KPIs, including those in the Balanced Scorecard and monthly income statement, are analysed monthly to address underperformance and track financial results.
3. Question 3 regarding initiatives to ensure the company's environmental and social sustainability – the company focuses on reducing its environmental impact through eco-friendly technologies, emissions reduction, recycling, and energy efficiency. It also prioritises employee health and safety and publishes annual sustainability reports on progress and challenges.
4. Question 4 regarding how these initiatives is communicated to stakeholders – the company publishes annual reports on sustainability progress and holds ISO 14001:2014 (environmental management) and ISO 45001:2018 (health and safety management) certifications.

5.2. Identification of Problems and Opportunities

In order to clearly highlight Italmetal's internal strengths and weaknesses, as well as external opportunities and threats, a SWOT analysis was conducted. This structured approach helps to identify the key factors affecting the company's operational performance and competitiveness.

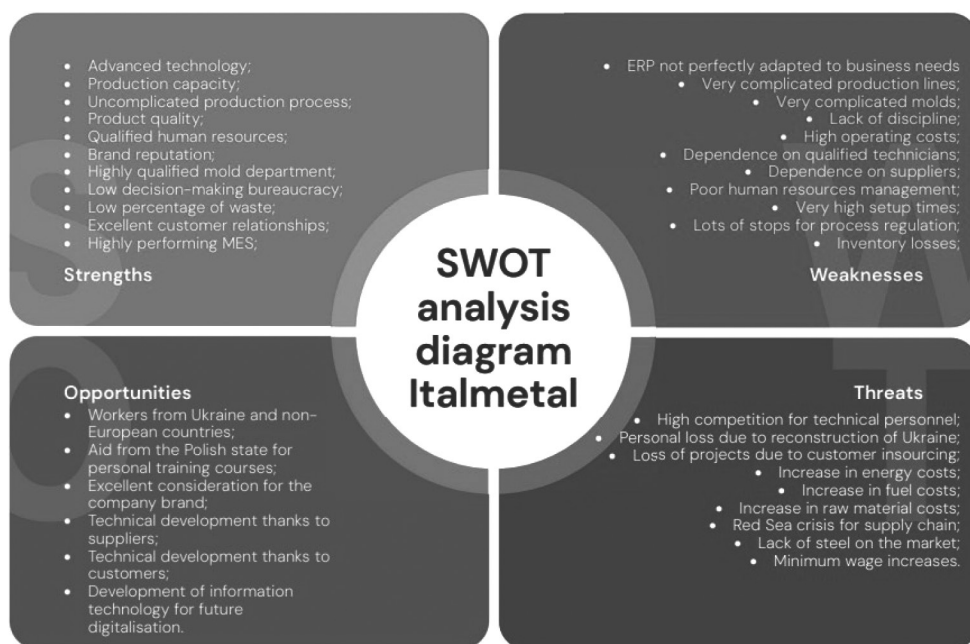


Fig. 1. SWOT analysis

Source: own elaboration.

While Fig. 1 summarises the findings, a short explanation is essential to contextualise the analysis and guide strategic decision-making. For this reason, each element of the SWOT is briefly discussed to better illustrate how it relates to current challenges and potential areas for improvement.

5.3. Selection of Improvement Strategies

The analysis will use the Ishikawa method and ‘5 Whys’ to identify root causes. The SWOT analysis highlighted key weaknesses: low OEE, high setup times, difficulty in supplying materials, and complex machines.

Significant weakness: low OEE (Tab. 1)

Table 1. Low OEE analysis

	Causes	Possible solutions
Material	Dimensions out of tolerance for the sheet	Automatic monitoring of sheet dimension and quality
	Thickness out of tolerance for the sheet	Automated material selection to ensure quality
	Poor quality of the sheet	Viso systems
Environment	Disorder on the line	Implement the 5S methodology to reduce disorder
	Noise	Improve lighting and noise levels on the line
	Insufficient lighting	
Methods	Preventive maintenance not performed on time	Implement predictive maintenance through the IoT
	Undefined processes	Standardise processes and automate operations
	Manual operations	
	Incorrect line setup	
Measurement	Finished product dimensions	Automatic checks for finished product dimensions and sheet measurement
	No automatic parameters check	
	No automatic checks for sheet dimensions	
Machine	No early warning system	Adopt predictive monitoring systems
	Incorrect lubrication	Automate lubrication processes and monitor tool conditions
	Tool anomalies	Adopt predictive monitoring systems
	Machine anomalies	
Men	No parameter checks	Continuous training and monitoring of critical parameters
	Manual operations	Automate manual operations
	Incorrect packaging	
	No detection of scrap	Introduction of Viso systems and machine learning

Source: own elaboration.

Italmetal’s OEE is 68%, below the target of 70%, with efficiency losses due to raw material quality, manual operations, and equipment downtime. Automation through robotics, sensors, and vision systems could improve efficiency and reduce waste.

Significant Weakness: High Setup Times (Tab. 2)

Table 2. High setup times analysis

Causes		Possible solutions
Material	Dimensions out of tolerance for the sheet	Automatic monitoring of sheet dimensions and quality
	Thickness out of tolerance for the sheet	Automated material selection to ensure quality
	Poor quality of the sheet	Viso systems
Environment	Disorder on the line	Implement the 5S methodology to reduce disorder
	Noise	Improve lighting and noise levels on the line
	Insufficient lighting	
Methods	Mold change operations, undefined time	Standardise and automate the mold change process. Implement time tracking and establish standard changeover durations
	Unsuitable equipment	Invest in equipment suited for the mold change process
	Undefined internal and external activities	Define and document all internal and external activities
	Non-parallelized activities	Parallelise task where possible to reduce downtime and improve efficiency
Measurement	Machine parameters not updated	Implement automatic parameter updates and regular checks
	Operation times not respected	Establish clear time standards and monitor adherence
	Non-compliance with setup start time	Standardise setup times and enforce strict scheduling
	Performance of line after setup	Implement post-setup performance checks and continuous improvement
Machine	Unsuitable transfers	Optimize transfer methods and invest in appropriate equipment
	Unsuitable molds	Redesign and update molds to match production requirements

Causes		Possible solutions
	Unsuitable presses	Replace or upgrade presses to meet production standards
	Complexity of the machine	Simplify machine operations and invest in operator training
Men	No check of parameters	Implement automated parameter monitoring and regular checks
	Waiting time and unnecessary movements	Optimise workflow and layout to reduce waiting and unnecessary movement
	Manual operations	Automate repetitive tasks and improve processes
	Staff rotation	Establish a clear rotation schedule to balance workload and prevent fatigue
	Competence and training	Provide continuous training and skill development programme
	Teamwork efficiency	Promote collaboration and clear communication across teams
	Stress and tiredness	Implement regular breaks and stress management practices

Source: own elaboration.

The company's current setup time is 3 hours, with a target of 1 hour. High setup times are mainly due to the lack of 5S and SMED methodologies, staff discipline issues, and insufficient continuous improvement. Implementing Visual Management with monitors to guide staff and monitor timelines is a key strategy for improvement.

Significant Weakness: Difficulty in Supplying Materials (Tab. 3)

Table 3. Difficulty in supplying materials analysis

Causes		Possible solutions
Material	Lack of steel in the market	Diversify suppliers, negotiate long-term contracts, or explore alternative materials
	Poor quality of the sheet	Viso systems
Environment	Disorder in the warehouses	Implement the 5S methodology to reduce disorder
Methods	Inventory not properly carried out	Implement regular inventory audits and use barcode/RFID systems for tracking
	Operators do not unload materials from the warehouses (IT)	Assign clear responsibilities and improve communication with warehouse staff

Causes		Possible solutions
	ERP does not properly manage materials	Update or upgrade the ERP system to enhance material management capabilities
	Suppliers not well managed	Strengthen supplier relationships, establish clear performance metrics and conduct regular reviews
Measurement	Wrong material inventory	Regularly update inventory records and conduct accurate stock audits
	Suppliers not well evaluated	Implement a supplier evaluation system based on performance metrics and quality
	Wrong raw material budget	Review historical data and adjust the budget based on actual consumption and market trends
Machine	ERP not well calibrated	Recalibrate the ERP system and ensure it aligns with current processes
	Warehouse Wi-Fi not working	Upgrade the Wi-Fi infrastructure and perform regular maintenance
	Unsuitable scanners and PDAs	Replace outdated equipment with more efficient and reliable models
Men	Failure to comply with procedures	Conduct regular audits and reinforce adherence to procedures
	Errors in locating materials	Implement better inventory tracking systems and improve warehouse organization
	Short times for carrying out operations	Review and optimize workflows to allow sufficient time for tasks
	Lack of training	Provide regular training sessions and develop a continuous learning programme for employees

Source: own elaboration.

The company faces 20% stoppages due to supply shortages, aiming to reduce this to 15%. Challenges include steel shortages, poor ERP integration, and untrained personnel, leading to delays and inefficiencies. To address this, the company must optimize internal processes, update the ERP system, train staff, improve supplier relationships, and enhance inventory management for reliable material procurement and better performance.

Significant Weakness: Complex Machines (Tab. 4)**Table 4.** Complex machine analysis Source: own elaboration

Causes		Possible solutions
Material	Materials that are not easy to put into production	Improve material handling processes and provide specific training for operators on handling challenging materials
Environment	Disorder on the line	Implement the 5S methodology to reduce disorder
	General discontent	Address concerns through open communication, feedback sessions, and improvement initiatives
Methods	Lack of clear instructions	Provide detailed and standardized work instructions for all tasks
	Creation of machines without involving technical operator	Involve technical operators early in the design and development phase of machines
	Production processes not fully defined	Define and document all production processes to ensure consistency and efficiency
Measurement	No evaluation of the complexity of the machine	Perform a thorough evaluation of machine complexity during the design phase. Evaluation to redesign the actual machine
	No assessment of the level of internal assistance from technicians	Regularly assess and document the level of internal technical support needed for operations
Machine	Machines built in steps	Implement a more streamlined machine design process to ensure smooth integration
	Parts of the line not perfectly interfaced	Improve the interface and communication between line components for better coordination
	Machines have no clear alarms	Install clear and intuitive alarm systems for quick issue identification
	Control panels are overloaded with commands	Simplify control panels by organizing and prioritizing commands for better usability
Men	Lack of skills and training	Implement regular training programmes and skill development initiatives
	Lack of availability of qualified manpower	Hire additional qualified staff or offer training to current employees
	Staff rotation	Establish a structured staff rotation system to ensure consistency and experience across roles
	Motivation and involvement	Foster a positive work culture, offer incentives, and involve employees in decision-making processes

Source: own elaboration.

The company faces 15% of stoppages due to machine complexity, aiming to reduce this to 10%. Challenges include the need for specialised skills and equipment for cold forming materials, low technician motivation, and lack of training and work instructions, leading to operational errors. The diverse origins of machinery also complicate production management. To address these issues, the company needs a strategic approach to improve recruitment, staff training, and motivation, while optimizing technologies and procedures. Continuous improvement is essential for long-term success.

6. Conclusions and recommendations

Italmetal faces key operational challenges, including low OEE, long setup times, material supply issues, and production line complexity. High setup times are exacerbated by the lack of methodologies like 5S and SMED, and personnel discipline. Introducing Visual Management can help improve setup processes and adherence to deadlines. Material supply issues are linked to market shortages and inefficient ERP integration, which can be addressed by optimising ERP systems, training staff, and enhancing inventory management.

Key recommendations for improvement include investing in machine learning, Visual Management, automation, IoT, and AI to reduce human error and drive Digital Transformation. By implementing these technologies, Italmetal can improve resource monitoring, optimise processes, and reduce waste and costs. These changes will enable the company to adapt to the fast-paced digital era and enhance its competitiveness in the market.

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Strategie operacyjne przedsiębiorstwa produkcyjnego: przypadek Italmetal

Streszczenie: W artykule autor analizuje strategie mające na celu zwiększenie efektywności operacyjnej przedsiębiorstwa Italmetal Sp. z o.o., producenta elementów metalowych tłoczonych na zimno dla sektora motoryzacyjnego oraz AGD. W toku analizy zidentyfikowano kluczowe problemy, takie jak niska ogólna efektywność wyposażenia (OEE), wydłużone czasy przebrojeń oraz nieefektywności w zarządzaniu łańcuchem dostaw. Zastosowano połączenie metod ilościowych (KPI, OEE, analiza zaległości) oraz jakościowych (SWOT, benchmarking, wywiady) w celu identyfikacji podstawowych źródeł nieefektywności. W odpowiedzi na zdiagnozowane wyzwania wdrożono kompleksowy plan doskonalenia oparty na podejściach Lean Management, Six Sigma, Total Quality Management (TQM) oraz Business Process Reengineering. Kluczowe działania obejmują eliminację marnotrawstwa, standaryzację procesów, planowanie zdolności produkcyjnych, konserwację prewencyjną oraz integrację cyfrową z wykorzystaniem technologii IoT i systemów ERP. Szczególny nacisk położono również na rozwój kapitału ludzkiego, systematyczne szkolenia oraz współpracę międzydziałową jako fundament trwałych zmian organizacyjnych. Studium przypadku prezentuje wdrożone usprawnienia w trzech filarach strategicznych: procesach, zasobach ludzkich i technologiach. Wykorzystanie narzędzi operacyjnych, takich jak Power BI, Kanban oraz logistyka FIFO, wspiera podejmowanie decyzji w czasie rzeczywistym i przyczynia się do wzrostu efektywności. Uzyskane rezultaty wskazują na istotną poprawę produktywności, jakości oraz elastyczności operacyjnej, umożliwiając Italmetal utrzymanie przewagi konkurencyjnej oraz zapewnienie długofalowego, zrównoważonego rozwoju.

Słowa kluczowe: Lean Manufacturing, efektywność operacyjna, Ishikawa, PDCA, cyfryzacja

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Unlocking Opportunities: Wielton Group's Sales Strategy for Growth in the African Market

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Abstract: The aim of this research is to evaluate Wielton Group's current sales strategy in the African market, analyse the factors influencing its performance, and identify opportunities for growth, market expansion, and efficiency improvement. Additionally, the study considers the company's potential entry into the Egyptian market and explores strategies for successful expansion. As the third-largest producer and distributor of trailers, semi-trailers, and truck bodies in Europe, Wielton Group seeks to expand its presence into Africa, with a particular focus on Egypt. The research aims to conduct a detailed analysis of the factors influencing Wielton Group's performance and sales opportunities. This includes evaluating the existing sales strategy, considering contemporary trends, and examining the potential of the Egyptian market as a sales channel for Wielton's products, based on valuable and professional insights gathered from Wielton Group's employees. The research was conducted using a qualitative data collection method – semi-structured interviews. In the empirical research phase, diverse perspectives shed light on the company's activities in the African market. The strategic motivations for entering the African market, the challenges encountered, and the adaptive sales strategies were discussed. The decision-making process regarding entry into the Egyptian market was examined, highlighting optimism and flexible strategies. Based on the research findings, various managerial proposals are presented to help the company achieve sustainable and profitable growth in the African market and Egypt.

Keywords: sales strategy, African market, performance improvement, intercontinental expansion

1. Introduction

In the days of rapid global changes, amidst the complexities of geopolitical, economic, technological, and ecological shifts, multinational companies must formulate sales strategies to remain competitive and boost their influence on

customers (Kasych & Vochozka, 2019). However, organizations need to determine the specific type of strategy on which to concentrate. This need is influenced by factors that are the elements of a dynamic and complex business landscape. In navigating these complexities, multinational companies find themselves in a crucial position where strategic decision-making becomes essential. As multinational companies chart their course through the interventions of global business, the role of sales management becomes not only about driving revenue but also about fostering long-term relationships.

The purpose of this research is to evaluate Wielton Group's current sales approach in the African market by analysing performance factors and identifying areas for growth, increased market reach, and operational improvements. Furthermore, the study considers the company's expansion into Egypt, assessing potential entry opportunities and strategic approaches. This problem is particularly relevant for Wielton Group, currently positioned as the third-largest manufacturer and distributor of trailers, semi-trailers, and lorry vehicle bodies in Europe. To conduct a more precise analysis, the Arab Republic of Egypt has been selected as the potential region for expansion and review as a possible sales channel for Wielton's products.

For the situation analysis, primary data was gathered from all accessible sources and reports of Wielton Group, supplemented by secondary data about the market and the industry. Additionally, information was derived from the author's experience and personal observations. Theoretical aspects and frameworks were chosen through an extensive analysis of available scholarly literature, articles, and journals for the literature review.

Furthermore, the conducted empirical research is qualitative and based on semi-structured interviews. The target population comprises key stakeholders within Wielton, including sales managers, marketing experts, executives, and others directly involved in the company's sales strategy in the African market. Additionally, the author concluded interviews with clients or customers in the African market. The received answers were used to interpret and formulate a set of instruments for strengthening the sales strategy and providing recommendations for sales expansion in the Egyptian market.

2. Theoretical Background

Sales Strategy Concept

The effectiveness of the sales process hinges on the ability to interpret and analyse opportunities (Peterson et al., 2011). A sales process encompasses the systematic application of steps or actions necessary for selling a product or service (Eades, 2003). According to McNeese and Klein (1991), adopting a process perspective in sales offers the advantage of leveraging tools from other process-oriented fields to

enhance the outcomes of the sales process. The primary goal of a sales process is to break down the sales cycle into distinct steps, enabling the tracking of progress for each sales opportunity as it advances through these stages. Each step involves various activities and associated measures, demanding specific achievements before progressing to the subsequent stage (McNeese & Klein, 1991). The sales strategy, also known as the 'customer development strategy' describes how a business intends to acquire, retain, and foster its customer base. Considering the traditional business approaches, this method prioritizes extensive planning, customer feedback over intuition, and iterative design in combination with upfront development (Viswanathan & Rosa, 2007). The necessity of having a sales strategy is underscored by its role in addressing common business challenges, including stagnant sales revenues, the merger of sales forces, start-ups of new ventures, new product introductions, the launch of new competitors, and expansion into new markets, as stated in the research of Acquah (2007).

Considering the international perspective, the global economic landscape is undergoing a substantial shift, with a notable transfer of economic activity from industrialized economies in North America and Western Europe to emerging economies (Bruton et al., 2013). Over the past three decades, emerging market firms have significantly influenced scholarly discourse on international sales management. Emerging markets, characterized by recent rapid economic growth despite low incomes, are predominantly situated in Latin America, Africa, the Middle East, Asia, and China, and transition economies of the former Soviet Union and South-Eastern Europe (Hoskisson et al., 2000). Scholarly researches have delved into a limited set of potential analyses shaping the international marketing strategies of emerging market firms. These investigations attracted diversity in their focus, commonly exploring variables such as managerial characteristics, firm behaviour, industry dynamics, and institutional environmental forces, either individually or in tandem, as influential factors in determining international marketing strategies (Dwairi et al., 2007). 'Sales Strategies in Emerging Markets' stands at the leading edge of contemporary business discourse, as organizations strategically position themselves to capitalize on the vast potential inherent in rapidly developing economies (Contractor et al., 2003). The various issues and complexities of these markets require a differentiated approach to sales, demanding a comprehensive understanding of local dynamics, consumer behaviour, and regulatory landscapes that undertakes a detailed examination of the multifaceted strategies deployed by businesses seeking success in emerging markets.

Continent of Opportunities – Africa

Often referred to as the 'continent of opportunity,' Africa presents an expansive and diverse market with substantial global business potential. Egypt offers several attractive opportunities for businesses in the manufacturing and transport

sectors, making it an appealing destination for investment. The report of PwC *Africa Gearing Up* (2013), provided an overview of the challenges faced by Egypt's business environment, particularly the decline in Foreign Direct Investment (FDI) after the 2011 uprising. Despite some positive indicators such as a large, educated population and a diversified economy, Egypt struggles with political instability, economic hurdles, and unfavourable business conditions. Key issues include political unrest, anti-market sentiments, poor ratings on global competitiveness, unstable rule of law, bureaucratic obstacles, and delays in economic policy improvements (Everington, 2023).

The Suez Canal is a significant asset, but disruptions could pose challenges. Infrastructure projects are on hold, affecting the logistics performance index. The transportation sector faces issues like fuel shortages, outdated railway systems, and road congestion (PwC, n.d). Positive measures to improve the trade environment were halted in 2013 with the removal of Morsi. Despite being a member of various trade blocs, Egypt's external position has deteriorated, with widening trade and current account deficits: "To help facilitate international trade, Egypt is a member of several trade blocs including the African Economic Community (AEC), Preferential Trade Area for Eastern and Southern Africa (PTA) and Common Market for Eastern and Southern Africa (COMESA)" – wrote Ghanem (2013) in the article *Can Egypt's Transition and Economy Be Saved?* The membership assures a strong attractiveness for investors.

Customising products and services to align with local preferences and cultural nuances is a prior aspect of multinational companies' success in Egypt. Recognising and addressing the specific needs of the Egyptian market goes beyond mere adaptation; it demonstrates a commitment to understanding and integrating with the local consumer base. This approach enhances the acceptance and relevance of products or services, contributing to more seamless integration into the market (CAPA – Centre for Aviation, n.d.).

3. Wielton Group. Operational Overview

General Information

The Wielton SA, located in Wieluń, Poland, is the largest manufacturer of trailers, semi-trailers, and lorry vehicle bodies in the country. Despite its relatively young age, the company's operational growth has been remarkable, positioning it as the third-largest in Europe and among the top 10 globally in the heavy-duty vehicles industry. Its production focuses on road transport, agriculture logistics, and related sectors (Wielton Group, n.d.). Additionally, Wielton has strong partnerships with global truck producers such as Man, Volvo, Iveco, Mercedes-Benz, DAF, and Scania. Wielton's ambitions go beyond excellence – the company aims for dominance. Fuelled by an expansive sales network of 35 countries, its products have traversed

over 75,000 roads bearing the Wielton logo and prove the presence in diverse sectors, from transport and construction to production and agriculture (Wielton Group, 2024).

In the first half of 2023, Wielton Group achieved notable financial performance despite challenges in the European transport sector. Consolidated revenues reached PLN 1,701.2 million, a 4% increase year to year, while volume sales experienced a 10% decline, with 10,762 units sold (Wielton Group, 2023).

The company also determined the possible risks and opportunities that might influence future expansion plans and operations (Wielton Group, 2023).

- Market dynamics. The cooling of demand and customers postponing purchase decisions present high risks, potentially affecting sales volumes and revenue generation.
- Geopolitical uncertainty. Geopolitical tensions, particularly the war in Ukraine and the situation in China pose high risks, leading to potential disruptions in trade, supply chains, and market stability.
- Inflation and wage pressures. Rising inflation and wage pressures introduce high risks, potentially impacting production costs, profitability, and overall financial health.
- Energy and gas price volatility. The volatility of energy and gas prices poses a risk of higher production costs, affecting margins and financial performance.
- Financial risk and customer insolvency. Financial risk, liquidity challenges, and customer insolvency represent medium risks, impacting cash flow, revenue collection, and overall financial stability.
- High financial costs. Persistently high financial costs present medium risks, potentially affecting profitability and the ability to invest in growth initiatives.
- Exchange rate volatility. Exchange rate volatility introduces medium risks, affecting the Group's financial results, particularly in regions with exposure to fluctuating currencies.
- Risk of impairment of eastern assets. The risk of permanent impairment of eastern assets poses medium risks, potentially impacting asset valuation and financial statements.
- Supply chain disruptions. While disruptions in supply chains present low risks, they can still affect production efficiency, timely delivery, and customer satisfaction.

By understanding and addressing these risks, the Group can proactively mitigate threats and capitalize on opportunities in the dynamic business environment.

Wielton Africa

Wielton Africa SARL, headquartered in Abidjan (Ivory Coast), was registered in 2017. Wielton's decision to expand its operations in this region was influenced, among other factors, by favourable legislative changes implemented in the West African Economic and Monetary Union, comprising eight member states. These

changes include, among others, a reduction in the permissible total weight of vehicles operating on local roads, necessitating the replacement of existing fleets. The company sees significant sales potential stemming from investments in the mining industry and infrastructure in the region (Wielton Group, n.d.).

Wielton Africa sold 192 vehicles in Africa in 2022, compared to 298 the previous year (with the total sales of Wielton Group reaching 23,180 units in 2022). Sales revenue on the Ivory Coast in 2022 amounted to PLN 23.1 million, compared to PLN 33.8 million the previous year (a decrease by 31.7%). The total revenue of Wielton Group amounted to PLN 3,433.4 million in 2021 and PLN 2,696.4 million in 2022 (ETK, 2024).

According to the new strategy, by 2027 Wielton intends to expand its operations in the Black Continent to include the markets in Kenya and Egypt. This decision has significant strategic value for Wielton for several reasons. First, the market potential. Both Kenya and Egypt boast growing economies and populations, presenting ample opportunities for the sale of commercial vehicles such as trailers and semi-trailers. Kenya, in particular, serves as an economic hub in East Africa, while Egypt holds a central position in North Africa, providing access to regional markets. Another reason is diversification. Entering new markets allows Wielton to diversify its revenue streams and reduce dependency on specific regions or markets.

Analysis of Wielton Group in Egypt

It is crucial to evaluate the company’s market position by considering its internal resources and external environment. The SWOT framework, recommended by Rahmat et al. (2020), offers an effective method to assess a company’s strengths, weaknesses, opportunities, and threats. In response, a SWOT analysis for Wielton Group services is provided (Tab. 1).

Table 1. SWOT Analysis of Wielton Group in Egypt

Item	Assessment of the aspect
Strengths	S1. Extensive industry experience and expertise in manufacturing trailers and semi-trailers. S2. Strong reputation for high-quality products and reliability. S3. Established presence in the European market, providing a foundation for global expansion. S4. Robust distribution network and after-sales service capabilities, enhancing customer satisfaction. S5. Ability to offer a diverse range of trailer types and configurations to meet various transportation needs. S6. Capacity for innovation and technological advancements, ensuring competitiveness in the market.

Item	Assessment of the aspect
Weaknesses	W1. Potential challenges in adapting products to meet specific regional requirements in Egypt. W2. Competition from local manufacturers or other international brands with lower pricing. W3. Cultural and regulatory differences that may require adjustments to business strategies and operations in Egypt.
Opportunities	O1. Egypt's growing transportation and logistics industry, providing opportunities for market expansion. O2. Increasing demand for high-quality trailers and semi-trailers due to infrastructure development and trade activities. O3. Potential for partnerships or collaborations with local companies to enhance market penetration and distribution channels.
Threats	T1. Intensifying competition from both local and international manufacturers in the Egyptian market. T2. Economic volatility or political instability in Egypt, affecting consumer confidence and purchasing power. T3. Technological disruptions or shifts in customer preferences that may require rapid adaptation to maintain competitiveness.

Source: own elaboration.

Wielton Group's SWOT analysis in Egypt reveals several key aspects of its market position. The company's strengths include extensive industry experience in trailer manufacturing, a strong reputation for producing high-quality products, and an established presence in the European market. Additionally, Wielton benefits from a robust distribution network and effective after-sales service, a diverse range of trailer types, and a capacity for innovation and technological advancements.

However, the company faces weaknesses such as challenges in adapting products to meet local requirements and competition from local manufacturers and lower-priced brands. Cultural and regulatory differences may also complicate its business strategies in the region.

Opportunities for Wielton Group include the growing transportation and logistics industry in Egypt, increasing demand for high-quality trailers due to infrastructure development, and potential partnerships with local companies to enhance market penetration.

On the threat side, Wielton must contend with intensifying competition from both local and international manufacturers. Economic volatility and political instability in Egypt could affect consumer confidence and purchasing power, while rapid technological changes may necessitate quick adaptations to maintain competitiveness.

This analysis provides a comprehensive overview of the factors influencing Wielton Group's potential success in the Egyptian market.

4. Research Design and Findings

Research Design

For this research, a deep understanding of overall sales performance and opportunities in Egypt was obtained through detailed, face-to-face conversations with informants. Despite its simplicity, this method is highly valued by researchers for its ability to provide nuanced insights and personalised perspectives, unlike other data collection techniques. The data for this thesis was collected over a period of two weeks, with a total of four interviews conducted in person.

Research Findings

This section presents the findings from the research conducted regarding the strategic decisions and market experiences of Wielton Group in the African market. The insights gathered from the interviews with informants provide a comprehensive understanding of the company's motivations for entering the African market, the challenges faced, and the specific focus on Egypt as a target market.

Reasons for Entering the African Market

The third question asked why Wielton Group decided to enter the African market. The interviewees noted that the company expanded into Africa in 2017 to boost its presence in logistics and transportation services. The answers emphasized the growth opportunities despite rising competition, while pointed out emerging trends and favourable economic conditions that made Africa an attractive market. This shows that Wielton entered the region for strategic expansion and growth opportunities.

Challenges in the African Market and Sales Strategy Adaptation

The fourth question examined the challenges Wielton faces in Africa. Informants cited infrastructure limitations, political instability, and cultural differences as obstacles, which shaped the company's localised sales strategies. These include building strong relationships, flexible pricing, and brand differentiation. This illustrates how the company adapts to local complexities to maintain a competitive edge.

Egypt as a Target Market

The fourteenth question focused on Wielton's decision to enter the Egyptian market. Informants identified Egypt's growing middle class, rising consumer demand, and diverse industries (e.g., agriculture and manufacturing) as appealing. Strategic

partnerships and product customization were highlighted as key entry strategies, and respondents saw Egypt as a critical step in expanding the company's global footprint.

Key Performance Indicators (KPIs) for Sales Strategy

Question 7 was about the KPIs used by the company to assess its sales strategy. Informants focused on metrics such as sales revenue, customer satisfaction, and order fulfilment rates, and also emphasised brand awareness, website traffic, and product penetration. These KPIs reflect a comprehensive approach to evaluating both market penetration and customer engagement.

Recent Initiatives for Market Penetration in Africa

The eleventh question detailed initiatives undertaken by Wielton to enhance sales growth in Africa. These included expanding distribution networks, streamlining sales processes with technology, and improving the company's digital presence. These efforts, supported by the local team in Abidjan, align with Wielton's aim to strengthen its market position across the continent.

Answers to these questions provide a deeper understanding of Wielton Group's strategic decisions, market challenges, and performance measurement in Africa and Egypt.

The research has several limitations: a small sample size of four informants, limiting representativeness; findings specific to Wielton, reducing generalizability; and potential biases from subjective, self-reported data. Lack of external validation, time constraints, and possible language or cultural barriers further affect the depth and reliability of the results.

5. Conclusions

This study focuses on analysing Wielton Group's sales strategy in the African market, with an emphasis on performance evaluation, market development, and efficiency optimization. In addition, it examines the company's potential entry into Egypt, identifying opportunities and strategies for successful market expansion.

The situational analysis revealed several key implications.

- Wielton Group has identified promising opportunities in the African market, particularly in countries like Kenya and Egypt, despite challenges such as regulatory hurdles and infrastructure limitations. The entering strategy aligns with the long-term strategic objectives of the company, which serves as the foundation of the 'Own Way' strategy 2023-2027.
- The Egyptian market, while competitive, offers significant potential for Wielton Group due to its diverse industry sectors and growing demand for transportation and logistics solutions.

With the research objectives in mind, the following aspects were discussed in the empirical research:

- The research highlighted the diverse range of perspectives from informants representing various roles within the company. Each individual brought unique expertise and experiences to the table, contributing to a comprehensive understanding of the company's operations in the African market.
- Informants emphasised strategic reasons for entering the African market, such as market expansion, business growth opportunities, and the increasing demand for transportation and logistics services. They also discussed specific challenges faced and adaptive sales strategies employed to overcome these challenges.
- The analysis delved into the decision-making process behind the company's plans to enter the Egyptian market. Informants expressed optimism about the opportunities presented by Egypt's market size, economic growth, and diverse industry sectors. Entry strategies, including strategic partnerships, local presence establishment, and product customization, were explored, highlighting the company's adaptability and commitment to market entry success.

With primary research taken into consideration, the recommendations were emphasised:

- The strategic recommendations emphasize the importance of conducting differentiated research and analysis to understand the unique characteristics, consumer behaviour, and competitive landscape of the Egyptian market. This involves commissioning various types of research reports and analyses, including market analysis, consumer behaviour study, competitive intelligence, regulatory compliance assessment, and digital market research.
- Another key highlight is the need for Wielton Group to address the gap in marketing involvement in Africa by developing comprehensive marketing campaigns to increase brand awareness and customer engagement. This involves prioritising digital marketing initiatives and e-commerce capabilities to reach a broader audience and streamline sales processes.
- The recommendations stress the significance of conducting a thorough regulatory compliance assessment to understand the legal and regulatory framework governing the Egyptian market. This involves analysing aspects such as import/export regulations, taxation policies, labour laws, and industry-specific regulations to ensure compliance, mitigate legal risks, and identify potential barriers to market entry or operation.

This paper may be beneficial to stakeholders within the Wielton Group involved in sales and market expansion efforts, providing them with valuable insights and strategic recommendations for enhancing performance in the African market, particularly in Egypt. Additionally, professionals in the transportation and logistics industry, as well as researchers interested in international business expansion, may find value in understanding the challenges and opportunities faced by companies

like Wielton Group as they navigate new markets. Overall, the thesis adds value by offering actionable recommendations grounded in empirical research, aimed at driving sustainable growth and profitability in the African market.

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Otwieranie możliwości: strategia sprzedaży Wielton Group na rzecz wzrostu na rynku afrykańskim

Streszczenie: Praca ma na celu zbadanie aktualnej strategii sprzedaży Wielton Group na rynku afrykańskim oraz zidentyfikowanie sposobów zwiększenia wzrostu sprzedaży, powiększenia zasięgu rynkowego i poprawy ogólnej wydajności w regionie. Jako trzeci co do wielkości producent i dystrybutor przyczep, naczepek i nadwozi samochodów ciężarowych w Europie Wielton Group dąży do rozszerzenia swojej działalności na Afrykę, ze szczególnym uwzględnieniem Egiptu. Badania mają na celu przeprowadzenie szczegółowej analizy czynników wpływających na wydajność Wielton Group i możliwości sprzedaży. Obejmuje to ocenę istniejącej strategii sprzedaży, uwzględnienie współczesnych trendów i zbadanie potencjału egipskiego rynku jako kanału sprzedaży dla produktów Wielton, opartego na cennych i profesjonalnych spostrzeżeniach zgromadzonych od pracowników Wielton Group. Badania przeprowadzono przy użyciu metody zbierania danych jakościowych – wywiadu półstrukturalnego. W fazie badań empirycznych różnorodne perspektywy rzucają światło na działania na rynku afrykańskim. Omówiono strategiczne motywacje wejścia na rynek afrykański, napotkane wyzwania i adaptacyjne strategie sprzedaży. Zbadano proces podejmowania decyzji o wejściu na rynek egipski, podkreślając optymizm i elastyczne strategie. Biorąc pod uwagę wyniki badania, przedstawiono różne propozycje zarządcze, które mają pomóc firmie osiągnąć zrównoważony i optymalny wzrost na rynku afrykańskim i w Egipcie.

Słowa kluczowe: strategia sprzedaży, rynek afrykański, poprawa wydajności, ekspansja międzykontynentalna

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The Role of Social Media in Enhancing Online Brand Visibility in B2B Sector on the Example of THT Group

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Abstract: The purpose of this paper was to explore the development and implementation of a social media presence for a medium-sized B2B industrial company, with the primary goal of enhancing its online visibility. The study employed market and competitor analysis to identify industry trends and best practices. A strategic approach to content creation and profile development was implemented, followed by monitoring to assess its effects on customer engagement and business growth. The findings highlight the benefits of a strong social media presence, such as increased visibility and improved customer engagement, and also show challenges such as content creation and platform selection. The results confirm the viability of social media for business growth in B2B sector. This research provides a framework for industrial companies to build an effective online presence, contributing new insights into social media strategies in B2B and offering practical guidance for similar firms.

Keywords: social media strategy, B2B marketing, online visibility

1. Introduction

The Internet and social media have become integral to modern life, influencing the way people access information and interact with the world. Even those who avoid using personal social media rely on the Internet for information (Armutcu et al., 2023). Companies leverage this influence by adapting marketing strategies to connect with audiences, using platforms to communicate, showcase products, and gather data (Cao & Weerawardena, 2023; Mazurek, 2022). For B2B firms, understanding platform dynamics is crucial for effective marketing, with success measured by views, engagement, and interactions. Firms increasingly invest in

online branding, recognising its value in shaping strategy and accessing customer insights (Insider Intelligence, 2023).

This paper explores the development and implementation of a social media presence for THT Group, a medium-sized B2B industrial packaging company, aiming to enhance its online visibility. The study employs a qualitative approach, combining a literature review and a single case study with documentation analysis and desk research.

The paper is structured into three sections: a theoretical background on social media in B2B marketing, research methodology, and the process of creating accounts, posting content, and managing brand image. The final section presents conclusions drawn from the study.

2. Theoretical Background

2.1. The Essence and Evolution of Social Media

In today’s digital world, businesses prioritize their online brand image using various social media platforms. Each platform’s unique features and content formats enable organizations to strategically engage with target audiences and align with their goals (Dash et al., 2023; Dover, 2023).

Facebook, YouTube, WhatsApp, Instagram, and TikTok stand as dominant forces in the global digital landscape (Tab. 1). The ranking based on global active user figures in millions underscores their pervasive influence and reach. This diversity reflects the dynamic nature of the digital environment, enabling users to navigate and utilise platforms that resonate most effectively with their unique requirements.

Table 1. The world’s most used social media platforms in January 2024

Social media platform	Global active user figures (in millions)
Facebook	3,049
You-Tube	2,491
WhatsApp	2,000
Instagram	2,000
TikTok	1,562
WeChat	1,336
FB Messenger	979

Source: (Kepios, 2024).

The infographic “Main Reasons for Using Social Media” (Kepios, 2024) highlights that users aged 16-64 primarily engage with social platforms to keep in touch with friends and family (49.5%), fill spare time (38.5%), and read news stories (34.2%).

Users also seek such content as articles and videos (30.2%) and engage with trending topics (28.7%). Additionally, many look for inspiration for things to do or buy (26.7%) or search for products to purchase (26.1%).

Although business-related reasons are less prominent, with 22.1% following content from their favourite brands, 21.3% engaging in work-related networking or research, and 20.1% following celebrities or influencers, these still account for around 20% of social media use. Given the massive global user base, this translates into a substantial number of individuals using social platforms for business and professional purposes, representing a significant segment of the overall audience.

2.2. Social Media in B2B Relationships

In recent years, the distinction between sales and marketing has become less defined, with research showing that 70% of B2B purchasing decisions are made before customers directly engage with a company (Sheridan, 2021). This emphasizes the critical role of a company's image and the strategic potential of social media. Even users who primarily use social media for entertainment are exposed to marketing strategies, offering businesses significant opportunities to engage their audience. Platforms like Facebook, LinkedIn, Instagram, and YouTube have become essential for B2B marketers, providing unique features that support branding, promotion, research, customer service, and relationship management (Tuten, 2021). Understanding how these platforms function and tailoring strategies accordingly are vital for success in the B2B marketing landscape.

Facebook

Facebook is an effective platform for B2C businesses, with over 200 million businesses using its apps monthly to create virtual storefronts and reach customers (Sandberg, 2022). It offers tools such as thematic groups for showcasing products, networking, and engaging potential customers, making it especially valuable for small retail businesses (Modzelewska, 2023).

According to marketers worldwide, Facebook offers the highest return on investment (ROI) among social media platforms, making it a valuable tool for businesses (HubSpot, 2024). For B2B companies, Facebook is more suited for building brand recognition rather than direct sales. A company profile serves as a virtual business card, presenting values and competencies to build trust and interest. The Newsfeed Rank algorithm determines content visibility based on affinity, post weight, and content freshness, helping businesses optimize their content strategy (Żukowski, 2023). A well-constructed company page is essential, featuring a memorable name, consistent branding, and comprehensive information. While Facebook may not be the primary driver for B2B contacts or sales, it contributes to shaping a company's image and enhancing client trust.

Instagram

Instagram, launched in 2010, is now one of the largest social media platforms, boasting over 2 billion monthly active users as of 2023 (Backlinko, 2024). Originally designed for sharing photos, Instagram has expanded to include various content formats like Stories, Posts, and Reels. Stories are temporary posts lasting 24 hours but can be saved as Highlights on a profile. Posts allow for larger images or carousels of up to 10 photos, while Reels are short, engaging videos of up to 5 minutes that dominate user interaction (Modzelewska, 2023).

Over 60% of Instagram users follow or research brands (Kepios, 2024), making it a powerful tool for business visibility. Businesses can use up to 30 targeted hashtags and craft detailed captions (up to 2,200 characters) to improve reach and engagement. A combination of broad and specific hashtags helps increase content discovery, allowing companies to connect with both wider audiences and niche markets (Stępowski, 2017).

Instagram profiles function as digital business cards, where companies can present their brand identity through cohesive visuals and a well-crafted bio. Including a relevant username, website link, and contact information is crucial. While B2B businesses may not rely on Instagram for direct sales, the platform is essential for showcasing expertise, building trust, and generating interest among potential clients, complementing more formal sales channels.

YouTube

In 2023, 75% of B2B marketers used video content, a rise from 66% the previous year, with 65% using YouTube (CMI, 2022). Despite the growth of other platforms, YouTube remains the top choice for long-form videos, offering global reach in over 100 countries and 80 languages (Tuten, 2021). Unlike TikTok's brief videos, YouTube supports in-depth content, making it ideal for educational and demonstrative videos (Stępowski, 2017). Strategic keywords in video descriptions increase visibility, while high-quality videos on YouTube build credibility, trust, and help customers make informed purchasing decisions.

LinkedIn

LinkedIn is the world's largest professional networking platform, with 850 million users from 200 countries, on a mission to foster business connections and drive professional growth (LinkedIn, 2024). It is a powerful tool for B2B networking, building brand reputation, and making business connections. Companies can create profiles to showcase their products, services, job offers, and insights, while users follow companies to engage with updates, increasing brand awareness (Stawarz-García, 2018).

In Poland, industries like IT, manufacturing, corporate services, and finance dominate LinkedIn. With 97% of decision-makers on LinkedIn (Kopeć, 2021), businesses can directly connect with influential individuals, making it effective for reaching target audiences (Chimkowska, 2022). Unlike other social networks, LinkedIn excels in professional relationship-building. Its strong organic reach allows businesses to engage their audience without relying on paid ads (Oruba, 2023). Tracking key performance indicators (KPIs) like impressions and click-through rates (CTR) is essential for measuring success, with LinkedIn Analytics offering detailed insights into follower growth, engagement, and conversion (Dmuchowski, 2024).

In conclusion, LinkedIn is the most business-oriented platform, uniquely suited for generating professional contacts and fostering meaningful connections. A company's profile on LinkedIn goes beyond just being a business card – it is a dynamic tool for building relationships, enhancing visibility, and driving business growth.

3. Research Method

3.1. Research Design, Methods and Data Gathering Techniques

The research for this project adopted a qualitative approach, combining both theoretical and empirical elements. The study followed a single case study research design. The theoretical framework was constructed through a comprehensive review of books, papers, and various online resources, which provided a robust foundation for the study. In the empirical study, the triangulation of data gathering techniques was employed. Along with analysis of organizational documentation, direct engagement with key personnel, including the CEO, Commercial Director, Creative Content Specialist, and other employees, was crucial. This interaction was facilitated through in-person meetings, email correspondence, and phone conversations to gain in-depth insights. Additionally, data from social media analytics were employed to assess performance and measure outcomes effectively. The analysis was further enriched by incorporating feedback from stakeholders, which offered valuable perspectives and contributed to a more nuanced understanding of the project's impact. This comprehensive and multi-dimensional approach allowed for a deeper investigation, providing a well-rounded perspective on the topic. The study was conducted in four weeks.

3.2. Characteristics of the Studied Company

THT Group, based in Świdnica, Lower Silesia, specialises in comprehensive plastic packaging solutions. Established in 1999 in Świebodzice, the company initially focused on foam plastics for the construction market. In 2004, THT moved to a new

headquarters, expanding its machinery and workforce. By 2013, the company joined the Wałbrzych Special Economic Zone, adding land and constructing a modern office and production hall, followed by a new facility in 2024 to introduce blow-molded pallets.

Operating on a 3.5-hectare site with 120 employees, THT Group collaborates with major brands like Toyota, Porsche, Volkswagen, Electrolux, and Bosch. The company's mission focuses on dynamic development, continuous improvement, and innovative technologies. With a modern design office and skilled professionals, THT specializes in thermoforming plastics, foam, containers, pallets, and textile packaging.

The product range includes plastic containers, steel racks, custom dunnage inserts, sewn protectors, thermoformed trays, and pallets. Soon, THT will offer pallet renovation and rental services. A commitment to quality is reflected in ISO 9001:2008 certification and participation in industry awards and trade fairs, solidifying their leadership in the packaging sector.

4. Research Results

4.1. Current Online Image

The online image of THT Group is currently limited to its website and Facebook. The company is in the process of updating its website to strengthen its online presence, with the site currently displaying an update notice, company details, and a product catalogue. It also highlights upcoming industry trade fairs where the company will participate. However, THT Group faces challenges with its outdated Facebook account, last active in 2018 and managed by an external agency. The company no longer has access credentials to delete the account and is awaiting Facebook's response to finalise the deletion and establish a new, professionally managed account.

The Empirical Examination of the Process of Developing Social Media Plan for THT Group

The project aimed to enhance THT Group's brand visibility on social media within four weeks by following project management principles. The key aspects of the project, including its objectives, scope, timeline, and resource management, are detailed in Tab. 2.

Table 2. The most important aspects in the project

Aspect	Description
1. Objectives	Enhancing THT Group's online brand visibility via social media in four weeks. SMART goals for a consistent brand image and future engagement.
2. Success indicators	Measured by page views, click-through rates, and qualitative feedback due to the current lack of social media presence.
3. Stakeholders and their roles	Project Sponsor/CEO: providing funding, setting vision, approving plans, and monitoring progress. Project Manager/Social Media Specialist: leading project, managing team, handling social media. Marketing Manager/Commercial Director: developing content strategy, managing posts. Creative Content Specialist: designing visual content. IT Support Team: ensuring technical functionality. Sales Team: engaging prospects and generating leads. Clients/End-Users: providing feedback and approving content.
4. Scope and budget	Creating social media profiles to establish brand identity. Budget: PLN 10,000, focusing on initial setup rather than ongoing content.
5. Milestones and deliverables	Milestones: research, brand identity, narrative creation, profile setup. Deliverables: strategy documents, branding elements, social media profiles.
6. Timeline and schedule	Four-week structure with weekly focuses: research, brand identity, narrative, profile setup. Flexible schedule for milestone achievement.
7. Communication plan	Emails for updates, phone calls for quick clarifications, and meetings for detailed discussions.
8. Risk management	Identifying risks: incomplete research, ineffective branding, technical issues. Mitigations: thorough research, stakeholder involvement, consistent branding, regular updates.
9. Quality management	Focus on standards for branding and social media setup: performance targets, regular reviews, stakeholder feedback.
10. Resource management	Assembling skilled team, defining roles, managing PLN 10,000 budget. Structuring timeline with milestones, conducting regular progress reviews, and effective communication.

Source: own elaboration.

4.2. Conducting the Project

Week 1: Initial Research and Analysis

A competitive landscape analysis was carried out to determine the best social media platforms for B2B companies. The optimal platforms identified are Instagram, Facebook, YouTube, and LinkedIn, each playing distinct roles in enhancing brand visibility and online presence.

Instagram and Facebook are ideal for boosting brand visibility, showcasing company activities, values, and competencies to build trust and interest among potential clients. YouTube functions as a video catalogue, offering product demonstrations and quality testing to address specific audience needs. LinkedIn is tailored for professional networking and brand promotion, making it perfect for sharing updates on company activities and connecting with potential business partners. These insights were gathered during a one-week research period.

Week 2: Brand Identity Development

This week focused on solidifying the company's brand identity. Key tasks included finalising the logo, colour scheme, and graphic elements, while maintaining the established orange and grey colours that have defined the brand for 25 years. The high-resolution logo, prominently displayed on the main building, catalogue, and products, reinforces brand recognition and visibility (Fig. 1).



Fig. 1. Company's logo

Source: company's documentation.

We also began crafting a social media content strategy, selecting key products to highlight and enhance the brand's online presence.

Given that this phase involves strategic planning with input from the CEO and Commercial Director, progress may appear slow. However, this careful approach is crucial for aligning all elements with the company's long-term goals and ensuring a cohesive brand identity.

Week 3: Brand Narrative Creation, Social Media Profile Setup and Content Creation

In week 3, we developed a brand narrative highlighting the company's values, history, and sustainability. Key aspects include: 25 years of expertise, trusted

partnerships, eco-friendly practices, high-quality products and customized solutions. This reform of the online image also led to an update of the company's mission and vision:

"Our mission is to provide returnable industrial packaging that minimize the carbon footprint and support sustainable development. We strive to create eco-friendly solutions that reduce waste and save natural resources. We believe that ecological responsibility and innovation can coexist, creating a better future for all."

"Our vision is to be the leading provider of innovative and reliable returnable industrial packaging that enhances the logistical and operational efficiency of our customers. We aim to set new standards in the industry by offering top-quality products that meet the needs of the modern market."

To further enhance the brand's online presence, we partnered with a Creative Content Specialist to ensure high-quality visuals. The shoot took place in a new hall, using two HD cameras and a drone to capture the product from every angle. Additionally, subtitles were added to the videos for accessibility, ensuring an inclusive and professional experience for all viewers.

In the final step of week 3, we focused on setting up and optimising our company profiles on social media.

The company's Facebook profile features a logotype, a chosen cover photo showcasing a stitched insert, tabbed company type set to industrial. It includes the headquarters' address, a direct link to the website, and a dedicated "Contact us" tab for seamless communication (Fig. 2).

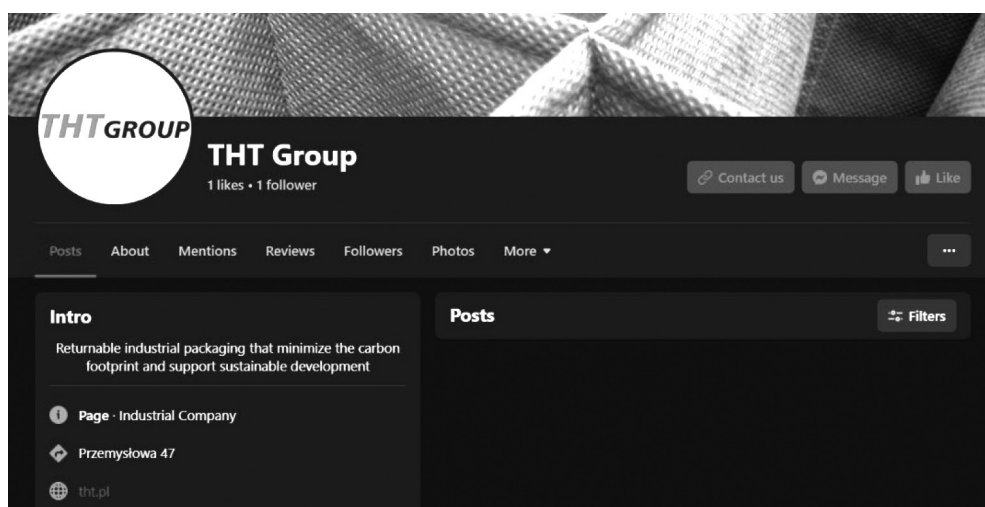


Fig. 2. Front page of THT Group Facebook profile

Source: (THT Group, n.d. a).

Instagram's streamlined interface offers limited business data display options, but THT optimizes its profile by featuring the logotype and essential product information. A direct link to the website and LinkedIn ensures easy navigation for users seeking more details (Fig. 3).



Fig. 3. Front page of THT Group Instagram profile

Source: (THT Group, n.d. b).

Similar to Instagram, YouTube has restrictions on business data presentation. However, THT maximizes its profile by displaying the logotype, a cover photo, and key product information. A direct link to the website makes it easy for viewers to explore the company's offerings further (Fig. 4).

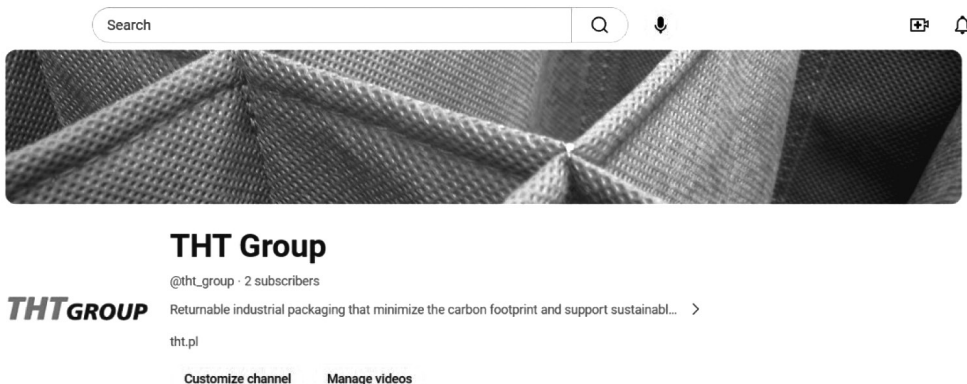
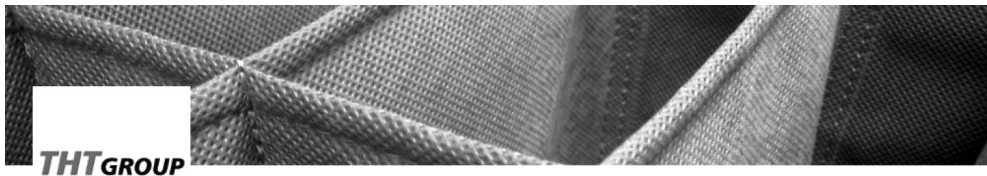


Fig. 4. Front page of THT Group YouTube profile

Source: (THT Group, n.d. d).

On LinkedIn, more detailed information can and should be provided. On the front page, visitors can immediately see the company's logo, cover photo, and a summary of the product types and business sector (packaging and containers manufacturing). Additionally, the headquarters' address and the estimated number of employees are displayed (Fig. 5).



THT Group

Returnable industrial packaging that minimize the carbon footprint and support sustainable development
Packaging and Containers Manufacturing · Swidnica, Lower Silesian Voivodeship · 1 follower · 51-200 employees

+ Follow



Fig. 5. Front page of THT Group LinkedIn profile

Source: (THT Group, n.d. c).

Overview

Our mission is to provide returnable industrial packaging that minimize the carbon footprint and support sustainable development. We strive to create eco-friendly solutions that reduce waste and save natural resources. We believe that ecological responsibility and innovation can coexist, creating a better future for all.

Website

<http://tth.pl/>

Industry

Packaging and Containers Manufacturing

Company size

51-200 employees

Headquarters

Swidnica, Lower Silesian Voivodeship

Founded

1999

Specialties

Packaging design , Industrial packaging, Returnable packaging, Packaging, Pallets, Plastic pallets , Sustainable packaging, Textile packaging, Plastic boxes, Large containers, Circular Economy , Metal containers, Thermoformed packaging, Customized packaging, and Packaging development

Fig. 6. About section on THT Group LinkedIn profile

Source: (THT Group, n.d. c).

As illustrated in Fig. 6, the *About* section on the THT Group LinkedIn profile presents this information in a clearer format, highlighting the company's mission

along with a direct link to the website. Moreover, it includes the founding date and 'specialties' – phrases that serve as hashtags and reflect the company's identity and aspirations – ensuring that visitors gain a clear and thorough understanding of the company at a glance.

Week 4: Social Media Content Publishing and Stakeholder Review

In Week 4, we focused on enhancing the company's online presence through strategic social media content. We tailored our approach for each platform, running Facebook and Instagram accounts in Polish to strengthen local connections while offering translation options for inclusivity. For LinkedIn and YouTube, we opted for English to reach a broader, international audience.

We maintained content consistency across Facebook, Instagram, and LinkedIn to establish a cohesive brand narrative, with flexibility for future adjustments. YouTube will highlight video content, playing to its strengths in video engagement.

The content strategy highlights two key posts. The first expresses heartfelt thanks to everyone who visited the Ptak Warsaw Expo, along with a photo of our company's business representatives. The second post features a video introducing the latest product, the Highwall container (Fig. 7), encouraging viewers to explore further on our YouTube channel.

Those posts were distributed across all three platforms in the appropriate language.

The YouTube profile stands out from the company's other social media platforms on Facebook, Instagram, and LinkedIn. With the help of a Creative Content Specialist, two engaging videos were created. The first highlights the features and functionality of the highwall container, while the second tests the durability and reliability of the plastic pallet in real-world scenarios.

Starting with two posts on each social media platform sets a solid foundation for future growth and engagement.

Stakeholder feedback was gathered, with the final results being very positive. The CEO noted: "The project allowed us to establish a presence on social media. We've seen the benefits of presenting information through short, concise videos, which help engage potential customers. We're very pleased with the results." However, some constructive feedback was provided on the YouTube videos. For the plastic pallet quality test, stakeholders suggested the video should feature only footage, without photographs. For the Highwall container video, it was noted that a shot of the fully loaded container would have been useful to show its appearance when filled.

These suggestions were carefully considered by the CEO, and it was decided to implement these corrections during the next meeting with the Creative Content Specialist.



Fig. 7. Post on THT Group LinkedIn profile

Source: (THT Group, n.d. c).

5. Conclusions

The study underscores the critical role of social media in B2B marketing, especially for industrial companies aiming to enhance their visibility and engage customers effectively. Using THT Group as a case study, it highlights the importance of a structured approach to building an online brand. This case study provides a comprehensive framework for businesses looking to leverage social media for marketing success. The process begins with defining clear business objectives and conducting thorough market research to understand the target audience and select the most suitable platforms. From there, companies can establish a strong brand identity, create compelling content, and publish initial samples. Gathering feedback and refining the strategy through iterative improvements ensures continual alignment with business goals. The key to success lies in tailoring content and strategy to the specific features of each platform, which ultimately strengthens brand visibility, fosters customer trust, and drives business growth.

To illustrate the effectiveness of this approach, Fig. 8 presents quantitative data from the initial phase of social media activity. While these numbers provide insight into early performance, it is important to interpret them in the right context.

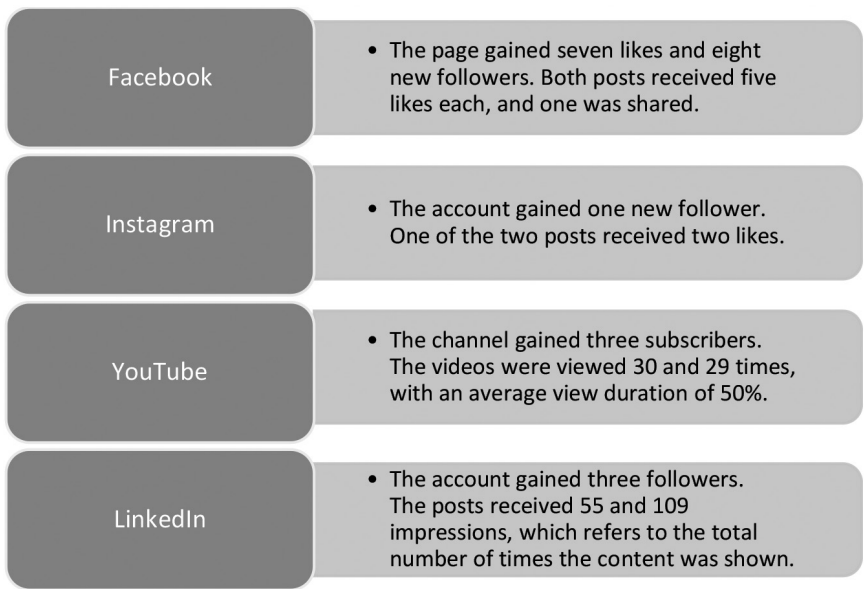


Fig. 8. Results of the project displayed in quantitative data

Source: own elaboration.

A common mistake in evaluating new social media accounts is placing too much focus on early engagement metrics. It is important to recognise that low numbers

in the early stages are completely normal and should not be considered an issue. At this stage, success is determined by the strategic setup rather than immediate likes or shares. Despite minimal engagement, these accounts are positioned to generate leads and drive sales. The main objective was to establish a strong presence on key platforms, which has been successfully achieved, creating a solid foundation for long-term growth and engagement.

The project achieved its goals, with stakeholder feedback, particularly from employees, playing a key role in shaping future development. The CEO expressed satisfaction with the new social media presence, emphasizing the impact of regular short videos in reaching new audiences. Constructive feedback on refining YouTube videos will guide the next content creation phase, ensuring ongoing improvement of the company's digital strategy.

The project was planned and executed in strict adherence to the timeline and within the allocated budget. Taking all these factors into account, the project was a success.

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Rola mediów społecznościowych w zwiększaniu widoczności marki online w sektorze B2B na przykładzie THT Group

Streszczenie: W artykule zbadano, jak zwiększenie obecności w mediach społecznościowych przekłada się na wzrost widoczności online w przypadku średniej wielkości firmy przemysłowej z sektora B2B. Analizowano rynek oraz konkurencję w celu identyfikacji trendów branżowych oraz najlepszych praktyk. Zastosowano strategiczne podejście do tworzenia treści i rozwijania profilu w mediach społecznościowych, a następnie przeprowadzono monitoring w celu oceny ich wpływu na zaangażowanie klientów i rozwój biznesu. Wyniki wskazują na korzyści płynące z silnej obecności w mediach społecznościowych, takie jak zwiększona widoczność i lepsza interakcja z klientami, przy jednoczesnym uwzględnieniu wyzwań, takich jak tworzenie treści i wybór platform. Rezultaty potwierdzają skuteczność mediów społecznościowych jako narzędzia wspierającego rozwój biznesu w sektorze B2B. Niniejsze badanie dostarcza ram działania dla firm przemysłowych, oferując nowe spojrzenie na strategię mediów społecznościowych w B2B oraz praktyczne wskazówki dla podobnych przedsiębiorstw.

Słowa kluczowe: strategia mediów społecznościowych, marketing B2B, widoczność online

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Exploration of Challenges in Team Management Faced by Managers in an IT Company

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JEL Classification: L1, O3

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Abstract: The purpose of this research was the exploration of the challenges in team management faced by managers in an IT company. The company being the subject of this study provides solutions in Software as a Service model. It uses an agile approach, and like many other IT organizations, it faces challenges related to scaling it to the level of many teams. The company uses the idea of reverse Conway manoeuvre, the strategy in which organizations focus on organizing team structures to match the architecture they want the system to exhibit. This research tries to answer the question of how to use the topology of development teams and their environment to optimise delivery of value to customers and prevent creation of team silos. To accomplish exploration of the problem analysed, a series of individual in-depth interviews was conducted. The research presents an analysis of issues being addressed in the interviews, as well as recommendations on selected subjects.

Keywords: teams management, scaled agile, silo mentality, virtual teams, Conway's law

1. Introduction

Agile approach in software engineering today can be taken for granted, but this was not always the case for this relatively young industry. Since the creation of the Agile Manifesto in 2001 (Beck et al., 2001) a lot of attention has been devoted to this subject. Much focus was put on how small, co-located, and self-organizing teams should function to provide business value in close collaboration with stakeholders and to adapt quickly to changing conditions. A question arises, how to scale the agile approach in larger projects or organizations. If agile methods are meant to optimise the way teams generate value in a changing environment, why not scale this optimisation at a higher level and answer the question how teams can behave in a similar manner. Thus, the aim of this paper is to explore how to use the topology of development teams to optimise delivery of value to customers and prevent creation of 'team silos'.

This paper presents a case study of the organization referred to as ComPlatform supported by a series of individual in-depth interviews. Like many companies in the Information Technology industry, it applies the agile approach to developing software and faces challenges related to scaling of agile teams. The way the teams have been structured at ComPlatform relies on Conway's Law and elements described in Team Topologies (Skelton & Pais, 2019). Team structure follows the idea of the reverse Conway manoeuvre, the strategy in which organization focuses on organizing team structures to match the architecture they want the system to exhibit rather than expecting teams to follow a mandated architecture design.

The system in which each team is focused on a distinct area of the developed solution, referred to as technology domain, comes with both advantages and challenges. A model, where a cross-functional team owns a part of the solution end-to-end is meant to accelerate delivery of value and break functional silos. The question is whether such teams focused on technology domains do not become new silos. This question is even more important in the world of the new normal after the COVID-19 pandemics, as the work continuous in so-called hybrid environments, where the teams co-located in the past became virtual at present, and it looks like such a situation is not going to change soon.

Section 2 provides the literature overview and theoretical background regarding scaling of agile, organizational silos and management of dispersed teams. Section 3 describes research methods. The description of the research context and the analysed company can be found in Section 4. Further sections provide results and conclusions.

2. Theoretical Background

The Reason to Scale the Agile Approach

Initially the agile methods were designed for small, co-located, and self-organizing teams that develop software in close collaboration with business customers using short iterations (Agile Alliance, 2024) to adapt quickly to changing conditions. The question is how to coordinate a large project requiring involvement of many agile teams.

Many scholars have been describing how to deal with projects within the so-called agile sweet spot, i.e. small and collocated teams of less than 50 people with easy access to business and customers. The findings of 2013 IT Projects Success Rates Survey Results indicate the advantage of use of Agile methods as far as effectiveness and success rate are concerned compared to so-called traditional methods (Ambler, 2014). However, the question of how to scale the agile methods in larger projects and/or organizations remains difficult to answer even if there are many reasons behind the creation and scaling agile teams (KPMG, 2019; Uludağ et al., 2021). The so-called bitter spot conditions for agile methods are large number

of teams, geographical distribution, entrenched culture, and formal governance structures (Agile Alliance, 2024). In such environments there is still a need for teams to place more value on adapting to change than on sticking to the plan (Rigby et al., 2018). This paper describes a case of use elements of Team Topologies (Skelton & Pais, 2019) but the question which arises with this approach is if it does not lead to creation of 'team silos'.

Organizational Silos and Silo Mentality

Organizations are divided into smaller units. They are aimed to maintain focus and distribute responsibilities with clarity (Sobande, 2020), shield the unit members from interference and distractions. Well-defined boundaries of these units have a clear purpose; together with the growth of an organization there is a need to facilitate its functioning. This need comes from the complexity of communication between people forming a unit due to the increasing number of communication channels. From the studies on complexity, it is known that people cooperating will create social networks and form clusters, so it is natural that organizations arrange people into smaller groups to enforce close collaboration and teamwork. More recent research in network analysis has provided indications of the importance of network clusters as spaces of social reinforcement necessary for the spread of complex information and behaviour change in organizations (Bento et al., 2020).

Even if according to studies on complexity, forming clusters is an evolving and emergent process in social networks, creating close collaborating units in organizations may have also negative effect: forming of organizational silos.

The term 'silo' comes from agriculture, where it defines storage towers separating different grains from each other (Bento et al., 2020). In the context of organizations, those isolated materials can be understood as interactions and knowledge. Within organizations silos mean the presence of barriers to communication and exchange (Bento et al., 2020). There is nothing wrong with empowering teams and enforcing their identity and autonomy, but it cannot be disconnected from the overall organization's goals.

Silo mentality can be defined as reluctance to share information with members of other teams or departments of the same organization and cooperate across departments. It is a mindset against information flow within the same organization, which, by definition, should allow all the organization members to align towards common goals (Bento et al., 2020; McPherson, 2018). The silo mentality is seen as an issue often related to competition between senior managers or employees of competing departments. It is defined as the absence of Systems Thinking and vision of the overall organization (Bento et al., 2020). As a result, an organization becomes fragmented and individual departments or teams become islands of knowledge.

Management of Dispersed Teams

Virtual teams can be defined as groups of people who share common goals and who collaborate on inter-dependent tasks across distance and time (Eisenberg et al., 2019). Virtual teams rely on technology to communicate and cooperate (Morrison-Smith & Ruiz, 2020).

There are many reasons why virtual teams are formed, which give benefits to organizations (Hansen et al., 2012; Morrison-Smith & Ruiz, 2020), such as easier access to key specialists and talent, reduction of travel cost, or answering increasing demand of better work-life balance.

However, forming virtual teams does not come without a cost. Collaboration in any type of team refers to synchronous and asynchronous interactions to achieve common goals (Morrison-Smith & Ruiz, 2020). Boundaries of any kind limit the possibilities of quality interactions and make it difficult to cultivate inter-personal relationships. Teams' dispersion creates several unique challenges that hinder their performance, among which communication seems to be one of the most important factors (Eisenberg et al., 2019).

Virtual teams are affected by physical factors, such as geographic distance, which are tightly coupled with social and emotional factors. Morrison-Smith and Ruiz (2020) categorized these factors as distance factors and contributing factors that are driven by distance. The distance factors are geographical distance, temporal distance and perceived distance.

Geographical distance seems to be easiest to define, as it can be measured by the number of kilometres between sites or by the amount of time it takes to reach one physical site from another. However, any physical barrier influences communication and collaboration among members of the team, so even a couple of floors in the same office can be considered as physical distance.

Temporal distance is a level of temporal displacement between two collaborators. It can be caused by time-shifts or differences in time zones (Morrison-Smith & Ruiz, 2020). It introduces challenges related to coordination of collaboration due to reduced overlapping work hours between collaborators. Synchronous communication is limited to overlapping work hours. Teams may suffer from the unavailability of vital resources when they need them, which may cause delays in responses and feedback, and a need to rework already processed tasks.

Perceived distance is a subjective distance characterised by a person's impression of how near or far another person is. When people interact strongly and frequently, they can create a sense of closeness independent of physical proximity (Morrison-Smith & Ruiz, 2020). Perceived distance might often be more important than spatio-temporal proximity and have a great influence on team interaction and collaboration.

3. Research Method

The aim of the research was the exploration of challenges regarding managing engineering teams in the organization referred to as ComPlatform. The exploration aimed to answer how to use the development team's topology and technology domains in ComPlatform to optimise delivery of value and prevent creation of 'domain silos.'

To accomplish this goal a qualitative method was applied – a case study supported by a series of individual in-depth interviews. The interviews were semi-structured, following the guidelines of Gray (2004). The list of questions and conversation directions were prepared before the interviews. The intent of the questions was to use them as a guide to keep the conversations within the explored subject, but they did not need to be asked in a specific order; additional questions could have been asked depending on the exploration path during the interview.

The list of interviews and characteristics of the respondents is presented in Tab. 1.

Table 1. List of interviews

No.	Respondent	Position	Language	Experience in current organization (years)	Experience overall (years)
1	RTE	Release Train Engineer Agile Coach	Polish	4	14
2	EM1	Engineering Manager	Polish	2.5	14
3	EM2	Engineering Manager	Polish	5	14
4	DEV1	Software Engineer	English	2.5	14
5	DEV2	Software Engineer	English	2.5	11
6	DEV3	Software Engineer	English	2	11

Source: own elaboration.

The research was focused on exploring the situation inside and among the engineering teams as well as their closest environment, in particular Product Management. This method allowed for the gathering of detailed information and probing of further understanding of the subject explored.

4. Research Context – Characteristics of the Industry and the Company

The way the engineering teams at ComPlatform have been structured relies on Conway's Law and elements of approach described in *Team Topologies* (Skelton & Pais, 2019). The law is the observation that the architecture of software systems

is very similar to the organization of the development teams that build it (Fowler, 2022). According to this law, team structures must match the required software architecture or risk producing unintended designs.

James Lewis, a technical director at Thoughtworks, and his colleagues came up with an idea of reverse Conway manoeuvre, the strategy in which organization focuses on organizing team structures to match the architecture they want the system to exhibit rather than expecting teams to follow a mandated architecture design. The goal is to support the ability of teams to get their work done, without requiring high bandwidth communication between teams (Skelton & Pais, 2019).

Following the concepts described above, ComPlatform structured its engineers in small, autonomous, and self-organized teams. Each team is responsible for its part of the solution, referred to as a technology domain. The team performs all the tasks, from design, up to deploying on production environments. The team is also responsible for operating its part of the solution, as designing and monitoring necessary metrics and reacting to incidents.

The solution architecture, and therefore the teams' structure, is designed to close highly coupled system components within a technology domain; these components are usually developed and changed together and require high bandwidth communication and intensive collaboration.

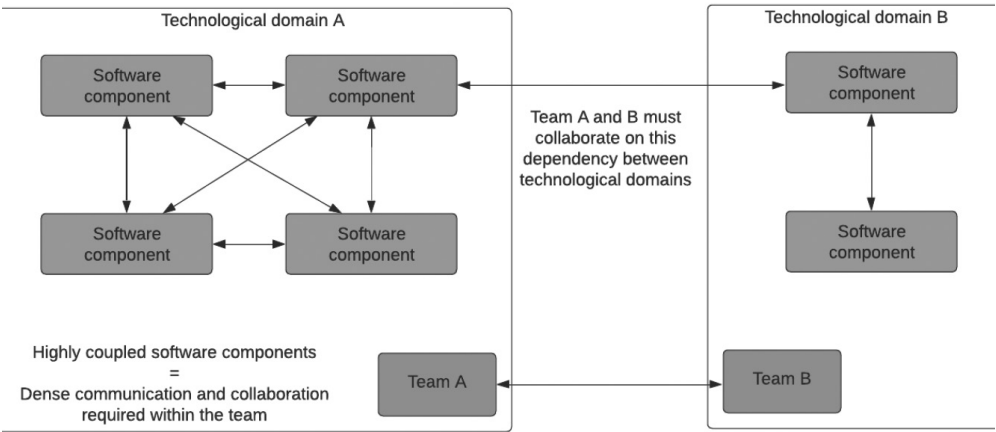


Fig. 1. Dependency between technology domains and therefore teams in investigated organization
Source: own elaboration.

To address this complexity and scale the work of multiple teams, ComPlatform implemented the use of Scaled Agile Framework (SAFe). Engineering teams working on a single solution form an Agile Release Train (ART). Product Managers define product features and prioritize them according to business needs. Features are then assigned to teams according to their fitting in technology domains.

Teams plan the development work for the next Planning Interval (PI) to discover dependencies and risks.

Features accepted to the plan are developed in 5-6 two-week iterations (sprints). This allows for the synchronization of value delivery of all the teams in an Agile Release Train; teams use this cadence to solve dependencies between them and synchronize their work. This also allows teams to choose their agile way of working.

5. Results

Use of Technology Domains

Use of technology domains in software development seems to be a good approach. Numerous advantages are noticed by team members and engineering managers. “Teams feel responsible for their work” (EM2). “Incidents and problems are resolved faster” (EM1); “it is easier to plan and develop changes” (DEV1). “Engineers see value provided to customers and do not jump from subject to subject” (EM1). The positive outcomes mentioned here are also a side effect of stable work environment and low attrition (EM2). Teams appreciate the space in which they can operate and clear borders of responsibility.

Technology domains provide a framework within which a product can be developed. If its structure, and therefore the configuration of software development teams is built properly, it makes Conway’s law work. However, the product, and so its architecture, evolves over time. “The intensity of work in domains changes over time” and the company “should be able to develop many high value features in a single domain – otherwise this is a bottleneck, and the business is not agile” (RTE). These dynamics must be addressed by proper flexibility of the configuration of engineering teams.

The structure must be able to adapt to the surrounding environment; the following aspects can enable this adaptation:

- Long term vision of the product, which must be shared between product and engineering organizations through long term planning, as “early planning identifies dependencies between domains earlier” (RTE).
- Identification of ‘busy’ domains; such domains require reinforcement and restructuring. EM1 indicates that engineering organizations can perform evolutionary adaptations, such as growing and splitting teams, moving individuals between teams or planning recruitment and training.
- Observation of cross-team dependencies emerging during planning; a dense network of dependencies may signal a need to restructure domains or organize multiple teams into bigger clusters.
- Short term needs can be addressed by secondment programmes (individuals temporarily working for other teams) or teams contributing to other domains, however clear rules must be defined in this regard to avoid tension and conflicts (DEV1).

Planning and Delivery

The iterative planning provides good results and is appreciated by ComPlatform stakeholders. The teams value “regular synchronization points, where all the required stakeholders are available for discussions and alignment” (EM1). “Lack of these points would keep us in constant ‘management’ mode and busy looking for new tasks for teams finishing current work” (EM2). It is the time when all involved parties focus on discovering dependencies, addressing risks, and setting expectations. This approach also enables setting goals and milestones, which are reachable by teams; “the period of a quarter is long enough to let teams focus on work and short enough to be able to plan the work and give estimations with high level of probability” (EM1). The movement towards continuous planning is also appreciated, as the period used for actual PI planning event would be too short to discover and then dive into details (DEV2).

However, the success of the PI planning and then its execution depends on the quality of input provided by Product Management. The long-term vision of the product is also very important. Product development directions should be known to engineering teams, so that they can better adapt currently developed features for potential changes expected in the future (RTE, DEV1, DEV3).

Engineering teams do not wish to discuss very details when there are no plans for near-term development of the matter discussed (DEV1, DEV2, DEV3). On the other hand, it is difficult to increase the quality of product management input without engagement of engineers as subject matter experts, especially that technology domains provide easier way to locate the source of knowledge. Engaging individual team members in these discussions seems to be a good compromise (EM1, EM2). A team can focus on its current work without being interrupted, while the knowledge about what is potentially coming is still provided. Information about future requirements flows in both directions without the cost of organizing expensive meetings before it is the right time to engage whole teams for detailed planning.

The level of details in the specifications of features provided as input of the planning requires further standardization. Currently a lot depends on personal relationships between the product manager and the engineering manager in question as well as engagement of the product manager in direct interactions with development teams (EM1).

Structure of Self-Organized and Autonomous Teams

All the respondents from the group of software engineers share the opinion that it is up to teams to define an agreement on how they work. “The ‘why’, benefits and drawbacks of agreed way of working should be discussed inside the team” (DEV3). “Every team should have its own way of working best for this team according to agreement of all the members” (DEV2). “If an agreement has been established,

new team members must adapt and learn first, then they can give feedback and propose changes” (DEV2). Software engineers value autonomy, and they underline that they want to be told what the problem is and would like to have as much freedom on how to solve it as possible. However, they do admit that there are necessary limitations to this autonomy. All agree that PI planning and synchronized sprints are elements to which all teams should align. They also notice that “the bigger flexibility on changing teams by individual members is expected, the higher alignment between teams is required” (DEV1).

Engineering teams expect higher alignment around technology and system architecture as well as design of APIs. They expect that stricter guidelines and verification processes should exist in this regard. API design guidelines are an example of a bigger picture, which must be defined outside of an engineering team. “It is a company decision to set constraints such as technology and the team cannot disagree with it, but it should be able to decide how implement the change” (DEV3). “The team cannot set its way of working in a way violating the company rules” (DEV3).

The point of view of software engineers is shared by engineering managers. All the respondents agree that the way of working should be left to teams, but expectations of the environment still must be met. There is a need to align to certain processes and reporting needs outside of the team. “If planning on a piece of paper is good enough for a team, in theory there is no reason to force other way, but this level of visibility will not meet the expectations of other parts of the system” (EM2). “Too high flexibility inside teams limits the flexibility on cross-team collaboration” (EM2). According to engineering managers, even if the decision of “how” belongs mostly to teams, technology used in the company must be centrally aligned, otherwise “too high variability brings too many problems” (EM2).

The configuration of an individual team may depend on many factors; in the case of ComPlatform the most important seem to be the complexity of a domain to be taken care of and the geographical location of team members. It is expected that intensive collaboration in the longer term takes place inside a team and that the team has all the necessary skills to perform its tasks; if this is not the case, it might indicate the need to review the borders of technology domains. The size of 4-5 software engineers seems to be most reasonable but can be higher if a domain is bigger or a team is in the process of growing to be split in the future. “The size above 9-10 engineers introduce a risk to create sub-teams within a team” (DEV3).

As far as the skillset is concerned, all the respondents agree that it depends on tasks realized by a team. EM1 indicates a need to have area leaders, team members working as subject matter experts in their part of the team domain. According to DEV2, “the team needs people who are specialists in selected areas, and generalists in others, so that they can support specialists.”

6. Conclusions

The purpose of this research was the exploration of challenges that managing engineering teams face in an international company and providing solutions in Software as a Service model. To accomplish this goal, a series of individual in-depth interviews was performed with people directly involved in developing and delivering solutions offered by the company.

The study shows that organizing teams in technology domains ensures that the teams become naturally responsible for their work. It also ensures high speed of delivery and problem solving, higher expected predictability, and product quality in long term, as well as stable environment for engineers and low attrition. However, technology domains cannot remain static. The teams must evolve along with changes in the solution, and life cycle of the product components. It can be achieved through building a long-term vision and planning, early identification of 'busy' domains and observation of emerging cross-team dependencies. Evolutionary adaptations can be made to restructure teams to face emerging challenges.

Proper planning and distribution of work to teams is a key element of making the system of teams perform effectively. An approach based on iterative planning brings regular synchronization and alignment points for teams and other stakeholders. It facilitates the discovery of dependencies and setting short-term goals and expectations. However, success depends on the quality of input provided by product management organization. A move towards continuous planning should enhance this aspect, but further alignment and standardization is still required.

The study shows that engineering teams at ComPlatform appreciate autonomy in their way of working. They effectively use collaboration tools that help reduce the perceived distance in a hybrid environment. Good organizational culture and trust in teams help to overcome potential barriers related to geographical distance. However, barriers in this form of work and the value of physical interactions were also noticed. Respondents underlined good cooperation within teams and challenges in cross-team collaboration.

The limitations of this study are the small sample size and the focus on a particular division of the company. The challenges reported in this study are not expected to be unique to ComPlatform, but the research method cannot be used to easily generalize the findings.

It is recommended to extend this research to product management organization and potentially other stakeholders. It seems to be crucial that both product management and engineering teams must be better aligned.

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Analiza wyzwań w zarządzaniu zespołem stojących przed menedżerami w firmach IT

Streszczenie: Celem pracy była analiza wyzwań w zarządzaniu zespołem, przed jakimi stoją menedżerowie w firmach IT. Dotyczyła ona konkretnej firmy dostarczającej rozwiązania w modelu Software as a Service. Analizowana firma stosuje zwinne podejście, rozwijając swój produkt, i jak wiele innych firm IT boryka się z wyzwaniami związanymi z jego skalowaniem na wiele zespołów. Organizacja używa odwrotnego manewru Conwaya, który zakłada formowanie zespołów w taki sposób, żeby odzwierciedlały oczekiwaną architekturę tworzonego rozwiązania. W artykule próbowano odpowiedzieć na pytanie, w jaki sposób wykorzystać topologię zespołów rozwojowych i ich otoczenie, żeby zoptymalizować dostarczanie wartości dla klienta i nie stworzyć ryzyka powstania silosów zespołowych. W celu analizy problemu przeprowadzono serię wywiadów z wybraną grupą osób. Przedstawiono analizę zagadnień będących tematem przeprowadzonych wywiadów oraz rekomendacje dotyczące wybranych obszarów.

Słowa kluczowe: zarządzanie zespołami, skalowanie podejścia zwinnego, mentalność silosowa, zespoły wirtualne, prawo Conwaya

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The Phenomenon of Employee Resistance to Change. Case Study of Alstom SA

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Abstract: The main goal of the research is to shed light on the topic of employee resistance to change, its sources and ways of minimizing it. The research was conducted in one of the production plants of Alstom SA, Alstom Wroclaw RSC, a Polish branch of a company specializing in rolling stock production. The method used to conduct research was a survey. The results of the survey show that the most significant factor influencing employee resistance to change in the researched organization is the large workload and employees' fear of increased workload resulting from the changes. Employees fear the consequences of reduced productivity after changes are implemented due to an organizational culture that focuses on productivity and results.

Keywords: resistance to change, change management, sources of resistance to change, minimizing resistance to change

1. Introduction

Since change is an essential part of company growth and resistance to change is an inevitable byproduct of implementing change, it is necessary for companies to manage it, as it can lead to long-term negative effects. Although it is impossible to completely eliminate employee resistance to change, without resulting to coercion, it is possible to minimise it. Also, resistance to change can be seen as a valuable indicator that provides insight into employees' opinions on the implemented changes and the entire process of transformation.

Since change has been recognised as an important part of an organization's development, a lot of models of the change management have been created to support the implementation of the change and, as a result, help minimise employee resistance to change. Despite that, in some cases, change management is still overlooked and seen as an unnecessary effort.

The research uses a case study as the main research method and a survey as the main data collection. Moreover, an analysis is used to interpret gathered data, with correlation calculated for the quantitative data. The survey was conducted with employees of various positions, but the main research group were production employees.

The research problem was formulated in the form of the following question: what are the signs and sources of employee resistance to change?

The research sought answers to the following questions:

1. How was the change implementation process carried out in the researched entity?
2. How was employee resistance to change manifested, and what were the main reasons for this resistance?
3. How the change management process affected employee satisfaction?

2. Theoretical Background

2.1. The Concept and Causes of Employee Resistance to Change

Employees' resistance to change is a natural reaction resulting from the desire to maintain security associated with keeping what is familiar. While not beneficial to the organization, the *status quo* provides a basis for employees to function comfortably in a familiar environment and sets the patterns to which they are accustomed. While change can be the basis for growth, defence mechanisms seeking to avoid risk are a compulsive reaction.

When considering employee resistance to change, we can distinguish its following sources: relational, individual, and related to the change itself (Grabus, 2013, p. 43). It should be pointed out that many classifications of sources of resistance to change appear in the literature, however they are all similar, differing largely only in the nomenclature used and some details (Centkowska, 2015, p. 13).

Relational Sources of Employee Resistance to Change

Relational sources of resistance to change arise from an individual's relationship with their organization, other members of the organization, and the extent to which they share the organization's values and their position in the organizational context (Grabus, 2013, p. 45).

Snyder proposed a model for analysing the relationship between organizational culture and employee approach to change. The classification considers two dimensions (Snyder, 1990, as cited in Siewierski, 1999, p. 10):

- the company's orientation, distinguishing between technological and social orientation;

- dominant value approach, distinguishing between performance and achievement approach.

By combining these two dimensions, Snyder distinguishes four types of organizational culture, each affecting the approach to change differently:

- **Productive culture**, with a technological orientation, performance-oriented. Attachment to procedures and efficiency can be observed; causes resistance to change.
- **Quality-oriented culture**, with a technological orientation, achievement-oriented. Effective planning can be observed; results in acceptance of change.
- **Supportive culture**, with a social orientation, performance-oriented. Attachment to cooperation, teamwork, and development can be observed; results in acceptance of change.
- **Creative culture**, with a social orientation, achievement-oriented. Attachment to innovation, entrepreneurship, and acceptance of risk can be observed; results in the initiation of change.

Additionally, organizational culture can be categorized into two aspects: formal and informal. The first is the values and behaviours promoted by management. The second aspect has more impact on the actual functioning of an organization, these are the behaviours, patterns, and values transmitted in the social process (Siewierski, 1999, p. 9).

Individual Sources of Employee Resistance to Change

Individual sources of resistance to change are the result of a person's experience and personal characteristics and can be rational and emotional (Grabus, 2013, p. 43).

Oreg (2003, pp. 680, 681) distinguishes six of the most significant individual sources of resistance to change:

- fear of losing control,
- cognitive rigidity, particularly dogmatism,
- low resilience,
- adaptability related to the period of change,
- preference for low levels of stimulation and novelty,
- reluctance to let go of old habits.

Sources of Employee Resistance to Change Related to Change Itself

Sources related to change itself may be a result of a lack of trust in those managing the transformation process, a lack of open and ongoing communication, or a flawed change process in general (Grabus, 2013, p. 45). It is worth noting that sources related to change itself are not limited to the aforementioned factors, but they can be highlighted as the most common.

2.2. Classification of Employee Resistance to Change

Employee resistance to change takes many forms, allowing us to distinguish (Centkowska, 2015, p. 14):

- passive and active resistance,
- overt and covert resistance,
- immediate and delayed resistance,
- emotional, rational, and political resistance.

The most basic types of resistance to change can be categorized as passive and active resistance. Passive resistance is associated with refraining from engaging in the change implementation process, while active resistance is associated with obstructing or actively preventing change (Penc, 2000, p. 189).

Passive resistance to change is simultaneously hidden, making it much more difficult to identify and manage. It results in apathy, isolation, and a decline in the productivity of employees. Active resistance is much easier to identify, as it is simultaneously overt.

Immediate resistance occurs in employees as soon as the change process begins, while delayed resistance occurs only at later stages of implementation.

Emotional resistance involves only the emotions that the change evokes and ignores the substantive aspects of the change, while rational resistance involves employees presenting fact-based arguments to justify their dissatisfaction. Political resistance, on the other hand, involves employees taking action to maintain their position (Centkowska, 2015, p. 15).

It is worth noting that the sole fact that employees resist change does not mean that any mistakes have been made, as it is a natural reaction and will always occur in some form (Grabus, 2013, p. 46).

2.3. Selected Methods of Reducing Resistance to Change

The valuable insight into employee viewpoints provided by observing the sources of resistance does not mean that one should downplay the threat that resistance poses to the transformation process. Properly overcoming resistance can determine the success or failure of a change.

Open Communication Regarding Change

Management's soft skills play an incredibly important role in providing employees with adequate space to express their emotions and respond appropriately.

It is important not only to inform employees about the change, but also why it is necessary, what is the management's vision of change and what benefits it brings. Employees have to have an opportunity to share their views and propose their solutions. It is necessary to empower broad-based action between the

members of an organization and communicate about short-term wins in the change implementation process (Kotter, 2012, pp. 9-13).

In addition, managers responsible for implementing changes should resolve conflicts that may arise as a result of the transformation on an ongoing basis, reward employees and inform them about the results.

In addition, managers responsible for implementing changes should resolve conflicts that may arise as a result of the transformation on an ongoing basis, reward employees and keep them informed about the results (Leszczyńska, 2001, p. 273).

Creating an Organizational Culture that Supports Change

Established behavioural patterns translate into employees' reactions and the organization's ability to act accordingly during a crisis. Organizational culture and the approaches it promotes translate into employees' attitudes toward the implemented changes, and their tendency to resist or respond to innovations (Masłyk-Musiał, 2003, p. 119).

It is possible to build a culture that adequately supports change, although in the case of an organization with a previously formed culture, this forces a change process. Organizational culture is created by its members and it is impossible to impose a specific transformation (Czop, 2001, pp. 283, 284).

Cultural change can occur as a result of (Czop, 2001, p. 285):

- a long-term, gradual process of integrating new methods and values into the organization;
- a cultural revolution involving the complete abandonment of old cultural elements and their replacement by new ones;
- adding new values to those currently in place to erase those that currently exist.

Coercion

When no methods and techniques for breaking down resistance work, some managers may choose to use manipulation or coercion to achieve established goals. Coercion requires the initiator of change to have significant influence and power in the organization. It is an effective method and can reduce resistance of any source, but it involves risk and anger towards the initiator of change (Kosała & Pichur, 2009, p. 93). It is worth noting that such methods raise ethical issues and do not provide a long-term solution to the problem of resistance to change.

3. Research Methodology

3.1. Research Goals and Methodology

The research problem was formulated in the form of the following question: what are the signs and sources of employee resistance to change?

The research sought answers to the following questions:

1. How was the change implementation process carried out in the researched entity?
2. How was employee resistance to change manifested, and what were the main reasons for this resistance?
3. How the change management process affected employee satisfaction?

The author used a case study as the main research method. Moreover, statistical analysis was used to interpret gathered data, with correlation calculated for the quantitative data.

Table 1. Questionnaire metrics

Sex (%)	Male 89		Female 9		Prefer to not say 2	
Age (%)	< 20 y/o 0	20-30 y/o 22	31-40 y/o 24	41-50 y/o 42	51-60 y/o 9	> 60 y/o 4
Education (%)	Primary 0		Vocational 33		High school 40	Higher 27
Position (%)	Intern 4	Production employee 69	Office employee 15	Production Team Leader 4	EPU Manager 7	Office Manager 2

Source: own elaboration.

The questionnaire was chosen as the main data-collecting technique to collect as much data as possible, both quantitative and qualitative. It was conducted in two ways: paper versions of the questionnaire were distributed to production employees, and electronic versions were distributed to office workers. The questionnaire contained 14 questions, with four of them being metrics (Tab. 1). 55 employees participated in the study. Anonymity was maintained throughout the research process.

3.2. Research Setting

The target company of the research was Alstom SA, a French manufacturer of rolling stock, specifically its factory in Wroclaw, Alstom Wroclaw RSC (Rolling Stock and Components). Headquartered in France, the company operates in 70 countries

and has over 74,000 employees. It has been operating in Poland for over 25 years, as Alstom Polska SA. Its main focus is manufacturing, servicing, and R&D work in rail transportation. In January 2021 Alstom announced the completion of its acquisition of Bombardier Transportation. The acquisition has increased Alstom's workforce from about 39,000 to about 72,000. In Poland, the expansion involved the acquisition of a plant in Katowice and the Pafawag plant in Wroclaw, now known as Alstom Wroclaw RSC. The plant in Wroclaw was a part of Bombardier Transportation for 20 years before the acquisition.

The most significant change in the last three years of operation of the Wroclaw plant was the takeover by Alstom. Employees had to get used to new procedures and methods that were significantly different from those used for 20 years.

Another significant change was the organizational structure change which began in the fall of 2023. The responsibilities of positions changed, and new positions were created. The change aimed at adapting the organizational structure to the standards in force at other Alstom plants.

A major change was the introduction of the Alstom Operation System (AOS) which was used to manage, supervise, and automate production. The purpose of this change was to standardize the IT tools used by the rest of the company's plants.

Decisions on major changes at divisions are made at Alstom headquarters. Plant directors and managers have no autonomy in strategic issues, and the corporation imposes decisions on changes. Headquarters communicates decisions in the form of a business case. It is important to mention that with the current focus on standardization and the introduction of universal solutions in all branches, the corporation does not allow plant managers to express concerns about the decisions being made. Afterward, each change has an individual action plan established, which defines the stages of transformation.

4. Research Findings and Data Analysis

4.1. Research Results

To determine the extent to which the changes implemented over the past year affected the employees' daily work, they were asked to grade the influence on a scale of 1-5, with 1 meaning that the changes had not affected their daily work at all and 5 meaning that their daily work had completely changed. The average score turned out to be 2.85. Roughly 35% of respondents rated the impact as significant (above 3).

At the end of the survey, the respondents were asked to rate their general impressions of the course of change implementation over the last year on a scale of 1-5, with 1 meaning definitely negative and 5 meaning definitely positive. The average response score was 2.4, while 46% of respondents rated their impressions as negative (below 3).

The two results combined indicate that while the recent changes have not had a significant impact on employees' daily work, they are still not satisfied with their implementation.

In order to study how the communication regarding changes in the organization is carried out, the respondents were asked to mark: the standard period between official and unofficial notification of respondents on planned changes and their implementation.

The results show that there is a large disproportion between the periods in the first criteria, as shown in Fig. 1. The largest group of respondents (33%) answered that they officially learned about the planned change six months in advance. At the same time, the second largest group of respondents (25%) answered that they learned about the planned change one month in advance. This creates a 5-month gap between the notification that the two largest groups of respondents received.

Informally, that is, for example, in a conversation with a co-worker or an informal conversation with a superior, the vast majority of respondents learned about planned changes six months in advance (40%).

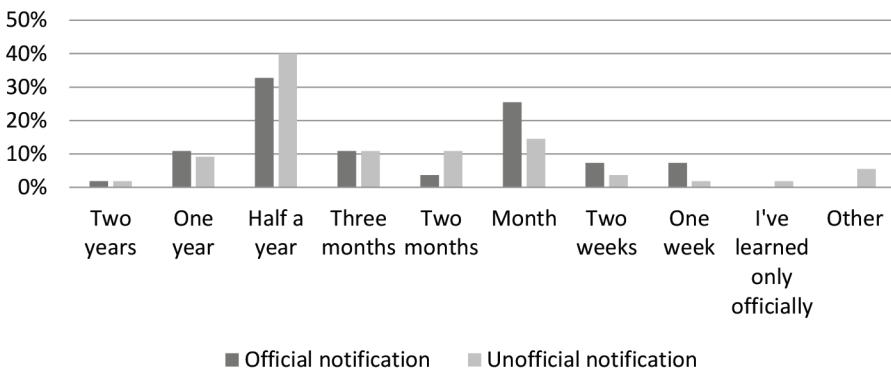


Fig. 1. The standard period between official and unofficial notification of respondents on planned changes and their implementation

Source: own elaboration.

To determine the main causes of sources of resistance to change, the respondents were asked to rate to what extent they agreed with the statements listed in the survey. Responses were rated using the 5-point Likert scale (1 – strongly disagree, 2 – rather disagree, 3 – hard to say, 4 – rather agree, 5 – strongly agree). The following statements were listed:

1. "I am afraid of losing my position".
2. "I feel stress from the unknown".
3. "I am afraid of more work".
4. "I do not like newness".

5. "I do not like to give up old habits".
6. "I am concerned about lack of support from superiors".
7. "I had a bad experience with change at Alstom".
8. "I do not trust those in charge of change".
9. "I do not see the point in making changes".
10. "I am not afraid of change".

The three main sources of employee resistance to change highlighted in the responses were:

- "I am afraid of more work" with 52% of respondents agreeing with the statement, 15% of whom strongly agreeing;
- "I had a bad experience with change at Alstom" with 42% of respondents agreeing with the statement, 15% of whom strongly agreed;
- "I am concerned about lack of support from superiors" with 41% of respondents agreeing with the statement, 6% of whom strongly agreeing.

It is worth mentioning that as many as 38% of respondents agreed with the statement "I do not trust those in charge of change", 11% of whom strongly agreed, however the author did not consider it one of the main sources of resistance to change, as less than 40% of respondents agreed with it.

The four least popular statements were:

- "I do not like newness" with 55% of respondents disagreeing with the statement, 21% of whom strongly disagreeing;
- "I am afraid of losing my position" with 46% of respondents disagreeing with the statement, 16% of whom strongly disagreeing;
- "I feel stress from the unknown" with 44% of respondents disagreeing with the statement, 12% of whom strongly disagreeing;
- "I do not see the point in making changes" with 42% of respondents disagreeing with the statement, 13% of whom strongly disagreeing.

The total distribution of ratings for the given statements is shown in Fig. 2.

To learn about the measures taken to reduce concerns, and in effect alleviate employee resistance to change, respondents were asked what actions responding to their concerns they had noticed in the past. The question allowed respondents to choose more than one answer. 37% of respondents stated that they had not noticed any such actions, making it the most common response. 18% of respondents took part in training sessions. At the same time, surprisingly, the answer "periodic employee satisfaction surveys" accounted for only 16% of responses. Only 13% of respondents stated that they noticed that consultations with superiors were held. The distribution of responses is shown in Fig. 3.

To learn more about how the respondents perceived company culture, they were asked to mark one of four descriptions provided. The vast majority (69%) of respondents described the company culture as a culture in which there is an attachment to strict procedures and a focus on efficiency.



Fig. 2. Respondents' views on their feelings regarding change

Source: own elaboration.

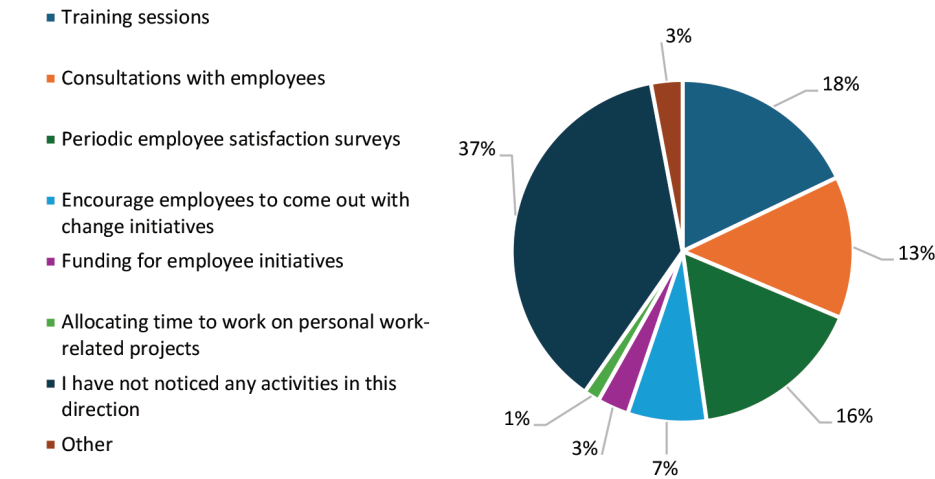


Fig. 3. Actions taken at the company to reduce employees' concerns about change

Source: own elaboration.

To find out more about the respondents' observations of the change implementation process they were asked to mark negative phenomena observed during this process. The most frequently noticed phenomenon was insufficient

information to employees about benefits they would gain from the changes (22%). A slightly less frequently noticed phenomenon was that employees were not made aware of the need for change (20%). The response “treating employees merely as contractors for change” was chosen by 16% of respondents. Slightly less frequently respondents observed the problem of assigning numerous informal tasks (14%). The distribution of responses is shown in Fig. 4.

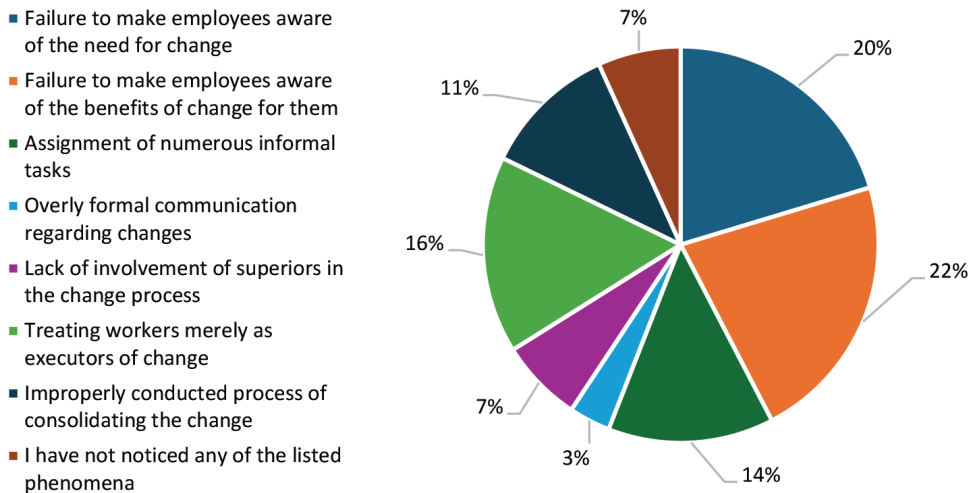


Fig. 4. Negative phenomena regarding change implementation in the organization observed by respondents

Source: own elaboration.

When asked about their reaction to a change with which the respondent disagreed, as many as 42% of respondents said that they have not overtly expressed their dissatisfaction with the change, but it affected the results of their work, 22% of them had not noticed that in such a case their dissatisfaction affected their effectiveness at work. 29% of respondents openly expressed their dissatisfaction.

4.2. Data Analysis and Discussion

Spearman's correlation coefficient r was calculated for all quantitative data, since most of the data are ranked on an ordinal scale or do not have a normal distribution. Selected results of the correlation test are described below, the threshold value of the significance level α , against which the p -value was compared, was set at 0.05. The correlation was counted in order to draw conclusions about important employee concerns that management should focus on minimising first.

The changes implemented at the plant in recent years have significantly affected the work of almost every employee at the plant. However, based on the survey, there was no statistically significant correlation between the impact of change on daily work and satisfaction ratings of the change implementation process (correlation coefficient $r = 0.12$).

As many as 47% of respondents who evaluated the course of change implementation negatively may represent the largest group of employees who will express their resistance to change in some way. This means that almost one in two employees may oppose the implementation of change. Knowing that as many as 42% of respondents admitted that their dissatisfaction with the changes affects their work efficiency, it can be assumed that improving the change implementation process would positively translate into the production capacity of the plant.

When considering the reasons for resistance to change, it is important to look at the company's organizational culture. The vast majority of respondents characterized the organization's culture as the presence of attachment to rigid procedures and a focus on efficiency. Using Siewierski's classification, these are characteristics of a productive culture, with a technological orientation that results in resistance to change. With a heavy emphasis on productivity and performance in the company's culture, employees may fear the consequences of reduced productivity and, as a result, resist change.

The survey showed that there is inconsistency in the advance notice with which employees are informed of changes. There is an interval of as much as five months between the two most frequently marked answers, differing by only 4 percentage points. This may indicate management's over-reliance on the flow of information between employees or the lack of a top-down advance notice with which employees should learn about the change.

However, there was no statistically significant correlation between the number of months in advance with which employees learned about the changes and the assessment of satisfaction with the transition process ($r = -0.12$ for official notice and $r = -0.21$ in the case of unofficial advance notice).

The problem most often noted by the respondents is the failure to make employees aware of the benefits they can derive from the changes and the purpose of the transformation being carried out. This indicates a poorly conducted 'unfreezing' stage and the adoption of a task-oriented strategy, which can translate into problems with consolidating the change. In addition, some employees noted that they are not involved in the change process. Both phenomena reinforce employee resistance to change.

The biggest concern of employees about change is the additional workload. One in two employees feared more workload after the implementation of the changes. There is a weak correlation between fear of more workload and employees' satisfaction rating of the change process ($r = -0.33$, $p = 0.012$). Considering that the assignment of numerous informal tasks during and after the implementation of

changes was observed by employees, it can be concluded that there is a problem with the proper organization of work during the transformation process. It is also worth noting that this is the only one of the statements evaluated by the respondents which is correlated with the evaluations of all other statements. This allows us to draw a conclusion that the concern of additional workload is the main source of employee resistance to change in the studied organization.

In addition, a statistically significant correlation between the evaluation of the statements provided in the survey and employee satisfaction rating was shown for the following statements:

- "I have a bad experience with change at Alstom" ($r = -0.32$, $p = 0.02$; weak correlation);
- "I do not trust the people responsible for the change" ($r = -0.42$, $p = 0.002$; moderate relationship);
- "I am not afraid of change" ($r = 0.39$, $p = 0.004$; weak correlation).

After adding up the answers given to the question about observed actions in this direction, the answer "I have not noticed any actions in this direction" was given by 37% of respondents, which clearly indicates that the awareness about the currently taken measures was still low. It may also mean that measures taken hardly translate into greater employee involvement in the transformation process, which is something the employees clearly want. This allows us to conclude that the measures currently being taken to address and minimize employees' concerns about change are either ineffective or do not involve sufficient number of employees. It is noteworthy that a significant number of employees see sense in implementing change, which means that employees notice problems in the company and believe that despite their concerns, change is needed.

5. Conclusions

The following conclusions are drawn from the research.

- Employee resistance can be characterized as passive resistance, as it is associated with reduced productivity.
- Currently, the 'unfreezing' stage is carried out incorrectly, which contributes to the increase in resistance to change expressed by employees.
- Employee resistance is largely influenced by poor work organization during the change process and employees are largely afraid of being assigned numerous informal tasks due to the transformation process.
- There is a problem of employees' trust in those responsible for the change.
- Employees are not sufficiently involved in the change process.
- Current measures to reduce fears, and thus employee resistance to change, are insufficient.

The low score of employee satisfaction regarding change implementation should always be an alarming signal to the management. All of the aforementioned conclusions can be also treated as sources of the low satisfaction score, which negatively translates into lowered effectiveness. Since employees are aware of the need for change and support its implementation, one can conclude that the problem in itself is not change, but the transformation process.

Results indicate that to minimize employee resistance to change it can be beneficial to reorganize work and take productivity losses into account during a transformation process when setting Key Performance Indicators (KPIs), as well as making changes to organizational culture to increase employee orientation. In addition, it may be beneficial to increase the involvement of willing employees in the transformation process, without increasing the workload and number of meetings.

Limitations

As the survey was the chosen method of research, there are some limitations. The low diversity of respondents' positions has limited learning the cross-section of employees' experiences and in effect may have limited the reliability of the results. Also, the as it is a case study of one company, the conclusions cannot be applied to all companies and their struggles with employees' resistance to change, but at the same time they provide a valuable insight into the phenomenon of employee resistance to change.

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Zjawisko oporu pracowników wobec zmian. Studium przypadku Alstom SA

Streszczenie: W artykule zbadano temat oporu pracowników wobec zmian, jego źródeł i sposobów jego minimalizowania. Badanie zostało przeprowadzone w jednym z zakładów produkcyjnych Alstom SA, Alstom Wrocław RSC, polskim oddziale firmy specjalizującej się w produkcji taboru kolejowego. Wykorzystaną metodą była ankieta. Wyniki pokazują, że najistotniejszym czynnikiem wpływającym na opór pracowników wobec zmian w badanej organizacji jest duże obciążenie pracą i obawa przed jego zwiększeniem wynikającym ze zmian. Pracownicy obawiają się konsekwencji zmniejszenia produktywności po wdrożeniu zmian ze względu na kulturę organizacyjną, która koncentruje się na produktywności i wynikach.

Słowa kluczowe: opór pracowników wobec zmian, zarządzanie zmianą, źródła oporu pracowników wobec zmian, minimalizowanie oporu pracowników wobec zmian

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Abstract: Optimising project team management in the CAD/CAE engineering services sector for the automotive industry aims to enhance efficiency and reduce costs in dynamic environments. Building technically skilled, flexible, and cost-effective teams remains a key challenge. This article presents a framework based on qualitative and quantitative research, focusing on leadership, diversity, and technological integration. The study hypothesizes that competence matrices and optimisation solvers improve efficiency and reduce delivery costs. Empirical research at Endego sp. z o.o. confirms the value of balancing team experience with costs to maximize operational performance. The findings highlight the importance of dynamic management, collaboration, and ongoing employee development. Optimisation tools that leverage competency and cost data enable real-time team adjustments, improving results while minimizing expenses. Future improvements, such as integrating live project data and using tools like the Cooperation Grade Matrix to measure team cohesion, are also recommended. Ultimately, investing in advanced optimisation solutions is essential for maintaining flexibility, innovation, and excellence in CAD/CAE project management.

Keywords: optimisation, efficiency, cost reduction, competence matrices, team cohesion

1. Introduction

In the growing engineering services (CAD/CAE) sector of the automotive industry, efficient project team management is essential for success. This study explores strategies for managing dynamic teams, focusing on leadership, diversity, and technological integration to optimise costs and improve efficiency.

Engineering service providers (ESPs) face challenges in building technically proficient, flexible, and cost-effective teams to meet industry demands for innovation and precision. Bridging theory and practice, the study examines

tools such as competence matrices and optimisation solvers to enhance team performance, verifying their impact on operational efficiency and cost reduction through empirical analysis.

Using qualitative and quantitative methods, the research investigates leadership styles, team composition, work environments, and technology adoption. It hypothesizes that competence matrices and solvers improve resource allocation and process optimisation, delivering time and cost savings. The study offers practical recommendations and highlights the importance of integrating management theory with real-world applications to advance project efficiency.

2. Project Teams – Building and Managing

Building an Effective Project Team

Building an effective project team goes beyond assembling individuals with complementary skills. It requires strategic selection, cultural alignment, and adaptability to evolving project demands. Defining the project scope and necessary competencies is fundamental. Team members should share common values and bring diverse experiences that enrich team dynamics (Piwowar-Sulej, 2013, p. 47). Strong interpersonal relationships, trust, and open communication are essential and can be fostered through effective leadership and team integration efforts. The team leader acts as a mentor, motivator, and strategist, ensuring alignment with project goals. Additionally, balanced role allocation according to Belbin's team roles model ensures optimal collaboration and responsibility sharing (Belbin, 1981).

The composition of a project team directly affects efficiency, collaboration, and overall success. An optimal team combines technical expertise, problem-solving capabilities, and interpersonal skills. Cross-functional expertise, combining designers, engineers, and project managers, enables comprehensive problem-solving, while a mix of senior and junior members fosters knowledge transfer and innovation. Cultural and cognitive diversity enriches creativity and decision-making, and clearly defined roles minimize confusion and increase accountability.

Diversity in personality traits, work styles, and life experiences boosts creativity and problem-solving (Goleman, 1995). An inclusive environment, built on respectful communication and regular feedback, enhances engagement and productivity (Lencioni, 2002).

Experience also plays a crucial role in project success by enhancing decision-making, communication, and crisis management. Experienced teams navigate challenges effectively and implement innovations with confidence (Meredith & Mantel, 2012; Pinto, 2010).

Leadership and Team dynamics

Leadership style has a significant impact on team dynamics and outcomes. Transformational leaders inspire with vision and innovation (Bass, 1990), transactional leaders focus on structure and rewards (Burns, 2009), and servant leaders build trust by prioritising team needs (Greenleaf, 1977). Democratic leadership fosters participation, while autocratic leadership ensures control in critical situations (Lewin et al., 1939). The appropriate leadership style should align with team maturity, project complexity, and organizational culture.

A team leader is not only responsible for task management but also for mentoring, supporting growth, and guiding strategy. Effective leaders inspire with a clear vision (Sinek, 2009), cultivate trust through open communication (Lencioni, 2002), and adapt their leadership style to the team's needs (Blanchard, 1985), while promoting ethical behaviour and cohesion.

Effective team management also requires understanding the team's development stages, as outlined by Tuckman (1965): forming, storming, norming, performing, and adjourning. Each stage demands specific leadership interventions, from establishing goals and resolving conflicts to fostering autonomy and reflecting on project completion. Psychological safety (Edmondson, 1999), diversity and inclusion (Shore et al., 2011), and flexible leadership support sustainable, high-performing teams.

Balancing Costs, Seniority, and Experience

Balancing costs and seniority is essential to optimising team performance. Senior members provide advanced expertise but incur higher costs, while junior members offer cost-efficiency and growth potential. Combining both enables knowledge transfer and long-term organizational value creation (Chmielewicz, 2019; Lichtarski, 2011). Competency models support effective role allocation, balancing experience and costs (Filipowicz, 2014).

Employing too many junior members increases the need for supervision and quality control, while over-reliance on seniors reduces margins. Mixed teams of juniors and seniors enhance cost-efficiency and performance by leveraging juniors' affordability and seniors' expertise. Proper support for junior employees boosts overall efficiency and sustainability.

Experience directly impacts problem-solving and decision-making capabilities, allowing teams to collaborate effectively, manage crises, and drive innovation. Teams with a balanced structure are better prepared for dynamic project environments, optimising both costs and performance outcomes.

Work Environment and Collaboration

The work environment – whether on-site, remote, or hybrid – shapes team dynamics and performance. Remote work offers flexibility but may lead to isolation, while on-site work improves direct communication but introduces logistical challenges. Hybrid models attempt to balance these advantages but require strong management and communication strategies to maintain cohesion. Regular check-ins, inclusive practices, and attention to team well-being are essential in all environments to ensure seamless collaboration.

Furthermore, diversity of work styles and preferences requires creating a supportive atmosphere that values different approaches. Respectful communication, psychological safety, and continuous feedback contribute to maintaining motivation, innovation, and productivity in diverse and distributed teams.

Technological Integration in Project Team Management

Technology plays a pivotal role in enhancing the efficiency, collaboration, and innovation of project teams. The integration of modern tools supports the management of complex projects and fosters agility.

Key technologies include:

- project management platforms (Jira, Asana, Trello) for task tracking and milestone management;
- collaboration and communication tools (Teams, Slack, Zoom) enabling seamless interaction in remote and hybrid setups;
- cloud-based solutions (Google Workspace, Confluence) that facilitate real-time document sharing and knowledge management;
- Data analytics and AI, which support risk prediction, performance tracking, and decision-making (Buxmann & von der Gracht, 2021);
- automation of repetitive processes and Agile workflows (Rigby et al., 2016), allowing teams to focus on high-value tasks.

A well-integrated technological ecosystem enhances transparency, reduces the risk of errors, and ensures better project outcomes. Organizations leveraging advanced solutions such as AI-driven risk assessment, real-time tracking, and collaborative environments achieve higher efficiency and competitiveness.

3. Strategies and Tools for Advanced Project Team Optimisation

Introductory Remarks

Building on the complexities of forming and managing project teams discussed in previous paragraph, this section shifts the focus to advanced strategies for optimising project teams. By leveraging foundational knowledge of team dynamics, we explore holistic approaches, optimisation models, mathematical modelling, and effective use of optimisation tools and techniques.

Challenges and Future of ESP Companies in Building Effective Project Teams

Engineering Service Providers (ESPs) in the automotive industry face ongoing challenges in building effective project teams. They must balance technical proficiency, adaptability, cost-efficiency, and innovation to meet demanding industry standards. Managing complex engineering tasks requires advanced expertise and flexibility to respond to changing project requirements and technological developments.

Cost optimisation is critical, as ESPs must align resource allocation and team structure with profitability without sacrificing quality. At the same time, a strong culture of innovation is essential to meet evolving client expectations and stay competitive in a fast-paced global market.

Strict safety, emissions, and performance regulations add further complexity, requiring deep knowledge of industry standards. Looking ahead, the integration of artificial intelligence, machine learning, and advanced technologies will reshape the sector, pushing ESP teams to continuously upgrade their skills and tools to drive efficiency and innovation.

Holistic Approaches to Optimisation

In today's rapidly changing business environment, a holistic approach to managing project teams is increasingly significant. This strategy emphasises understanding team members' needs and potential, essential for sustained efficiency and innovation (Brassey et al., 2023; Oboloo, 2022).

A holistic view considers employees' mental, physical, and social well-being, enabling managers to harness individual strengths and improve productivity and creativity (Brassey et al., 2023). Investing in well-being – encompassing physical, mental, and emotional health – yields measurable short- and long-term benefits, with healthier employees demonstrating higher productivity.

Unlike traditional approaches focused on short-term results and cost minimization, holistic management integrates methodologies like Total Delivered Cost (TDC), which evaluates true costs, including transportation, storage, and hidden fees (Oboloo, 2022). This comprehensive perspective enhances strategic decision-making and process optimisation.

Companies like Google, SAS Institute, Netflix, and Patagonia exemplify successful holistic practices by prioritising well-being, open communication, and flexible work environments, achieving high employee satisfaction and productivity.

Competence Matrix and Project Teams at Endego

The use of a competence matrix (Tab. 1) is integral to Endego's approach to project team management. This tool helps in identifying the skills and expertise required for each project and matching them with the available resources within the company. By systematically assessing and documenting the competencies of team members,

Table 1. Fragment of Endego skill matrix

Personal Number	Employee name	Role	Leadership	Communication with customers	Cooperation	Proactivity	Problem solving	Project Management	English language	German language	NX Solid	NX Surface	NX Assy	NX 2D Drawing	VW	Audi	Skoda	Mercedes	BMW	Porsche	IP/Miko	Door Panel	Headliner	Pillar trims	Carpets/ Insulations	Trunk
ID1	Dominik Kaczka	Junior	1	1	2	2	1	1	2	1	0	0	0	0	1	1	1	1	1	1	3	2	2	3	2	0
ID2	Monika Łabędź	Junior	1	2	3	3	2	2	3	1	0	0	0	0	3	2	1	1	1	1	2	0	0	1	2	0
ID3	Grzegorz Sokół	Regular	1	2	3	3	2	2	2	1	3	2	3	2	3	3	3	2	2	3	3	3	2	3	2	3
ID4	Piotr Wróbel	Senior	2	2	3	2	3	2	3	2	1	1	3	3	3	3	3	1	2	3	3	2	2	2	1	2
ID5	Aleksander Jeż	Senior	2	3	3	3	3	2	3	1	1	1	2	2	2	3	1	1	2	1	1	1	1	2	2	2
ID6	Damian Wrona	Leader	2	3	4	3	3	3	3	1	1	1	1	1	3	3	3	3	2	3	2	3	1	2	2	3
ID7	Paweł Kos	Leader	3	3	3	2	3	3	3	2	2	2	2	1	3	3	3	1	3	3	3	3	1	2	3	3
ID8	Łukasz Gołąb	Junior	1	2	3	3	3	1	3	2	2	3	2	1	1	1	1	0	3	2	1	1	1	3	2	2
ID9	Mirek Orzeł	Leader	2	4	3	3	3	3	3	3	1	1	1	1	4	4	4	2	3	2	3	2	4	3	3	4
ID10	Ola Wrona	Junior	1	2	3	3	2	1	3	2	3	3	3	3	1	1	1	3	1	1	4	2	2	2	1	2

Source: own elaboration.

Endego can ensure that the right people are assigned to the right projects. The competence matrix also aids in identifying skill gaps and areas for development. This allows for targeted training and development initiatives, ensuring that team members continuously enhance their capabilities and stay abreast of the latest industry trends.

Optimisation Models

Optimisation models are essential for improving project team efficiency, helping identify the best solutions under specific constraints through mathematical and algorithmic methods (Hillier & Lieberman, 2001). Integrated with team management strategies, they support goal achievement while maintaining employee satisfaction and well-being.

Types of Optimisation Models

- Linear Programming (LP): used in production planning, supply chain management, and resource allocation.
- Nonlinear Programming (NLP): applied in advanced engineering, economics, and finance.
- Integer Programming (IP): relevant for logistical planning, project management, and scheduling problems.
- Dynamic Programming (DP): effective in sequential optimisation, resource management, and game theory.

Each type has specific applications and requires appropriate solution methods (Bertsimas & Tsitsiklis, 1997). These models are widely applied across industries, from engineering and economics to logistics, medicine, and environmental protection, enabling efficient resource use and problem-solving.

Mathematical modelling further enhances optimisation by analysing and predicting complex phenomena (Bevington & Robinson, 2003; Karnopp, 1990; Ross, 2014; Varian, 1992). Models can be deterministic, stochastic, dynamic, or static and are increasingly hybrid, combining various techniques for more robust analysis. Applications range from weather forecasting and disease modelling to technological innovation and financial markets (Black & Scholes, 1973; Feynman et al., 1964; Kitano, 2002; Lorenz, 1963).

Ensuring model reliability in complex environments is challenging, driving the adoption of artificial intelligence and machine learning to create adaptive solutions (Bengio et al., 2015). Future directions include real-time optimisation, cloud computing, and quantum computing, which further expand the potential of optimisation techniques.

Optimisation Solvers

Optimisation solvers are essential tools for addressing complex decision-making challenges in fields such as engineering, logistics, IT, and project management. By applying advanced algorithms—based on linear, nonlinear, and integer programming, as well as heuristic and metaheuristic methods—solvers support efficient resource allocation, scheduling, and system design.

Their key advantage lies in the ability to analyse multiple variables and constraints simultaneously, enabling the selection of optimal team compositions, cost structures, and work plans. In project management, solvers help compare alternative scenarios, balance workloads, and predict the impact of different configurations on overall performance and profitability.

With increasing project complexity, computational efficiency becomes critical. Modern solvers use technologies such as parallel and cloud computing to process large datasets quickly and accurately. Additionally, the growing integration of artificial intelligence and machine learning enhances solver adaptability, allowing real-time adjustments to project changes and improving the accuracy of predictions (Bengio et al., 2015).

In dynamic environments like the automotive industry, optimisation solvers play a strategic role, enabling companies to respond faster to evolving client needs, manage resources effectively, and maintain high-quality standards while controlling costs.

4. Endego sp. z o.o.: Innovation and Challenges in Project Team Management

Introductory Remarks

This section delves into the specific challenges and innovative strategies employed by Endego sp. z o.o. in managing project teams within the CAD/CAE engineering services sector of the automotive industry. By examining the company's approach, this analysis aims to provide insights into effective team management practices, the role of innovation, and the unique challenges faced by engineering service providers (ESPs).

Company Endego sp. z o.o.

Endego sp. z o.o., based in Krakow, Poland, provides comprehensive engineering and software development services for the automotive industry, delivering end-to-end solutions from concept to market. The company specialises in designing vehicle interiors and exteriors with a focus on aesthetics, functionality, safety, and aerodynamics. In collaboration with leading European OEMs, Endego develops automotive lighting, electrical installations, and embedded electronics, utilising

programming languages such as C Embedded/MISRA, C++, and Java. Additionally, the CAE team performs advanced simulations – including structural, CFD, and electromagnetic analyses – to optimise designs and reduce costs. Combining technical expertise with strong project management capabilities, Endego delivers innovative, reliable solutions to meet the industry's demanding standards.

To address diverse client needs, Endego applies flexible cooperation models. The Time & Material model supports dynamic projects with evolving scopes, ensuring transparency and cost control, while the Work Package Delivery model focuses on clearly defined deliverables and milestones, facilitating precise planning and resource allocation. Tailoring these approaches enables Endego to manage projects efficiently while maintaining high client satisfaction.

Endego builds effective project teams by leveraging modern methodologies such as Agile and Lean, which enhance collaboration, efficiency, and adaptability. The company promotes innovation through access to advanced tools and encourages open communication and experimentation. Prioritising psychological safety, diversity, and inclusion creates an environment where team members feel valued and empowered, driving creativity and high performance. By continuously integrating emerging technologies and responding to industry trends, Endego strengthens its competitive advantage while consistently delivering high-quality engineering solutions.

5. Optimisation: Results and Their Interpretation

Optimisation at Work: Evaluating Project Team Strategies at Endego

The preceding section examined how project team optimisation can enhance the dynamic environment of the automotive industry. This paragraph focuses on assessing the effectiveness of these optimisation strategies, evaluating how they translate into measurable business outcomes, and deriving lessons from these results.

The analysis will involve a detailed examination of Endego's results using analytical tools and mathematical models introduced earlier. This will help identify critical success factors and areas for further optimisation. Consequently, this section bridges theoretical exploration and practical application in a real-world business setting, offering valuable insights and recommendations for future initiatives.

Purpose of the Task

The goal is to determine the optimal composition of the project team by analysing the competences and costs of employees. The input data include:

- skill matrix with designated specific competences depending on the project (Tab. 2);
- project parameters (man hours, area, OEM, required foreign language, capacity plan for individual months, etc.; Tab. 3).

Table 2. Project skill and seniority matrix

Personal Number	First name	Role	Competence Center	Rate (PLN)	Weekly (40 h) costs (PLN)	Project Language	Project CAD Competence	Project Industry Competence	Industry Competence Bonus	OEM Expertise	Project Management	Competence & Seniority	Role in project	Employee Presence
ID1	Dominik Kaczka	Junior Engineer	Interior	50.00	2 000.00	0	8	4	2	1	0	24	DE	YES
ID2	Monika Łabędź	Junior Engineer	Interior	50.00	2 000.00	3	8	2	0	1	0	21	DE	YES
ID3	Grzegorz Sokół	Regular Engineer	Exterior	75.00	3 000.00	0	11	5	5	2	0	36	DE	YES
ID4	Piotr Wróbel	Senior Engineer	Exterior	90.00	3 600.00	3	12	4	2	2	0	37	DE	YES
ID5	Aleksander Jeż	Senior Engineer	Interior	90.00	3 600.00	3	12	1	1	2	0	22	DE	YES
ID6	Damian Wrona	Project Leader	Interior	110.00	4 400.00	3	14	3	2	2	3	41	PL	YES
ID7	Paweł Kos	Project Leader	Interior	90.00	3 600.00	3	12	5	5	3	3	55	PL	YES
ID8	Łukasz Gołąb	Junior Engineer	Exterior	50.00	2 000.00	3	11	1	1	3	0	21	DE	YES
ID9	Mirek Orzeł	Project Leader	Interior	110.00	4 400.00	3	13	5	5	3	3	56	PL	YES
ID10	Ola Wrona	Junior Engineer	Exterior	55.00	–	3	1	5	2	1	0	35	N/A	YES
ID11	Justyna Kos	Regular Engineer	Exterior	75.00	–	0	10	1	1	2	0	11	N/A	YES
ID12	Marcin Gołąb	Regular Engineer	Exterior	75.00	3 000.00	3	11	4	4	2	0	36	DE	YES
ID13	Maciej Orzeł	Senior Engineer	Interior	85.00	3 400.00	3	10	6	6	2	0	55	DE	YES
ID14	Przemek Wrona	Senior Engineer	Exterior	85.00	3 400.00	3	13	1	1	3	0	23	DE	YES
ID15	Grzegorz Kos	Project Leader	Exterior	110.00	4 400.00	0	11	5	5	4	3	45	DE	YES

Source: own elaboration.

Table 3. Project basic capacity plan for optimisation

Month	M1	M2	M3	M4	M5	M6	M7
Empl./month for optimisation	0.5	4	1.5	3.5	2	0.5	0.25
Working hours/month	80	640	240	560	320	80	40

Source: own elaboration.

Key competence indicators:

- Project Language: knowledge of the language is crucial, with values considered only if equal to or greater than 3;
- Project CAD Competence: assesses CAD skills, essential for design engineers;
- Project Industry Competence: experience in designing a given part or module, enhanced by an Industry Competence Bonus;
- OEM Expertise: knowledge of OEM standards, processes, and tools;
- Project Management: skills in managing projects in each area.

Mathematical Model and Representation of the Optimisation Task

To achieve cost minimisation and maximise team ranking, the optimisation model integrates multiple variables and constraints reflecting real-world project requirements and team dynamics.

Mathematical Model with Cost Minimisation

The primary goal is to minimise project costs (Scenario 1) while maintaining appropriate experience and seniority levels. The model uses data from 15 individuals with varying levels of expertise and weekly costs (Tab. 2). Ranking points, reflecting the competence and seniority of each team member, are calculated to determine their suitability for the project.

The optimisation model was implemented in Excel Solver, determining the participation level of each employee (0-4 units).

Mathematical Model to Maximise Team Ranking

The second model focuses on maximising team ranking (Scenario 2) by optimising the competence levels of team members while keeping costs within budgetary constraints.

CEPI Maximisation

CEPI (Composite Employee Performance Index) maximisation (Scenario 3) involves fine-tuning team compositions to enhance overall performance, considering both competence and cost.

Example of Project Completed at Endego and Optimisation Attempts

A case study of a completed project at Endego showcases the application of the optimisation models. The project (Tab. 4) spanned seven months, with the optimisation model adjusted to reflect real-world conditions.

Table 4. Project – basic project data/parameters

Project Hours budget (h)	1960
Time (months) – W	7
Working time (h/month)	160
OEM	BMW
Competence Centre	Interior
Part/Module	IP/Miko
CAD	Catia
Language	English
Customer rate	PLN 149.60
Project expected revenue	PLN 293 216.00

Source: own elaboration.

Scenario 1: Maximise the Gross Margin (GM1)

In this scenario, the aim is to maximise the project margin while maintaining a balanced team. The Solver identified a team composition of 1 Project Leader, 1 Senior Design Engineer, and 2 Junior Design Engineers. The high involvement of juniors results in a potentially high margin, though it introduces a risk due to their lesser experience (Tab. 5).

Results:

- Revenue: PLN 293 216.00;
- COGS: PLN 98 088.80;
- GM1: 67%.

Table 5. Results of Scenario 1

Role	Competence & Seniority	Role in project	Employee Presence	Project Employee COGS (PLN)	Empl./ month for optimisation	Sum of Employee Working units	Month 1	Month 2	Month 3	Month 4	Month 5	Month 6	Month 7
					Working weeks								
					Working hours								
Regular Design Engineer	45	DE	YES	–	49	16	80	4	6	14	8	2	0.5
Regular Design Engineer	36	DE	YES	–									
Regular Design Engineer	35	DE	YES	–									
Junior Design Engineer	24	JUN	YES	–	1960	640	320	560	240	80	320	80	40
Junior Design Engineer	18	JUN	YES	–									
Junior Design Engineer	22	JUN	YES	–									
Junior Design Engineer	21	JUN	YES	9 600.00	8	4	2	4	4	4	4	4	1
Junior Design Engineer	27	JUN	YES	17 000.00									
Junior Design Engineer	22	JUN	YES	–									
Senior Design Engineer	37	DE	YES	–	18	4	2	4	4	4	4	2	2
Senior Design Engineer	30	DE	YES	–									
Senior Design Engineer	50	DE	YES	49 888.80									
Senior Design Engineer	31	DE	YES	–	6	4	2	4	2	4	4	2	2
Project Leader	74	PL	YES	–									
Project Leader	56	PL	YES	21 600.00									

Source: own elaboration.

Scenario 2: Maximise Team Seniority

This scenario focuses on forming the most competent team. The team includes 2 Project Leaders, 1 Senior Design Engineer, and 1 Regular Design Engineer. This results in a lower margin but ensures higher team competency and potentially faster project completion (Tab. 6).

Table 6. Results of Scenario 2

				Empl./ month for optimi- sation		0.5	4	1.5	3.5	2	0.5	0.25
				Working weeks	49	2	16	6	14	8	2	1
				Working hours	1960	80	640	240	560	320	80	40
Role	Competence & Seniority	Role in project	Employee Presence	Project Employee COGS (PLN)	Sum of Employee Working units	Month 1	Month 2	Month 3	Month 4	Month 5	Month 6	Month 7
Regular Design Engineer	45	DE	YES	29 140.80	8		4		4			
Regular Design Engineer	36	DE	YES	–								
Regular Design Engineer	35	DE	YES	–								
Junior Design Engineer	24	N/A	YES	–								
Junior Design Engineer	18	N/A	YES	–								
Junior Design Engineer	22	N/A	YES	–								
Junior Design Engineer	21	N/A	YES	–								
Junior Design Engineer	27	DE	YES	–								
Junior Design Engineer	22	N/A	YES	–								
Senior Design Engineer	37	DE	YES	–								
Senior Design Engineer	30	DE	YES	–								
Senior Design Engineer	50	DE	YES	45 080.00	14		4	2	4	4	2	
Senior Design Engineer	31	DE	YES	–								
Project Leader	74	PL	YES	117 003.60	21	2	4	4	4	4	2	1
Project Leader	56	PL	YES	21 600.00	6		4		2			

Source: own elaboration.

Results:

- Revenue: PLN 293 216.00;
- COGS: PLN 212 824.40;
- GM1: 27%.

Scenario 3: Maximise the Cost-Effectiveness Performance Indicator (CEPI)

This scenario combines employee ranking with cost to find the most cost-effective team. Two sub-scenarios were considered: 3a and 3b.

Scenario 3a includes at least 50% Junior Design Engineer involvement (Tab. 7).

Table 7. Results of Scenario 3a

				Empl./ month for optimi- sation		0.5	4	1.5	3.5	2	0.5	0.25
				Working weeks	49	2	16	6	14	8	2	1
				Working hours	1960	80	640	240	560	320	80	40
Role	Competence & Seniority	Role in project	Employee rate (PLN)	Cost-Effectiveness Performance Indicator (CEPI)	Sum of Employee Working units	Month 1	Month 2	Month 3	Month 4	Month 5	Month 6	Month 7
Regular Design Engineer	45	DE	91.07	0.49								
Regular Design Engineer	36	DE	92.15	0.31								
Regular Design Engineer	35	DE	93.75	0.30								
Junior Design Engineer	24	N/A	42.86	0.56								
Junior Design Engineer	18	N/A	53.57	0.39								
Junior Design Engineer	22	N/A	30.00	0.63	4				4			
Junior Design Engineer	21	N/A	25.00	0.84	21	2	4	4	4	4	2	1
Junior Design Engineer	27	DE	58.94	0.32								
Junior Design Engineer	22	N/A	32.00	0.59								
Senior Design Engineer	37	DE	69.29	0.43	4		4					
Senior Design Engineer	30	DE	112.50	0.27								
Senior Design Engineer	50	DE	80.50	0.62	14		4	2	4	4		
Senior Design Engineer	31	DE	80.00	0.48								
Project Leader	74	PL	139.29	0.53								
Project Leader	56	PL	90.00	0.62	6		4		2			

Source: own elaboration.

- Results:
- Revenue: PLN 293 216.00;
 - COGS: PLN 103 566.40;
 - GM1: 65%.

Scenario 3b excludes Junior Design Engineers (Tab. 8).

Table 8. Results of Scenario 3b

				Empl./ month for optimi- sation		0,5	4	1,5	3,5	2	0,5	0,25
				Working weeks	49	2	16	6	14	8	2	1
				Working hours	1960	80	640	240	560	320	80	40
Role	Competence & Seniority	Role in project	Employee rate (PLN)	Cost-Effectiveness Performance Indicator (CEPI)	Sum of Employee Working units	Month 1	Month 2	Month 3	Month 4	Month 5	Month 6	Month 7
Regular Design Engineer	45	DE	91.07	0.49								
Regular Design Engineer	36	DE	92.15	0.39								
Regular Design Engineer	35	DE	93.75	0.37								
Junior Design Engineer	24	N/A	42.86	0.56								
Junior Design Engineer	18	N/A	53.57	0.34								
Junior Design Engineer	22	N/A	30.00	0.73								
Junior Design Engineer	21	N/A	25.00	0.84								
Junior Design Engineer	27	DE	58.94	0.46								
Junior Design Engineer	22	N/A	32.00	0.69								
Senior Design Engineer	37	DE	69.29	0.53	14		4	2	4	4		
Senior Design Engineer	30	DE	112.50	0.27								
Senior Design Engineer	50	DE	80.50	0.62	21	2	4	4	4	4	2	1
Senior Design Engineer	31	DE	80.00	0.39								
Project Leader	74	PL	139.29	0.53	8		4		4			
Project Leader	56	PL	90.00	0.62	6		4		2			

Source: own elaboration.

Results:

- Revenue: PLN 293 216.00;
- COGS: PLN 172 595.20;
- GM1: 41%.

Conclusions from the Optimisation Scenario Analysis

Balancing skills, experience, and cost in project teams are key to achieving efficiency. Employing too many juniors risks quality and increases supervision, while relying solely on seniors reduces margins. The CEPI (Cost-Effectiveness Performance Indicator) effectively balances these factors, optimising team composition. Mixed teams of juniors and seniors enhance cost-efficiency and performance by leveraging juniors' affordability and seniors' expertise. Proper support for young employees

boosts efficiency, and the CEPI model shows potential for broader application by integrating competencies and costs.

Challenges include the subjectivity of evaluating competencies, static models' limitations in dynamic environments, and overlooked human factors like motivation and relationships. To address these, dynamic management tools, fostering collaboration, and investing in employee training are recommended. An integrated approach, combining economic and interpersonal factors, is essential for creating effective, adaptable teams and achieving sustainable optimisation.

6. Conclusions

This article explores optimising project teams in the automotive CAD/CAE sector, highlighting study insights and future pathways for research and application. It confirms the strategic value of competence matrices and optimisation solvers in enhancing operational efficiency and reducing project delivery costs, supported by empirical data.

Key Findings

The study validated that integrating theoretical models with practical applications improves team performance. Leadership styles, team composition, technological integration, and work environment emerged as key factors influencing project outcomes. Competence matrices and solvers proved instrumental in enhancing efficiency and cost-effectiveness.

Strategic Recommendations

- Cooperation Grade Matrix: a proposed tool to quantitatively assess interpersonal relationships and team cohesion, enhancing communication in high-stakes projects.
- Enhanced Optimisation Solvers: incorporating real-time project data and feedback ensures dynamic refinement, adaptability, and continuous improvement.

Future Directions

Organizations should invest in advanced solvers integrating competence matrices and the Cooperation Grade Matrix to foster continuous improvement and innovation. Regular updates with new performance data ensure solvers remain effective in real-world scenarios. This work provides a foundation for further research into advanced tools and strategies for project team management, promoting efficiency and innovation in the CAD/CAE sector.

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Optymalizacja zarządzania zespołami projektowymi w sektorze usług inżynierskich CAD/CAE dla przemysłu motoryzacyjnego

Streszczenie: Optymalizacja zarządzania zespołami projektowymi w sektorze usług inżynierskich CAD/CAE dla przemysłu motoryzacyjnego ma na celu zwiększenie efektywności i redukcję kosztów w dynamicznych środowiskach. Budowanie zespołów o wysokich kompetencjach technicznych, elastycznych i efektywnych kosztowo pozostaje kluczowym wyzwaniem. Niniejszy artykuł przedstawia ramy teoretyczne oparte na badaniach jakościowych i ilościowych, koncentrujące się na przywództwie, różnorodności i integracji technologicznej. Badanie pozwala postawić hipotezę, że matryce kompetencji i solverzy optymalizacyjne poprawiają efektywność i redukują koszty realizacji. Badania empiryczne przeprowadzone w Endego sp. z o.o. potwierdzają wartość równoważenia doświadczenia zespołu z kosztami w celu maksymalizacji wydajności operacyjnej. Wyniki podkreślają znaczenie dynamicznego zarządzania, współpracy i ciągłego rozwoju pracowników. Narzędzia optymalizacyjne wykorzystujące dane o kompetencjach i kosztach umożliwiają dostosowania zespołów w czasie rzeczywistym, poprawiając wyniki przy jednoczesnej minimalizacji wydatków. Zalecane są również przyszłe ulepszenia, takie jak integracja danych projektowych na żywo i wykorzystanie narzędzi, takich jak Macierz Stopnia Współpracy, do pomiaru spójności zespołu. Inwestowanie w zaawansowane rozwiązania optymalizacyjne jest niezbędne dla utrzymania elastyczności, innowacyjności i doskonałości w zarządzaniu projektami CAD/CAE.

Słowa kluczowe: optymalizacja, efektywność, redukcja kosztów, matryce kompetencji, spójność zespołu

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Exploration of Change Management Process in the Global Project

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Abstract: The article discusses the complexity of change management in a global company, focusing on e-procurement tool deployment. It analyses the challenges and drivers of change, emphasizing the supportive role of the leader as the most important in the process of successful implementation of the changes. In-depth interviews with business leaders revealed three categories of key factors of the implementation of e-procurement tool: people, technology, and process. The study provides practical guidelines for improving change management strategies in global projects.

Keywords: change management, business leaders interview, leadership role, e-procurement

1. Introduction

Organizations must adapt to technological development, market changes, and evolving customer expectations in today's dynamic business environment. This article explores change management within a global company, focusing on the implementation of the e-procurement tool. Various change management approaches, such as Kotter's eight-step model, Lewin's framework, and the ADKAR model, are examined, along with enablers and barriers to change.

Understanding the company's context, industry dynamics, and market positioning sets the stage for this exploration. The research process involved in-depth interviews (IDIs) and a robust research framework to uncover insights into the company's change management. The findings highlight the intricacies of change and provide actionable insights for the e-procurement deployment strategy, including best practices and pitfalls to avoid.

The research goal of this paper is exploration of change management process in the given company. The exploration will involve understanding how the company navigates and implements changes effectively, focusing on the role of business leaders and people managers in aligning with the company's future vision.

2. Key Enablers and Hindering Factors for Change

There is nothing permanent except change and many change initiatives fail. The crucial aspect of organizational change management lies in comprehending change drivers. By identifying them, organizations can effectively implement transformative initiatives and work toward achieving their strategic objectives. By understanding the enablers of change, organizations can better plan and execute change initiatives, overcome resistance, and increase the chances of success (Romford, 2023). Organizations often overlook the human element of change management. The employees' resistance to change, the internal power dynamics of the organization, and external factors are often overlooked and underestimated by the management. They take a top-down approach to managing change and ignore the inevitable resistance to imposing new ways of doing things (Clayton, 2021).

The top important change enablers are the following:

- supportive leadership: employees are more likely to embrace the change when leaders demonstrate commitment and provide clear direction;
- effective communication: transparent and timely communication is essential. leaders should articulate the reasons for change, address concerns, and keep everyone informed throughout the process;
- engaged employees: involving employees in the change process fosters ownership and commitment;
- training and skill development: equipping employees with the necessary skills and knowledge ensures a smoother transition;
- aligned incentives, such as performance metrics or rewards, with the desired change to encourage adoption. when employees see the benefits, they are more likely to embrace it;
- change champions: identifying and empowering change champions within the organization can create positive momentum. these individuals advocate for change and inspire others;
- organizational culture: a culture that values innovation, adaptability, and continuous improvement supports successful change efforts (Prosci, 2023).

When planning the change, it is essential to identify both the supportive and hindering factors to navigate the transition effectively. Hindering factors refer to elements or conditions that limit or impede the progress of a change. These factors can delay, interrupt, or create difficulties in implementing new initiatives or modifications. Here are some examples identified (Kotter et al., 2011):

- lack of ownership – basic parts of a venture are less likely to be completed if no one takes obligation for them;
- poor involvement from both the business leaders and people managers may impact the readiness and adoption of employees during the change programme;
- no buy-in from top managers/sponsors will decrease the credibility of a change programme;
- resistance to change – the enunciation of numerous irrational contentions for why the alternative will not work is one kind of resistance. The most minor acts of defiance can add up to big problems;
- lack of planning – efficiency misfortune, worker separation, steady loss, and resistance are quite a few of the awful results that can happen when alter is actualized without fitting arranging and thought of the effect on the workforce;
- bad change management communication – change management depends intensely on successful communication. Lacking communication strategies can cause superfluous delays, as the expecting beneficiary may not be the same as the beneficiary of the message;
- lack of clarity – the initiation of change projects often suffers from a lack of clarity in communicating the scope and objectives of the proposed transformation;
- lack or poor change governance – projects may go behind schedule without proper managerial oversight due to a lack of accountability among team members;
- change fatigue – encouraging employees to embrace change poses challenges, as they may perceive repeated requests to modify processes and practices while observing the leadership team and managers adhering to familiar routines (Kotter et al., 2011).

Change management is the systematic use of processes and tools to address the human aspects of transitioning from a current state to a desired future state. Its purpose is to ensure that the anticipated outcomes of the change and the expected return on investment are successfully realized. The change implementation is rooted in various perspectives (Hiatt & Creasey, 2003).

1. Emerging need for change – the basic principle of change management is that we change for a reason. The reasons for changes are as diverse as the changes themselves: increasing revenues, increasing customer satisfaction, reducing costs, improving the quality of the product or service, reducing the level of risk, improving quality of life, etc.
2. Collectivity vs. individuality – change only happens when individuals start working in a new way: exhibiting new behaviours, using new tools, acting according to new processes, and acquiring new values. Change comes from people adopting new skills and demonstrating new competencies.
3. Understanding the people-oriented aspect of change – change management ensures that every change in our organization will bring the expected results, so it influences employees and develops them through various activities such as communication, training, and active and visible leadership.

4. Desired outcomes of change – change management focuses on achieving desired results or outcomes change by managing people during the transformation process. The purpose is to increase the probability that the target change state will be completed and related outcomes will be achieved.

Change management's effectiveness relies on integrating organizational and individual change processes. Senior leaders, supervisors, managers, employees, and project team resources are key roles. Unlike project management, which a project manager leads, change management involves many organizational players, from executives to front-line supervisors.

3. Research Context

The surveyed company operates in over 70 countries with 50,000 employees across 156 production units. It is divided into several business units, each with its own management and activities. The board of directors oversees strategic direction, while the management team handles daily operations. Each business unit specializes in products and services, with functional areas like R&D, manufacturing, sales, marketing, and customer service. The Company plans to implement a new e-procurement solution to streamline procurement processes, enhance expense transparency, and improve supplier management. This global template is designed to simplify purchasing, strengthen compliance, and drive efficiency. The system will reduce costs by consolidating expenses with contracted suppliers, allowing for better negotiation terms and cost savings. It will standardize processes globally, improving coordination and simplifying operations. In summary, the influence of the e-procurement tool extends across the entire procurement ecosystem, from purchasers and approvers to suppliers and internal support teams. What is challenging for change management is that not only internal stakeholders need to be considered in communication, training, and hyper care, but also external partners – suppliers who need to use the tool to do business with The Company.

Change management resources in global projects should be well estimated, selected, and fitted to play one of the most critical roles in the project – as it relates to the human side. Change Manager is a role that can support the project manager in professionally and effectively managing 'people' risks. To put simply, it can be said that while the Project Manager prepares a solution for the organization (implements the project), the Change Manager prepares the organization to adopt this solution (Ogonowski & Kastrau, 2024).

Change management focuses on supporting employees through transitions from a current state to a future state, known as adoption. During transitions, employees need Awareness, Desire, Knowledge, Ability, and Reinforcement. These elements form the ADKAR Change Management Model by Prosci, which customizes strategies for each phase.

For change initiatives to be successful, leaders should be aligned on the vision and reasons for the change, understand what it will mean for the employees and the organization, and visibly champion the project. Leadership Alignment is key to effective communication and engagement. Active and visible Sponsorship is the No. 1 contributor to success. Business leaders are preferred senders of organizational messages as they play a key role in change outcomes because employees trust them, are close to where the change happens, and mitigate resistance. People Managers are preferred senders of personal impact messages – what’s in it for me? As presented in Fig. 1, the CEO/President and Executive Manager are preferred senders of organizational messages, while the Employee’s Supervisors are the ones who more preferably communicate personal messages.

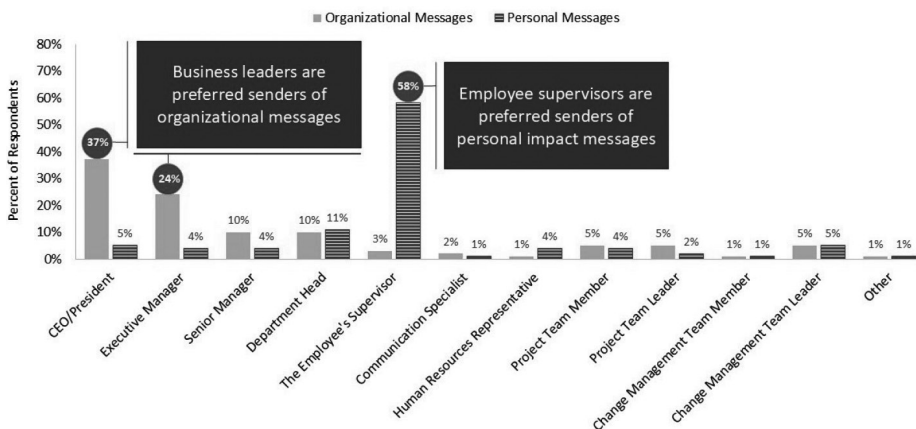


Fig. 1. The organizational and personal messages by different business roles

Source: (Prosci, 2023).

To get leadership buy-in and to elaborate a precise leadership engagement plan as part of the change management strategy, it is necessary to (McMahon, 2021):

- get to know the sponsors and their attitude towards the change,
- align messaging about e-procurement tool,
- know e-procurement deployment success definition,
- define who our allies are in the change process,
- expand the network of contacts.

4. Research Design

The aim of the research was to explore the change management process in The Company. The research involved understanding how the company navigates and implements changes effectively, but most of it, how the success of effective change looks like and what challenges the project team may encounter.

To accomplish these goals, the qualitative research method, In-Depth Interviews (IDI), was selected, as this research approach involves one-on-one engagements with participants. These interviews are used to gather an honest, intimate, and profound understanding of an audience or user behaviour in the context of a specific topic. The interviewees are business leaders and people managers. IDI is a relevant method as it allows for gathering detailed and in-depth participant feedback, especially when researching complex or nuanced topics. During the interview, new issues that arise during the conversation can be adapted and explored, allowing for deeper insight (*Choosing & Using Sources...*, 2018).

I identified 10 leaders as key stakeholders whose teams will be impacted by e-procurement tool deployment in the Asia-Pacific region. Their input is valuable for the project’s business and people readiness aspect. The structure of the interviewees is presented in Tab. 1.

Tabel 1. Structure IDI’s interviewees

Interviewee	Role description	No. of years in The company
Interviewee 1	finance lead for EMEA and APAC	10
Interviewee 2	manages procurement organization in APAC	3
Interviewee 3	manages data management organization	20
Interviewee 4	supply chain director for APAC region	20
Interviewee 5	manages account payable team for APAC	3
Interviewee 6	oversees procurement operations for Indonesia, Malaysia, and Singapore	3
Interviewee 7	oversees manufacturing operations in APAC	10
Interviewee 8	operation director for production sites in China	29
Interviewee 9	manages supply chain team for APAC business	15
Interviewee 10	optimizes supply chain efficiency in APAC region	9

Source: own elaboration.

I conducted the IDIs as virtual meetings via MS Teams from February 29th to April 30th, 2024. Each 30-minute interview was preceded by a personalized e-mail outlining the purpose and discussion prompts. Two out of 10 respondents declined the invites and provided written responses which were still included in the analysis. The other eight interviews were recorded and transcribed for documentation. Collected data were categorized and grouped to address the research question.

The research questions were as follows.

1. What is your image of e-pro?
2. From your perspective why e-procurement tool deployment is important to The Company?

3. What is needed to succeed with implementation of e-procurement?
4. What challenges during the change process, do you expect the team to encounter?
5. How do you see your role in driving that success?

5. Research Findings

My respondents, selected carefully for in-depth interviews, are all supporting businesses in the APAC region. Their seniority and experience are very different, from 3 to 29 years in The Company. Considering their roles, they deal with a wide range of diverse business areas. There are supply chain, operation, production, procurement, and accounts payable representatives. This set of informants was selected because all of them and their teams will be impacted by e-procurement deployment, and most of them need to be involved in supporting the change in the organization.

It was vital to learn about the benefits of implementing e-procurement tool from the business perspective and if the implementation fits with The Company's future vision. The analysis of the responses to this question reveals several key themes like standardization, productivity, and global consistency. Several responses highlight the significance of standardization. E-procurement serves as a tool to streamline and standardize processes across the organization. By doing so, it reduces manual labour and intervention in payment-related tasks. Interviewee 3 noted that the e-procurement tool is part of a global system that ensures consistency, completeness, and synchronization across various platforms. Most responses emphasize that e-procurement is integral to achieving operational excellence. It simplifies, standardizes, and automates processes, contributing to overall efficiency. Informant 4 said: "Simplification and modernization align nicely to APAC initiative; we are all for it." Providing a consistent procurement platform ensures that employees can focus on value-added tasks rather than manual administrative work. As confirmed by Informant 6: "I believe with e-procurement, we will be moving into a modernized and energized workplace." In summary, the deployment of e-procurement tool is viewed as an integral component of The Company's growth strategy, providing a unified platform for global procurement. It is also seen as a tool to streamline approval processes and manage attachments effectively within the organization.

It was essential to investigate the understanding of e-Procurement tool benefits for the entire organization. The feedback received reflects a blend of constructive criticism and optimism, with a clear desire for continued progress and enhancement of the e-procurement tool. Most interviewees have heard about e-procurement tool, some of them use it, and some individuals have no direct experience with it. The system is perceived as more efficient for contract management, although there are difficulties with e-bidding, especially in registering vendors for non-standardized categories due to complexity. Despite some obstacles, there has been progressive improvement in the experience with e-procurement since its inception. Generally, e-procurement tool is perceived as a comprehensive solution with high

expectations. Users are eager to understand the system better and anticipate improvements. As confirmed by Informant 7: "I heard a lot of people previously from the US or Europe. I'm not very sure about the issues, but I'm curious to know what their previous issues were. From a user perspective, we need to do anything to well prepare for that".

Secondly, I wanted to understand what are, according to my respondents, the key success factors of e-procurement tool implementation. The analysis of the responses highlights several critical factors for successful implementation, among them are understanding of local complexities, training and support, but also effective change management. Knowing what challenges the team may encounter during e-procurement deployment was also crucial. The analysis of the responses reveals three key areas of concern: people, processes, and technology.

Regarding people, language, and communication were mentioned several times. Providing training materials in local languages ensures that users understand e-procurement functionalities. Effective communication with other functions, especially finance, ensures alignment and collaboration. Effective change management strategies, including promoting the changes positively and providing resources in local languages, were underscored as essential for user readiness. Informant 10 emphasized: "We need to explain why we are having this platform using their own language so it is easier to follow what you're trying to tell them and what are the benefits of these tools. We need to have some promotion on this." Ensuring user readiness through training and support fosters a smooth transition. Vendor readiness could also be a struggle, as small and medium vendors, particularly from low-cost countries with less developed technology and suppliers' may express resistance to self-onboarding in the new tool. From all the responses, the key takeaways are that the deployment of e-procurement presents a multifaceted challenge that requires careful management of change, user training, data integration, and support systems to ensure a successful transition. Informant 9 paid attention to training: "To receive the good training, I think this is very, very critical. I don't see any big risk here."

Overall, the successful implementation of e-procurement tool requires a multifaceted approach that addresses local complexities, fosters open communication, provides robust training and support, and integrates seamlessly with existing systems.

Technology is understood as a transition from the current (manual) to the new (automated) way of working. One of the crucial elements, mentioned several times by my respondents, is transitioning from manual processes to e-procurement tool will necessitate extensive change management. As confirmed by Informant 1: "Now we are still pretty much relying on a lot of manual work. So that's gonna require a huge change management for the people to really start using and adopting e-procurement tool." An important message about business continuity was received from one interviewee, as ensuring uninterrupted business operations

while introducing new tools is a primary concern. Informant 10 mentioned: "People need to adjust to a new way of working. Of course, you will get challenged. Why? It is not as simple as what they're doing right now." Developing a backup plan is essential to prevent any disruptions that could lead to urgent delivery issues.

The third important category of challenges is Process. Most of my respondents emphasize that recognizing and adapting to each region's unique challenges and requirements is essential. This includes compliance with local government regulations and market practices. As confirmed by Informant 1: "It's important to understand clearly what the complexity is and then working with the team for a local resolution, and what challenges or what barriers we might face." Comprehensive training for users and responsive support, especially during the initial deployment phase, are crucial for a smooth transition. As mentioned by Informant 2: "People normally will be afraid or consent about any of the changes, so the responsiveness and the support after launch, especially for the beginning phase, is very critical."

Successful e-procurement deployment involves a holistic approach considering people, processes, technology, and integration. Addressing these challenges proactively can mitigate the risk of failure and lack of adoption.

It was pivotal to understand that among change management enablers and hindering factors, the most important group is connected with leaders' role. My respondents see their role in driving that success focusing on communication, collaboration, and support. Most individuals see their role as bridging local practices with global design, ensuring alignment and seamless support at regional and local levels. Emphasizing the importance of understanding what changes are being made and why they are necessary, particularly in the Asia-Pacific region where cultural factors play a significant role. Informant 1 pointed out: "I think the key is to make sure everyone fully understands what we are going to do and why we are doing this. Because in Asia Pacific, we typically need the leader to understand what the change is and why we are changing it." Many individuals aim to motivate and engage their teams by communicating the value of e-procurement and coordinating efforts across different functions and manufacturing plants. Informant 8 confirmed: "If I see the value here, then I can work with the team. Say: here's a value and how this will help all of us together. So, I can help with motivation, engagement, and communication." All the responses underscore the importance of three activities to drive the successful implementation of e-procurement tool: energize (active involvement in the deployment process), support (understanding the rationale behind changes and providing support), and communicate (clear communication of consistent and meaningful messages).

The in-depth interviews provided valuable insights, refined survey questions, and offered a holistic understanding of program dynamics. They helped me understand business leaders' preferences, needs, and experiences and expanded my network for future change management activities. The responses also clarified how leaders define project success, allowing me to align future communication effectively.

6. Conclusions

The paper focuses on leaders' attitudes and concerns regarding deploying the e-procurement tool. Based on the exploration research analysis, the key findings confirm the importance of change management in specific areas that should be applied in e-procurement deployment change management strategy to improve readiness and adoption of stakeholders. Here are the recommendations for an effective change management strategy focusing on Leadership engagement.

Visible leadership support is essential in successful change management, especially in global projects. One of the most important roles for leaders in the change process is communicating the need for change. Clear and compelling communication builds support and minimizes resistance. By explaining the reasons ("why?") for the change, managers help stakeholders understand the importance of adopting new ways of doing things. Effective business leaders inspire stakeholders by highlighting the positive impact the change will have on the organization, employees, customers, and other key stakeholders. A compelling vision motivates people to actively participate in the change process and become change agents or super users, creating desire. By promoting open dialogue and inclusivity, leaders create an environment where diverse perspectives are valued. Leaders also play a crucial role in overcoming resistance to change. Leaders reduce resistance by actively engaging with stakeholders, addressing doubts, and involving them in decision-making. Their commitment to the shift sets an example for others to follow.

Here are my key recommendations for engaging leadership in the e-procurement deployment project.

- **Identify Leaders:** identify all relevant business leaders who will be impacted by the change or whose teams will be impacted. Engaging them early in the process is better to ensure buy-in and alignment. During the interviews, it can also be identified who the allies are and determine if any coalition is built among leaders.
- **Buy-in:** clearly articulate the strategic value of e-procurement tool deployment. This includes explaining how it aligns with the organization's goals, improves user shopping experience, and enhances data quality. The best way is to present the business case, emphasizing cost savings, streamlined processes, and automated approval flow.
- **Messaging:** leaders should be aligned on the vision and reasons for the change, understand what it will mean for the employees and the organization, and visibly champion the project. The messages and actions of leaders throughout the organization must be aligned. Figure 2 shows examples of business leaders' engagement divided into three top important areas: Energize, Support, and Communicate.
- **Educate leaders:** business leaders are eager to learn more about e-procurement and be equipped with tools and knowledge to share with their employees. I re-

commend keeping leadership informed about project milestones, achievements, and challenges, regularly sharing progress reports, and metrics related to system usage and user satisfaction.

- Feedback: create feedback channels for employees to express their concerns, share feedback, and ask questions directly with leadership. Regular town hall meetings or virtual forums can facilitate open dialogue.
- Success stories: sharing success stories, highlighting positive outcomes, and recognizing teams or individuals who embrace the change would reinforce the idea that incremental progress matters.

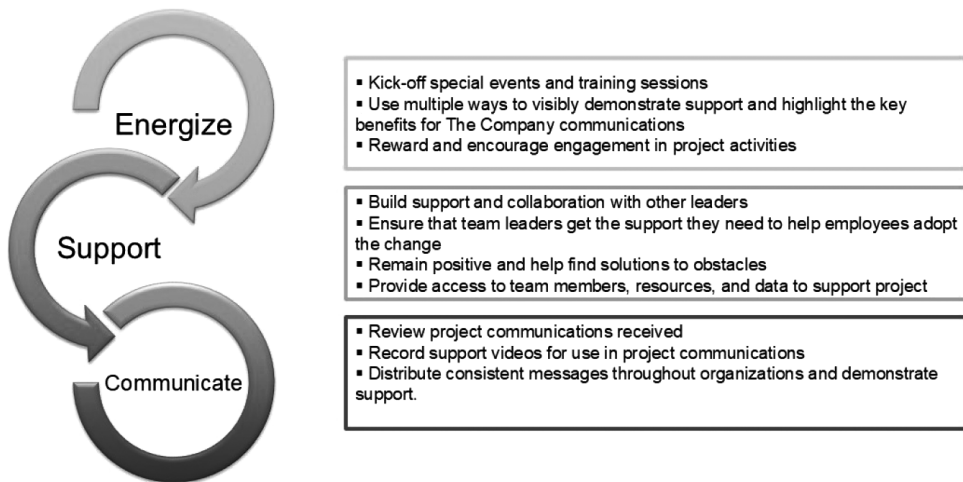


Fig. 2. Examples of business leaders' engagement

Source: own elaboration.

Research findings highlighted critical aspects of change management for The Company. Key recommendations for e-procurement deployment include fostering a collaborative environment, engaging stakeholders at all levels to ensure alignment and minimize resistance, and securing leadership support. Early involvement of leaders, addressing their concerns, and demonstrating the value of change are crucial for successful deployment.

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Eksploracja roli lidera w zarządzaniu zmianą w projekcie o zasięgu globalnym

Streszczenie: Artykuł omawia złożoność zarządzania zmianą w globalnej firmie, koncentrując się na wdrożeniu narzędzia *e-procurement*. Analizuje wyzwania i czynniki sprzyjające zmianie, podkreślając wspierającą rolę lidera jako najważniejszą w procesie udanego wdrożenia. Badanie, oparte na wywiadach z liderami biznesu, ujawnia 3 kategorie kluczowych czynników wdrażania narzędzi *e-procurement*: ludzi, technologię i proces. Dostarcza praktycznych wskazówek do strategii zarządzania zmianą w globalnych projektach.

Słowa kluczowe: zarządzanie zmianą, wywiady z liderami, role liderów, *e-procurement*

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Modelling the Effectiveness of Scrum Daily Using SEM: A Mathematical Model for Agile Teams

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JEL Classification: C38, C51, M15

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Abstract: In the world of modern business, where change is the only constant, traditional methods of managing IT projects are gradually fading into oblivion. More organizations are adopting agile methodologies to flexibly manage projects, continuously deliver value to customers, maximize team efficiency and quickly respond to changing business requirements. One of the most commonly used methods is Scrum, with the key event being the Daily Scrum – a short, daily team meeting aimed at synchronizing progress and addressing any obstacles in the project. *The Scrum Guide*, the official handbook for the method, provides clear guidelines on how to organize this event. However, despite following the same principles, many teams are not satisfied with the quality of their Daily Scrum. This study aims to address this issue by building a theoretical mathematical model that considers selected aspects (Communication, Sprint Goal, Timing, Team Autonomy, and Self-Management) and conducting a Structural Equation Modelling (SEM) analysis. The findings will help identify factors worth considering to make the Daily Scrum as effective as possible.

Keywords: Scrum Team, Scrum Daily, Scrum Daily effectiveness, structural equation modelling

1. Introduction

The IT industry is one of the fastest-growing sectors. Technological advancements and increasing competition force teams to constantly adapt to changing market conditions and demands. Agile methodologies, particularly Scrum, were developed as a response, offering a flexible approach to project management that contrasts with traditional techniques. Scrum emphasises communication, close collaboration with clients and iterative delivery of business value.

A critical component of the methodology is the Daily Scrum, a concise, daily meeting intended to synchronize information, monitor progress towards the Sprint

Goal and address impediments. Despite its fundamental role within the Scrum framework, the author has observed that this practice is frequently overlooked in real-world application. Notably, many developers perceive it as redundant and ineffective, which is particularly troubling given its significance in ensuring the successful implementation of Scrum.

The study aims to identify factors affecting the quality of these meetings, understand the specific challenges faced by Agile teams and propose solutions to address them. The research problem can thus be defined as follows: How do selected aspects influence the effectiveness of Daily Scrum meetings within the Scrum methodology?

To achieve the aim, the following research questions have been posed.

- Do the identified factors affect the effectiveness of Scrum Daily?
- How do the proposed factors influence the effectiveness of Scrum Daily?
- What are the most common problems associated with Scrum Daily?
- What strategies can help improve the quality of Scrum Daily?

The study was conducted using a quantitative method. This approach aims to establish causal relationships using mathematical and statistical techniques. The methodology is characterized by a high degree of objectivity and the results of quantitative research can be generalized to a larger population.

2. Theoretical Background

Agile software development methods generally attract the interest of researchers. In-depth literature reviews have shown that many aspects have already been studied, but there has been little focus on what essentially contributes to their effectiveness.

The research that may offer valuable insights into the effectiveness of the Scrum Daily specifically, comprises publications that focus on the Scrum Team itself.

Kristinsdottir et al. (2016) examined how Product Owners (PO) communicate with developers and manage the challenges. The research highlighted communication and the indirect leadership role of POs as key challenges. Effective communication skills are crucial. POs should encourage a broad perspective within the team and inspire developers to engage deeply with the product.

Hidayati et al. (2020) identified key hard and soft skills needed in Scrum Teams. Both junior and senior developers ranked communication and interpersonal skills as the most important, highlighting the growing recognition of soft skills in the IT industry, which were undervalued under conventional project management.

In 2021 Morandini et al. evaluated how theoretical Scrum principles translate into real-world execution. The primary goal was to identify best practices in Scrum Teams and compare how they align with theory. While most respondents conducted Scrum Daily according to the recommendations, nearly half felt these meetings were ineffective. The study therefore proposed several improvements:

reviewing the Scrum Daily agenda to focus on the most important aspects, involving developers in task prioritisation and ensuring Backlog items are complete to facilitate implementation.

Moe et al. (2010) examined how Scrum impacts team dynamics. The study found that a lack of interdisciplinarity and team member specialization negatively affected communication. Issues were concealed and the lack of collaboration led to delays and significant project errors. The key takeaways are that communication is the foundation of effective collaboration and Scrum Daily plays a crucial role here. Without good communication, these meetings lose their effectiveness, potentially jeopardizing the entire project.

Ultimately, the most relevant publication is a study by Verwijs and Russo from 2021 which, in brief, mathematically models the impact of various factors on the overall effectiveness of a Scrum Team.

The article was prompted by the fact that, although attempts have been made to identify aspects leading to success in agile software development, there is no research that explains why some Scrum Teams are more effective than others. The authors posed two research questions:

RQ1: What are the key factors that determine high Scrum Team effectiveness and how do they relate to each other?

RQ2: Can this theoretical model be generalized to all Scrum Teams?

It is also important to note that only factors at the team level are considered. The research process employed a mixed-methods approach, combining quantitative and qualitative methods and was divided into two parts.

The first part was an exploratory case study aimed at identifying potentially significant factors. As a result, 16 key themes were identified, along with six high-level dimensions that group them. The results were used to induce testable hypotheses.

The first dimension is team effectiveness which is expressed through stakeholder satisfaction and team morale. The second dimension is responsiveness and is practically realized through the refinement and release frequency. Stakeholder concern is another concept in the model. This variable manifests in four areas: focus on value, collaboration with stakeholders, the quality of Sprint Reviews, and shared goals. The fourth dimension is team autonomy, influenced by self-management and cross-functionality. As next, there is also continuous improvement. This variable encompasses Sprint Retrospective quality, concern for quality, psychological safety, shared learning and the learning environment. The final variable is management support. In this case, only one factor was proposed, named exactly as the variable itself.

The extensive case study led the researchers to formulate the hypotheses and the following conclusions were drawn based on the findings.

Firstly, the overall effectiveness of the Scrum methodology is largely determined at the team level. The most relevant insights concern how a supportive environment

positively impacts team responsiveness and, consequently, its effectiveness. As the researchers emphasize, in the spirit of continuous skill development, teams learn how to overcome obstacles and improve collaboration. It also turns out that organizations aiming to improve Scrum Team effectiveness benefit from investing in teams’ autonomy. The more independence teams experience, the more likely they are to take responsibility for improving their work as a team, which translates into increased effectiveness. Lastly, team responsiveness directly impacts its effectiveness, as understanding needs and responding appropriately is the foundation of the Agile approach and largely determines project success.

3. Research Design

3.1. Research Tool, Variables

The significant variables, whose impact on the quality of Scrum Daily meetings the author wishes to examine, are described in Tab. 1.

Table 1. Model Variables

Variable	Authors
Communication Skills	Kristinsdottir et al.; Hidayati et al.
Sprint Goal	Verwijs and Russo; Schwaber and Sutherland (Scrum founders)
Timing	Morandini et al.; Schwaber and Sutherland (Scrum founders)
Team Autonomy	Verwijs and Russo
Self-Management	Moe et al.; Schwaber and Sutherland (Scrum founders)

Source: own elaboration.

The research tool was a survey designed to evaluate the five proposed variables and utilising a 5-point Likert scale for subjective assessment. The operationalization of the variables was based on verified sources, including *Communication Skills Assessment Scale* (n.d.), relevant sections of the survey developed by Verwijs and Russo, resources from Scrum official website and Time Management Questionnaire Template (n.d.). Additionally, an open-ended question was included, addressing other challenges faced by members of Scrum Teams.

3.2. Research Sample

The inclusion criterion for the study was employment in the IT sector with the application of the Scrum methodology in the software development process, whereas the exclusion criterion was defined as the absence of professional experience with Scrum.

The research tool was subjected to a pilot test in December 2023. In this manner, an evaluation of *face validity* was conducted, which pertains to how the test is perceived by the participants and whether it is appropriate for the intended purpose. The test is generally conducted on a small scale. The study involved 21 programmers specializing in agile software development. The pilot phase was successful – no complaints were received regarding the questionnaire used for the study.

In the next phase, in February 2024, the main study was conducted. Participation in the survey was entirely voluntary and participants were assured of the anonymity and confidentiality of their data. The data collection process spanned a duration of one month.

A total of 113 individuals participated in the study. 74.5% of the respondents consisted of technical staff. Further 14.5% were Scrum Masters, 21.8% held the position of Product Owner and the remaining 9.1% were other stakeholders. Overall, the respondents exhibit significant experience with Scrum. 41.8% reported more than five years of practice, 49.1% – between two and five years of expertise, and only 9.1% of the respondents have been working in a Scrum team for less than two years.

3.3. Method

Similarly to the research conducted by Verwijns and Russo, causal relationships pertaining to the effectiveness of Scrum Daily were analysed using Structural Equation Modelling (SEM) (Kaplan, 2009). This approach emerged in response to the limitations of classical multivariate analysis methods, such as the capability to model only simple relationships and the assumption that all variables must be observable and measurable without error.

Generally, SEM excels in modelling complex relationships among multiple variables. Covariance-Based SEM and Partial Least Squares SEM are most widely used applications of this method. To elaborate, CB-SEM is specifically used for hypothesis testing and evaluating theories. This approach employs a correlation matrix between dependent and independent variables to assess the degree to which the model aligns with empirical data. For the study of Scrum Daily effectiveness, where a potential theoretical model has already been developed, covariance-based SEM is applicable.

3.4. Model

The model comprises a structural model, which defines the causal relationships between exogenous and endogenous variables and a measurement model, which specifies the relationships between observable variables and theoretical constructs, where each observable variable is associated with at least one latent variable.

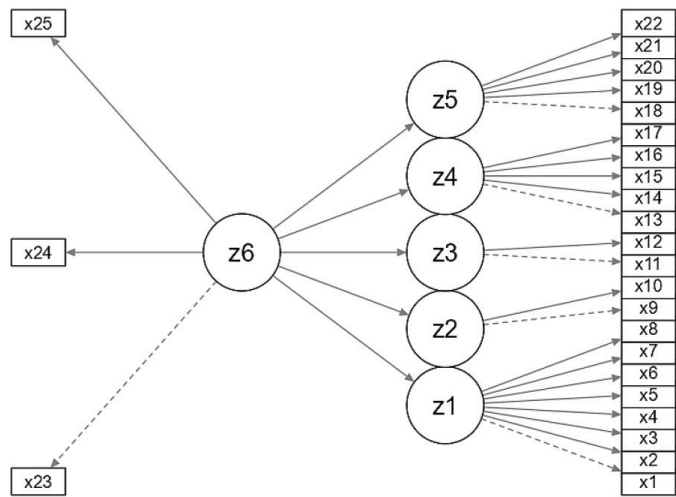


Fig. 1. Data model

Source: own elaboration.

z1-z6 are the designations of the variables representing theoretical constructs, respectively: Communication Skills, Sprint Goal, Timing, Team Autonomy, Self-Management and Scrum Daily Effectiveness.

x1-x25 correspond to indicator variables, measured using questionnaire items.

Table 2. Indicator variables

Variable	Significance
1	2
x1	the degree of openness and honesty when sharing information
x2	the degree of understanding that the message sent may differ from received
x3	the degree of effort to be precise in conveying messages
x4	the frequency of using specialized language with individuals who may not understand it
x5	the degree of avoiding the use of slang and idioms with individuals who might be offended by them
x6	the degree of effort taken in considering how to convey a message so that it is best understood
x7	the frequency of forming opinions based on what one hears rather than personal beliefs
x8	the frequency of making efforts to listen to ideas with which one disagrees
x9	the degree of clarity of sprint goals within the team
x10	the degree of clarity in formulating the sprint goal during sprint planning
x11	the degree of regularity of the Scrum Daily

Table 2, cont.

1	2
x12	the degree of adherence to the timebox of the Scrum Daily
x13	the degree of the team's responsibility for planning its capacity
x14	the degree of the team's involvement in decision-making considering working method
x15	the degree of assigning responsibility to individual team members for specific specializations
x16	the degree of collaboration among team members regardless of their specialization
x17	the degree of keeping each other informed about what one is working on
x18	the frequency of scheduling before starting work
x19	the degree of awareness of the time and effort required to complete tasks
x20	the frequency of setting priorities
x21	the frequency of completing the most important/challenging tasks first
x22	the frequency of completing tasks at the last minute/missing deadlines
x23	the degree to which respondents have all the information to continue working towards the sprint goal after Scrum Daily
x24	the degree to which respondents address their impediments during Scrum Daily
x25	the overall degree of recognition of the effectiveness of Scrum Daily

Source: own elaboration.

4. Results and Interpretation

To conduct the analysis, the free, open-source software Jamovi was used. This tool offers a range of advanced statistical functions including SEM.

4.1. Fit Indices

Particular attention should be paid to the CFI and TLI. These are comparative Fit indices that compare our specified model to a null model. The values range from 0 to 1, with higher values being desirable. Various authors, including Xia and Yang (2019), suggest a good model fit with values around 0.9 and an excellent fit above the threshold of 0.95 for both indices. Although the obtained values are below these thresholds, it is important to note that there is no definitive cutoff value that unequivocally determines the quality of model fit. In the context of an amateur study, conducted on a relatively small scale and examining rather elusive relationships, CFI and TLI values of 0.874 and 0.860 respectively can be considered decent and allow for reliable conclusions from the SEM analysis.

Table 3. Model fit indices

Index	Model	Scaled
Comparative Fit Index (CFI)	0.875	0.796
Tucker-Lewis Index (TLI)	0.861	0.773
Bentler-Bonett Non-normed Index (NNFI)	0.861	0.773
Relative Noncentrality Index (RNI)	0.875	0.796
Bentler-Bonett Normed Fit Index (NFI)	0.840	0.703
Bollen's Relative Fit Index (RFI)	0.822	0.670
Bollen's Incremental Fit Index (IFI)	0.875	0.799
Parsimony Normed Fit Index (PNFI)	0.756	

Source: own elaboration.

4.2. Model Estimates

In the context of the measurement model, the most significant elements are the values of the estimates and the p -statistics.

Table 4. Model estimates

Latent	Observed	Estimate	SE	95% confidence intervals		β	z	p
				Lower	Upper			
z6	x23	1.0000	0.0000	1.0000	1.000	0.6504		
	x24	1.0712	0.1019	0.8715	1.271	0.6967	10.516	< .001
	x25	0.8380	0.1161	0.6104	1.066	0.5450	7.219	< .001
	z1	0.7922	0.1141	0.5685	1.016	0.8893	6.941	< .001
	z2	1.0089	0.1022	0.8085	1.209	0.6818	9.871	< .001
	z3	0.1787	0.1413	-0.0982	0.456	0.3744	1.265	0.206
	z4	0.9041	0.1009	0.7063	1.102	1.0262	8.959	< .001
	z5	0.7316	0.0973	0.5409	0.922	0.6841	7.521	< .001

Source: own elaboration.

The estimate signifies both the strength and direction of the relationship between a pair of variables, while the sign of the estimate denotes the direction of the relationship.

The p -value indicates the statistical significance of the relationship, it is used to support or reject the null hypothesis (in this case, it concerns the existence of the relationship between variables). For small p -values (here less than or equal to 0.05), there is no basis to reject the hypothesis.

Based on the obtained results, the following conclusions can be drawn:

- Communication skills [of team members] do affect the effectiveness of Scrum Daily (z6 -> z1). For the variable pair the *p*-value suggests the statistical significance of this relationship. The estimate is equal to 0.7922, indicating a strong positive relationship – an increase in z1 is associated with an increase in z6.
- The Sprint Goal does affect the effectiveness of Scrum Daily (z6 -> z2). For the variable pair the *p*-value suggests the statistical significance of this relationship. The estimate is equal to 1.0089, indicating an extremely strong positive relationship – an increase in z2 is associated with an increase in z6.
- Timing does not affect the effectiveness of Scrum Daily (z6 -> z3). The estimate is equal to 0.1787, yet the *p*-value does not reach the level of statistical significance, indicating that there is no relationship.
- Team autonomy does affect the effectiveness of Scrum Daily (z6 -> z4). For the variable pair the *p*-value suggests the statistical significance of this relationship. The estimate is equal to 0.9041, indicating an extremely strong positive relationship between z6 and z4 – an increase in z4 is associated with an increase in z6.
- Self-management does affect the effectiveness of Scrum Daily (z6 -> z5). For the variable pair z6 and z5, the *p*-value suggests the statistical significance of this relationship. The estimate is equal to 0.7316, indicating a strong positive relationship – an increase in z5 is associated with an increase in z6.

4.3. Other Reported Issues Concerning Scrum Daily

An examination of the issues encountered by team members can yield valuable insights into the optimisation of the process. Through the analysis and categorization of responses from an open-ended question, several principal areas were identified that respondents believe diminish the efficacy of Scrum Daily meetings.

The most prevalent issue appears to be the occurrence of lengthy and often overly technical discussions. Prolonged dialogues lead to a loss of time and reduce the focus of individuals not directly engaged in the conversation. Furthermore, this overemphasis may result in a loss of business perspective and a diminished focus on value delivery.

The second concern pertains to the challenges associated with team size. Respondents believe that working within large groups can result in disorder and impede effective communication. Additionally, managing a sizable team presents significant challenges, including an effective communication style promotion.

Another noted difficulty, partially related to operating within a multicultural environment, involves language barriers. Respondents reported that varying levels of language proficiency impact the quality of communication and contribute to the extension of Scrum event durations. Moreover, inadequate language skills can lead to misunderstandings, thereby affecting overall project efficiency and customer satisfaction.

Respondents also identified absenteeism of team members as further factor, particularly when the meetings are scheduled early in the day. The absence of key personnel disrupts the flow of information, especially if the absent individual is solely responsible for specific tasks.

5. Conclusions

5.1. The Model – Practical Implications

The variable most strongly associated with the subject of this study is a well-defined Sprint Goal. It is therefore essential to ensure that the goals set are both understandable and realistic. A clear Goal directs the discussion topics and serves as a reference point for evaluation. Moreover, it serves as a source of motivation for the team-shared objective drives team members to become more engaged in the project.

Similarly strong is the positive impact of high team autonomy. This result aligns with the research of Verwijs and Russo (2021). More autonomous teams can use the Daily time more productively because their ability to independently make decisions on crucial matters. Organizations should therefore support team autonomy by providing the necessary resources, tools and decision-making authority. This approach allows team members greater freedom in organizing their work, promotes creative thinking and leads to innovative ideas. Another aspect to consider here is the selection of working methods – independent experimentation with different approaches allows for finding those most suitable for team's dynamics and project needs. All of this must be underpinned by a culture of collaboration and the support in solving problems and removing obstacles.

High communication skills among team members also have a significant impact on the quality of event. For the appropriate synchronization of information, smooth communication flow and inspection of Sprint progress, it is crucial to communicate concisely, without delving into technical complexities. At the same time, an open attitude toward actively listening to what colleagues have to say is essential. The research suggests that organizations should raise awareness of the importance of soft skills and strive to understand how these skills affect the effectiveness of the entire processes. A culture of open and effective communication should be promoted within teams and investments in developing these skills should be made. Such practices help train the ability to convey information within the team and build awareness of colleagues' communication needs and styles. This will contribute to the development of effective mechanisms for exchanging ideas during the Daily, based not only on mutual support and collaboration but also on a better understanding of shared goals and tasks. Moreover, when team members feel heard and valued for their contributions to the discussion, they feel more motivated, which boosts team morale.

Finally, team self-organization is also statistically linked to the effectiveness of the Daily. In this context, the ability to self-organize contributes to maintaining control over tasks, making it easier to discuss progress and make decisions. In practice, a culture of mutual trust for employees in their pursuit of self-organization is crucial. A self-organizing team can independently make day-to-day decisions without the support from higher-level managers. Demonstrating initiative also enables rapid response to changes and proactive measures to resolve issues. Team members should be encouraged to take responsibility for organizing work in the Sprint, including organizing the Scrum Daily and other events. Collectively determining the format and flow of meetings and involving the team in preparations increases employee engagement and motivation, which translates into more effective meetings. It is also important to regularly monitor team members' progress in this regard and provide constructive feedback.

5.2. Other Issues – Practical Implications

Addressing issues related to the effectiveness of daily meetings in the Scrum methodology may require the application of various strategies. The following paragraphs outline those strategies that respond to the challenges observed by the respondents.

Limiting meeting duration and using moderation techniques – establishing and adhering to strict time limits can help prevent unnecessary prolongation of discussions. Additionally, to maintain focus, ensure everyone has a chance to express their views and better direct the discussions, it is beneficial to introduce appropriate moderation techniques. The first one is Powerful Questions. According to Scrum experts, unlocking a team's potential can be achieved by asking the right questions rather than providing ready-made answers. In Scrum Daily context, the following questions can be particularly effective:

- “What is the biggest bottleneck in our current work together? What can we do today towards removing it?”
- “What is keeping us from completing this task? Where do we need help?”
- “Instead of starting something new, where can you assist others in finishing the work already in progress?”

If the team is already working within a format that includes responding to the classic three questions (“What did I do yesterday?”, “What will I do today?”, “Do I have any obstacles?”), it might suffice to adjust the terminology used to better promote a focus on delivering value:

- “What did you accomplish yesterday that we can leverage?”
- “What do you plan to accomplish today that we need to utilize or coordinate?”
- “Is there anything beyond your control that might prevent you from achieving today's goal?”

To prevent overly specific discussions, the ELMO technique (Enough, Let's Move On) can be introduced, where participants signal, by raising an ELMO toy, that it is time to conclude the current topic and move on to the next. For topics that are too technical to discuss during the Daily but still important for the project, the Parking Lot technique can be used – these topics can be noted in a visible place and scheduled for a separate meeting. This approach ensures that important issues are not overlooked, while also not disrupting the current discussion.

Employing scaling techniques – Scrum founders recommend that teams consist of 3 to 9 members. It is therefore unsurprising that respondents find working in larger teams detrimental to process efficiency. If this issue arises in an organization, it is worth considering at least splitting the team into smaller groups to enhance communication clarity. However, the best solution would be to move away from classic Scrum in favour of a framework that allows for scaling. Nexus or SAgE are worthy options to consider.

Supporting intercultural communication and collective learning. The issue of language barriers is fortunately recognized by employers and offering language courses has become a standard practice. Cultural differences seem to be a more challenging issue. To address this, it would be essential enable team members from diverse backgrounds to better understand both the impact of their behaviours and the working styles of their colleagues. Another step that could potentially enhance the effectiveness of such a team would be organizing communication workshops, which would help develop techniques for effectively resolving issues within a heterogeneous team.

Establishing clear rules regarding attendance at meetings. Improving participants' punctuality typically requires a combination of different strategies and appropriate oversight. The meeting time should align as much as possible with the availability and preferences of all team members and be established collectively. This aims to increase the likelihood of punctual arrival and regular attendance at the event.

Promoting awareness of Scrum principles – this is essential for ensuring that everyone involved in the agile software development process understands the rules governing it. Regular Scrum training can help solidify the knowledge of team members, which may lead to improvements in the quality of daily meetings. Importantly, managers and other stakeholders should also be equally familiar with the framework's principles to shift from micro-management practices toward strengthening team autonomy and embracing the values of Scrum. Such knowledge enables a better understanding and support of the team's workflow, which can increase mutual satisfaction with the collaboration. Each person is then clear about their responsibilities and role expectations, which helps to avoid conflicts. It is also important not to forget to organize regular retrospective meetings and promote a feedback culture – this practice supports continuous process improvement by facilitating constructive discussions on strengths and weaknesses, identifying challenges and collaboratively finding solutions.

5.3. Limitations

The findings of this research should not be regarded as a definitive guide for all teams using Scrum, despite considerable efforts to ensure their reliability. The study's limitations arise from the small sample size, which precludes the generalization of results. The fact that most respondents were from a single organization further introduces the influence of specific organizational culture on the data. Additionally, individual experiences, beliefs and preferences can lead to varied interpretations of the same phenomena by the responders. Furthermore, the research model concentrated primarily on internal team dynamics, potentially overlooking external factors, such as project-specific conditions, that could also impact the effectiveness of Scrum Daily. Consequently, this model should be considered rather as a guideline for teams working with the method and looking for the ideas to improve the process.

5.4. Future Research Directions

The future development of the study should primarily focus on refining and adapting the model. The first potential extension would involve incorporating so-called contextual aspects. These include factors at the level of organizational culture in a given workplace, team structure, and project specifics. Integrating variables that define the operational environment ensures that the obtained results can be applicable to various organizational contexts.

Another dimension would be external factors, such as technological advancements, competition, and evolving customer needs. Considering external conditions would optimize the model's ability to predict efficiency within a dynamic business environment, increasing risk and shifting market conditions.

Finally, it is crucial to consider temporal variability. A project team is not static; it evolves over time, with potential changes in its composition, size, or structure. Customer requirements may also differ overtime. The approach to conducting Daily meetings, which may be effective in one phase of the project, might no longer be suitable in another phase after a shift in project direction.

By implementing these improvements, the model will have long-term applicability throughout the entire project lifecycle.

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Efektywność *Scrum Daily* – wybrane aspekty

Streszczenie: W świecie biznesu tradycyjne metody zarządzania projektami IT stopniowo odchodzą w zapomnienie. Coraz więcej organizacji przyjmuje metodyki zwinne, a jedną z najczęściej stosowanych jest *Scrum*, w której kluczowym wydarzeniem jest *Daily Scrum* – krótkie spotkanie zespołu mające na celu synchronizację i rozwiązanie wszelkich przeszkód w projekcie. Pomimo jasnych wytycznych, wiele zespołów pozostaje niezadowolonych z jakości swoich spotkań. Celem tego badania jest rozwiązanie tego problemu przez opracowanie teoretycznego modelu matematycznego, który uwzględni wybrane aspekty (komunikację, cel sprintu, terminowość, autonomię zespołu i samoorganizację) oraz przeprowadzenie analizy modelowania równań strukturalnych (SEM). Wyniki pomogą zidentyfikować czynniki, które warto wziąć pod uwagę, aby uczynić *Daily Scrum* jak najbardziej efektywnym.

Słowa kluczowe: zespół scrumowy, *Scrum Daily*, efektywność *Scrum Daily*, modelowanie równań strukturalnych

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Crisis Management in the Airline Industry During the COVID-19 Pandemic: A Comparative Analysis of Emirates and Wizz Air

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Abstract: The article analyses crisis management in the aviation industry during COVID-19, focusing on differences between airlines with distinct business models. The objective is to identify these differences by comparing the crisis management actions of Emirates and Wizz Air during the pandemic. The article consists of two parts. The first provides a literature review covering crisis management concepts and airline economics, and examines crisis management measures in the air transport sector. The second part defines the methodology and background, mentioning the specifics of COVID-19 pandemic, and briefly presents the characteristics and business models of the carriers – Emirates as a full-service airline and Wizz Air as a low-cost carrier. Next it details the decisions made by both companies and, finally, identifies the differences in their crisis management actions during the pandemic. Emirates adopted a more defensive approach, while Wizz Air pursued aggressive actions.

Keywords: crisis, crisis management, air transport, airlines, Emirates, Wizz Air, full-service carrier, low-cost carrier, COVID-19.

1. Introduction

Crises have been a part of human history for centuries, but crisis management has become increasingly critical in today's unpredictable world. Organizations must handle disruptions that can threaten their survival. The COVID-19 pandemic highlighted the importance of crisis management. Many companies were unprepared for its challenges, and even those with emergency plans fought problems. The air transport sector, crucial for moving goods and people during crises, is vital to the global economy. However, research on crisis management in the airline business remains limited, highlighting the need for further study.

The article focuses on analysing crisis management in the airline industry during the COVID-19 pandemic. The research problem is a question – what were the differences in crisis management activities in the airline industry during the COVID-19 pandemic, based on case studies of carriers using different business models? The aim is to identify these differences by comparing the crisis management actions of Emirates and Wizz Air during the pandemic. The study will be structured in two main parts. The first will review literature on crisis management, airline economics, and anti-crisis measures in the aviation sector, while the second will present a comparative analysis of the actions taken by the airlines. To ensure the coherence and reliability of the article, various research methods will be used, including literature review, desk research, case studies, and comparative analysis.

2. Crisis Management in Aviation – A Literature Review

2.1. Concept of Crisis Management

In the context of management science, a crisis is the result of unexpected events disrupting or threatening the everyday operations of an organization. However, it is important to remember that each crisis is different from the previous one, and the detailed definition of the phenomenon itself, as well as the approaches to dealing with it, often depend on its type (Oldhorn, 1989). To address this issue, Tab. 1 presents the categorization of crises.

Table 1. Categorization of crises

Type	Description
Internal	Arises from within the organization, such as mismanagement, fraud, or system failures.
External	Driven by outside forces like economic downturns, terrorism, or geopolitical instability.
Natural	Caused by environmental events like earthquakes, hurricanes, or pandemics.
Political	Stems from government actions, wars, sanctions, or trade restrictions.
Reputational	Damages public perception due to scandals, unethical behaviour, or negative publicity.
Financial	Involves monetary instability, including bankruptcy or market crashes.

Source: own elaboration based on (Coombs, 2007; Soroka, 2013).

Over time, various crises have underscored the need for structured approaches to crisis management. These unexpected events and their ripple effects form the foundation of the field (Farazmand, 2001).

Crisis management, focused on planning and responding to unforeseen incidents, is a relatively young discipline. Its growth in the late 20th century, as

noted by Penuel et al. (2013), was driven by notable disasters like the Chernobyl incident, Challenger explosion, and Exxon Valdez oil spill. As crises became more severe, including terrorist attacks and cyber threats, crisis management became essential for organizations' survival and attracted significant academic attention. Researchers have since worked to define and structure this field, as reflected in efforts to develop a universal definition of crisis management, presented in Tab. 2.

Table 2. Selected definitions of crisis management

Author	Definition
Fink	"Crisis management begins with the recognition of a prodromal event, a symptom of an oncoming crisis."
Mitroff	"Crisis management is primarily reactive. It addresses crises only after they have happened."
Pearson, Misra, Clair, and Mitroff	"Crisis management is helping to avert crises or more effectively managing those that do occur."
Regester and Larkin	"Crisis management is about recognizing you have one, taking the appropriate actions to remedy the situation, being seen to take them and being heard to say the right things."
Devlin	"Crisis management is to confine or minimize any damage to the organization's reputation or image."
Canyon	"Crisis management is the measures and methodologies used to recognize, control and limit the damage of a crisis, and its ripple effects."

Source: own elaboration based on (Canyon, 2020, p. 8; Devlin, 2007, p. 1; Fink, 2002, p. 14; Mitroff, 2004, p. 25; Pearson et al., 1997, p. 60; Regester & Larkin, 2005, p. 173).

From these definitions, crisis management emerges as the practice of handling risks and minimizing the consequences of crises. It should involve tasks such as diagnosing causes, assessing risks, preparing and executing crisis plans, while also ensuring ongoing monitoring and recovery (Mączyńska, 2009). Additionally, communication plays a key role, especially in today's rapid, information-driven environment. Effective communication can help manage a crisis, while poor communication can worsen its impact (Anthonissen, 2008).

In the literature, various approaches to crisis management have been proposed. For example Bland (1995) outlines a five-phase process based on empirical research: theoretical training, planning, media training, simulations, and audits. Similarly, Seeger et al. (2005) suggest five stages: forecasting, prevention, operation, reconstruction, and research, whereas Baubion (2011) simplifies the process into two phases: preparedness and response. However, the most widely accepted framework involves four key stages: prevention, preparation, response, and recovery (Wojciechowska-Filipek & Mazurek-Kucharska, 2019).

Additionally, over the years, several strategies of crisis management have been developed. A comparison of the most important ones is presented in Tab. 3.

Table 3. Strategies of crises management

Strategy	Description
Defensive	Aims at maintaining stability and minimizing damage through cost-cutting and retrenchment.
Offensive	Seeks to capitalize on crisis conditions by investing, expanding, or taking risks.
Exploration	Focuses on adapting to new opportunities arising during the crisis.
Exploitation	Utilizes existing resources and operational efficiency to sustain business continuity.

Source: own elaboration based on (Mitroff, 2001).

Despite some universal principles, no single approach fits every situation, as each crisis and industry present unique challenges. Hence, to identify the range of actions that may prove effective in a specific situation, it is necessary to describe the operational mechanics of entities that are key to a given sector. In the case of this article, these will be airlines.

2.2. Airline Economics

As aviation services have become more globalized, airlines have emerged as crucial players, shaping the efficiency of the sector. According to IATA (2023), the airline industry contributes approximately 1% to global GDP, supporting millions of jobs worldwide. In 2019, over 4 billion passengers travelled by air, demonstrating the industry’s fundamental role in international mobility and commerce. To fully understand its characteristics and dynamics, airlines should be defined at three levels: legal, economic, and functional (Marciszewska, 2001).

Legally, an airline is an entity authorized by a state authority to provide air transportation for passengers or cargo (Żylicz, 2011). Economically, an airline is a business providing air transport services using aircraft (Tłoczyński, 2016). Functionally, an airline is a structured organization that manages a route network that connects various cities (Wells & Young, 2003). As the aviation sector evolved, different airline business models emerged, particularly legacy carriers and low-cost airlines, which differ in the services they offer.

Historically, full-service carriers dominated the industry, offering comprehensive but expensive services. The rise of low-cost airlines focused on price competition created new market segments, making air travel more accessible and popular. While low-cost carriers have grown, full-service airlines remain strong in certain segments. To compare the two, key areas such as services, market segments, and strategies must be analysed (Nair et al., 2011).

First, both airline types primarily compete in passenger transport. The cargo sector, with fewer opportunities for cost-cutting, is rarely explored by low-cost carriers. Second, their marketing strategies differ significantly. Full-service airlines invest heavily in advertising and offer loyalty programs, while low-cost airlines

minimize marketing expenses, focusing on online commercials and eliminating loyalty programmes (Tłoczyński, 2006).

Service offerings are also distinct. Full-service airlines feature higher fares with multiple class options (economy, business, first class) and offer benefits like free baggage, seat selection, and in-person booking. In contrast, low-cost airlines prioritize low prices with a single fare (economy class) and charge extra for services such as baggage and seat reservations, with tickets typically available only online (Rucińska et al., 2012).

Route structures differ as well. Full-service carriers use the hub-and-spoke model for long-distance connections, while low-cost airlines offer point-to-point routes, mostly limited to regional destinations. Low-cost carriers favour secondary airports to reduce costs, while full-service airlines use major hubs (Lange & Bier, 2019). In-flight experience varies significantly, with full-service airlines providing more space, assigned seating, and free amenities, while low-cost carriers limit space and charge for onboard services (Gross & Lück, 2016).

Lastly, organizational structures reflect their business models. Full-service airlines have traditional, multi-layered management with complex decision-making, while low-cost airlines adopt a leaner structure, eliminating middle management for faster decisions. Both models are dedicated to their operational needs (Wensveen, 2007).

As indicated by the above analysis, the presented models sometimes demonstrate extremely different characteristics. However, they share the international nature of operations and the resulting vulnerability to crisis. Hence, to complete the aspect of crisis management in aviation, it is necessary to present the methods employed by airlines to combat them.

2.3. Crisis Management Measures in the Air Transport Industry

Crises have always been challenging for aviation, from disasters to economic downturns (Doganis, 2005). Airlines implement crisis management strategies, yet each crisis differs, making responses uncertain (Clark, 2010).

The crash of Japan Air Lines Flight 123 in 1985 led to swift action: victim support, scholarships, and leadership accountability, helping regain trust (Hood, 2012). Similarly, British Airways handled the Kegworth crash by ensuring visible leadership and family support, strengthening its reputation (Regester & Larkin, 2005). However, large-scale crises demand different strategies. After 9/11, fear of flying led airlines to cut flights and costs (Cento, 2009). The 2002 SARS outbreak forced similar reductions (Boksberger, 2011).

These cases show aviation crisis management varies by situation. Examining airline responses to the COVID-19 pandemic can offer further insights.

3. Crisis Management Actions Undertaken by the Carriers During the COVID-19 Pandemic – A Comparative Analysis

3.1. Methodology and Background

The comparison will be based on pairing two airlines utilizing fundamentally different business models – low-cost and full-service. The primary goal is to identify differences in their crisis management approaches and serve as an introduction to the discussion on the resilience and efficiency of each model in times of crisis. When selecting the airlines, factors such as target segments, marketing strategies, airfares, route networks, inflight services and organizational structures were considered. Additionally, the availability and level of detail of strategic data, as well as financial conditions, were taken into account.

After a thorough analysis of the aviation market, Emirates was chosen as a representative of full-service airlines, while Wizz Air was selected to represent low-cost carriers. Other airlines were excluded due to differences in their hybrid business models or a lack of consistent crisis response documentation. A brief overview of the operations of the selected entities is presented in Tab. 4.

Table 4. Comparison of Emirates and Wizz Air

Feature	Emirates	Wizz Air
Segments	Passenger and cargo	Passenger
Marketing	High expenses, traditional channels, loyalty programmes	Low expenses, primarily online channels, no loyalty programmes
Airfares	High, multiple fare system	Low, single fare system
Routes	Primarily hub and spoke, length spatially unlimited with central, main, and regional airports served	Point to point, domestic and continental with regional and local airports served
Inflight experience	Large space per passenger, assigned seating, free in-flight service	Limited space per passenger, unassigned seating, paid onboard service
Organizational structure	Complex, UAE state-owned	Flattened, European private equity

Source: own elaboration based on (Emirates, n.d.; Wizz Air, 2024).

When analysing the decisions made by the airlines and their crisis management actions, the circumstances under which these decisions were made emerge as essential. The COVID-19 pandemic, initially a health crisis, rapidly evolved into a significant economic and social catastrophe. The widespread lockdowns implemented during that period brought the airline industry to a standstill, halting nearly all passenger travel. The frequent use of flight bans as a strategy to control the virus spread led to the term ‘closing the skies’ becoming widely used. The

events from that time highlight the unpredictability of challenges ahead. Responses had to be made in real-time, often without the benefit of pre-established plans (Nadanovsky & Pires dos Santos, 2020).

Given the above, the analysis will take the form of a comparison of the crisis management actions undertaken by the airlines. The first stage of the research procedure will involve gathering information about events, their chronology, and details which will primarily come from four key sources:

- Emirates' Annual Report 2019-2020,
- Emirates' Annual Report 2020-2021,
- Wizz Air's Annual Report 2020,
- Wizz Air's Annual Report 2021.

The above data will then be described, analysed, interpreted, and verified to finally be compared with the goal of identifying differences between them. Remembering that, according to the WHO (2024), the pandemic officially began on March 12, 2020 (though the spread of the virus began a few weeks earlier), and that both airlines were among the leaders in their markets, dynamically growing and generating significant revenues before the crisis, the actions taken by Emirates will be described first.

3.2. Results and Discussion

3.2.1. Emirates Airlines

From the outset of the COVID-19 crisis, Emirates' main strategy focused on strict cost control, utilising cash reserves from prior profitable years. On March 25, the airline suspended all passenger flights in line with public health guidelines. This approach, shaped by close cooperation with the government, led to significant subsidies that helped preserve most of the workforce and maintain operations (Emirates, 2020).

Despite capital injections, Emirates had to implement cost-cutting measures, including workforce reductions, pay cuts, halting recruitment, and renegotiating contracts. The airline also grounded a large portion of its fleet and streamlined business processes (Emirates, 2021).

The SkyCargo division, handling freight transport, adapted quickly as demand for cargo services rose. Emirates reconfigured passenger aircraft for cargo use, expanded the network, improved loading protocols, and reduced ground logistics. The airline also increased charter operations to meet growing demand. Thanks to government subsidies, cost-cutting, and SkyCargo's adaptation, Emirates survived the worst part of the crisis. By June, when the UAE began reopening, the carrier gradually resumed passenger flights (Emirates, 2021).

To reassure customers, Emirates introduced new health protocols and technologies, such as biometric processing and COVID-19 medical cover, to enhance safety. The airline also offered free flight rebooking, extended loyalty points, and

sped up refunds. Emirates partnered with health authorities to support vaccine transport and distribution. Resuming operations was gradual, with the carrier maintaining its cost-reduction strategy and keeping investments minimal during the recovery (Emirates, 2021). A synthesized summary of the crisis management strategy adopted by the airline is illustrated in Fig. 1.

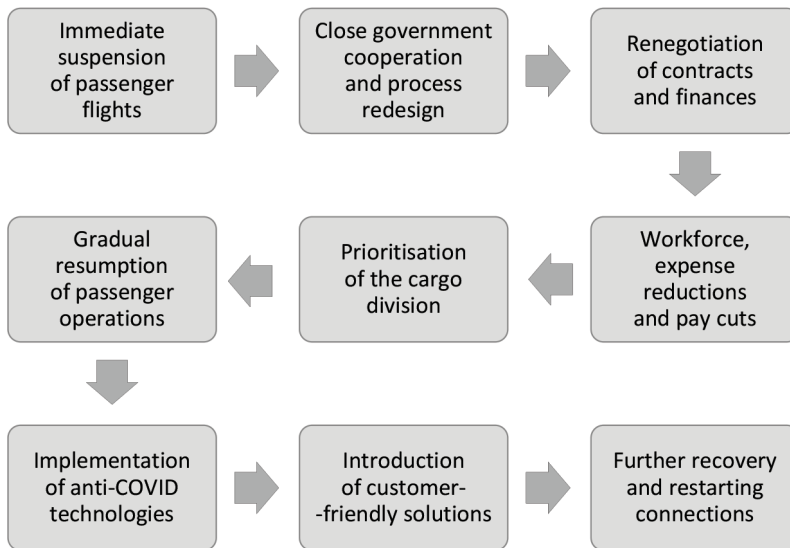


Fig. 1. Emirates' crisis management actions during the COVID-19 pandemic

Source: own elaboration.

From the above summary, it is crucial to note that Emirates does not refer to any crisis preparations or plans in its reports. The timeline of events outlined by the airline indicates that their actions were largely reactive and taken on an ad-hoc basis. This is further supported by the fact that their response only commenced after the UAE government implemented flight bans and strict measures to limit virus transmission. In contrast, Wizz Air demonstrated a different approach in its crisis management strategies, which will be explored in the following section.

3.2.2. Wizz Air

Wizz Air's initial crisis management actions began in February, even before the official COVID-19 pandemic declaration. The airline activated its crisis management centre and formed a cross-functional team to address both operational and customer concerns. The strategy focused on cash preservation and cost reduction, which included workforce cuts, salary reductions, grounding majority of the fleet, renegotiating supplier contracts, and postponing capital expenditures (Wizz Air, 2020).

Although Wizz Air lacked a dedicated cargo division, it allocated some aircraft for freight transport to generate cash flow and enhance its image, primarily transporting medical supplies and conducting humanitarian flights. The airline also implemented various low-cost health protocols and standards to protect passengers and staff, launched a brand awareness campaign and automated the refund process (Wizz Air, 2021).

As countries began to ease travel restrictions in June, Wizz Air was among the first to resume operations, adjusting routes and schedules to meet new demands. The airline expanded by opening additional bases, connections and introducing features like a travel map that informed passengers about flight availability and destination restrictions (Wizz Air, 2021).

To navigate the constantly changing conditions of flight bans and restrictions, Wizz Air initiated charter operations to transport sports teams and holiday travellers, primarily aimed at strengthening brand loyalty. Despite challenges from inconsistent regional strategies, the airline remained committed to its cash and cost control approach while soon after investing in route development and new bases following the resumption of passenger flights (Wizz Air, 2021). A summary of Wizz Air's crisis management actions is depicted in Fig. 2.

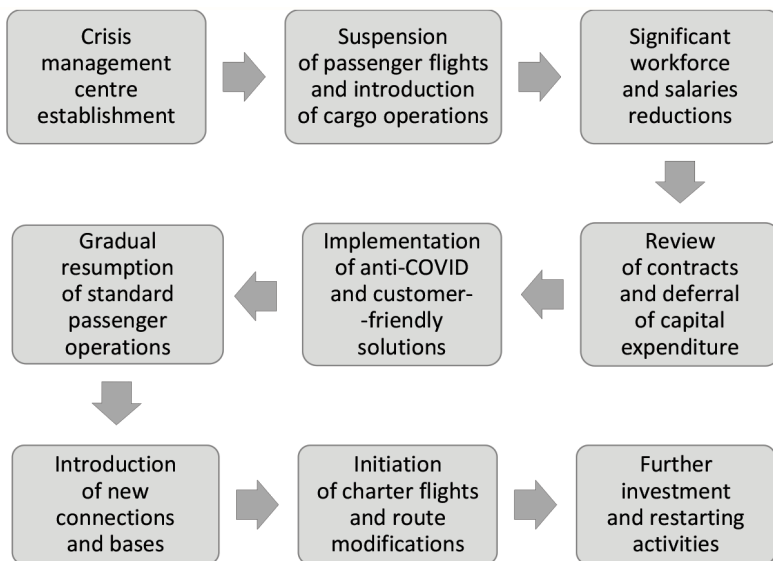


Fig. 2. Wizz Air's crisis management actions during the COVID-19 pandemic

Source: own elaboration.

Analysing the visualisation above, it is clear that Wizz Air's actions featured a level of structure and consistency. The formation of a dedicated crisis management unit suggests that there were pre-existing plans in place, reflecting a proactive view

towards crisis preparedness. This strategic approach probably enabled the airline to initiate investment activities at an early stage in the crisis.

3.2.3. Comparison

After reviewing the decisions, actions and strategies of Emirates and Wizz Air, the next step is to compare their actions. This comparison will highlight differences in their pandemic responses.

Initially, both airlines adopted similar strategies focused on cash preservation during the pandemic outbreak. However, Wizz Air took proactive crisis management steps even before restrictions were imposed. In contrast, Emirates decided to collaborate closely with the government only after flight bans were introduced, while Wizz Air quickly established a small cargo unit at that time.

Both airlines implemented cost-cutting measures at the same time, such as workforce reductions and contract renegotiations. Following these actions, Emirates concentrated on its established cargo division, whereas Wizz Air introduced COVID-19 preventive measures and customer-friendly initiatives, although these were less comprehensive than those of Emirates, which came after the reopening of passenger operations.

As the situation changed, Emirates limited its investment activities, while Wizz Air expanded by opening new bases, routes, and charter operations. While both airlines implemented cash-saving strategies similarly, they exhibited notable differences in their approaches. A summary of these distinctions is outlined in Tab. 5.

Table 5. Differences in crisis management actions between Emirates and Wizz Air during the pandemic

Area	Emirates	Wizz Air
Actions before the outbreak of the pandemic	No major actions taken	Establishment of a structured crisis management centre
Cargo division	Strong adaptation of the existing division, relying on it for survival during the pandemic	Establishment of a new division, treating operations more as a marketing element
Implementation of anti-COVID and passenger-friendly solutions	Later implementation, more advanced solutions	Earlier implementation, less advanced solutions
Resumption of passenger operations	No new routes or bases, slow reopening of existing ones	Rapid introduction of new routes and bases, quicker reopening
Government support	Significant financial aid from the government	Limited government assistance, dependence more on market-driven strategies
Chosen strategy	Exploitation, reactive approach	Exploration, proactive approach

Source: own elaboration.

As shown in the comparison, Emirates behaved in a rather defensive yet stable manner, while Wizz Air's decisions had a more aggressive and dynamic character. It seems that these differences primarily originated from variations in their business models. Full-service airlines tend to adopt more cautious actions due to their long-standing presence in the market and the nature of their operations. Low-cost carriers, due to the specifics of their processes, are more willing to take risks.

4. Conclusions

This article aimed to identify differences in crisis management within the airline industry during the COVID-19 pandemic, using case studies of Emirates as a traditional carrier and Wizz Air as a low-cost airline.

Crisis management is a complex aspect, as demonstrated by the different responses of nearly direct competitors to the same crisis. These differences may stem from their economic frameworks and distinct business models. Addressing the research question – what were the differences in crisis management activities during the pandemic – it is quite clear that Emirates adopted a defensive approach with no clear action plans, while Wizz Air implemented aggressive initiatives to resume and expand operations, establishing crisis management structures. Additionally, the chosen approaches (exploration vs. exploitation) played a crucial role in shaping their responses.

A natural extension of the studied aspects would be the assessment of crisis management effectiveness during the pandemic, though measuring outcomes is challenging since each crisis is unique. A company's preparedness often depends on chance, with previously chosen business models either protecting or threatening the organization. Employing qualitative methods, such as interviews with airline employees, could help explore these aspects further.

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Zarządzanie kryzysowe w branży lotniczej podczas pandemii COVID-19: analiza porównawcza Emirates i Wizz Air

Streszczenie: Autor analizuje zarządzanie kryzysowe w branży lotniczej podczas pandemii COVID-19, koncentrując się na różnicach między liniami lotniczymi o różnych modelach biznesowych. Celem jest zidentyfikowanie tych różnic przez porównanie działań Emirates i Wizz Air w czasie pandemii. Artykuł składa się z dwóch części. Pierwsza zawiera przegląd literatury w obszarach koncepcji zarządzania kryzysowego, ekonomiki linii lotniczych, a także strategii zarządzania kryzysowego w branży lotniczej. Druga część definiuje metodologię i tło badania, wspominając o specyfice COVID-19, a także krótko przedstawia charakterystykę i modele biznesowe przewoźników – Emirates jako przewoźnika tradycyjnego oraz Wizz Air jako przewoźnika niskokosztowego. Następnie szczegółowo opisuje decyzje podjęte przez obie linie, a na końcu identyfikuje różnice w ich podejściu do zarządzania kryzysowego podczas pandemii. Emirates przyjęła bardziej defensywne podejście, podczas gdy Wizz Air podjęła agresywne działania.

Słowa kluczowe: kryzys, zarządzanie kryzysowe, transport lotniczy, linie lotnicze, Emirates, Wizz Air, przewoźnik tradycyjny, przewoźnik niskokosztowy, COVID-19

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The Role of Social Media in Crisis Management in the Fashion Industry

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Abstract: The article explores the intersection of social media, crisis management, and the fashion industry. It begins by defining social media's role in business operations, focusing on how digital platforms can be leveraged for effective crisis communication. The study highlights the challenges specific to the fashion industry, stressing the importance of aligning crisis management strategies with consumer values and expectations. Through case studies of notable controversies – Gucci's balaclava scandal, Balenciaga's campaigns, and Nike's 'Satan Shoes' incident – the research demonstrates how quickly crises can escalate through social media, affecting brand reputation. The article identifies best practices for handling crises, such as issuing prompt statements, engaging transparently with audiences, and mitigating negative sentiments. Ultimately, it underscores the importance of proactive crisis management and the strategic use of social media to control public perception, offering insights for fashion companies to strengthen their resilience in a fast-evolving market.

Keywords: crisis management, social media, fashion industry

1. Introduction

Social media has become an integral component of modern business strategies, transforming communication, marketing, and crisis management. In the fashion industry, where brand image and consumer engagement are paramount, digital platforms such as Instagram, Twitter, and TikTok offer both significant opportunities and unique challenges. The ability to communicate directly with consumers, manage brand reputation, and address crises in real time has become a crucial aspect of business survival.

The fast-paced nature of the fashion industry, combined with the transparency and rapid information flow on digital platforms, creates a landscape where crises can emerge and escalate quickly. Brands are under intense public scrutiny, with consumers actively using social media to voice concerns about brand ethics, cultural sensitivity, and business practices. A single post or campaign misstep can escalate into a global controversy, leading to significant reputational and financial damage.

The increasing role of social media in crisis communication highlights the need for effective crisis management strategies, particularly in industries like fashion that are heavily reliant on public perception. With the potential for crises to escalate rapidly on social media, understanding how brands navigate these challenges is crucial for both academic research and industry practice. The ability to manage crises effectively can make the difference between maintaining consumer trust and facing long-term reputational damage.

Despite the importance of crisis management in the fashion industry, there remains a research gap in understanding how brands effectively navigate crises using social media. Many studies focus on crisis communication in general, yet limited research explores the specific challenges of crisis management in the fashion sector, where image and consumer sentiment are highly volatile. This study aims to fill this gap by analysing real-world case studies and assessing the impact of different crisis response strategies.

The main objective of this article is to analyse the role of social media in crisis management within the fashion industry. The study aims to:

- define key crisis management strategies in the context of digital communication,
- examine social media's role in mitigating crises in the fashion industry,
- analyse case studies of fashion brands facing crises and their response strategies,
- provide recommendations for best practices in crisis communication on social media.

The research employs a qualitative methodology, using case study analysis to examine crises involving Balenciaga, Nike, and Gucci. Data sources include social media content, brand statements, and media reports to assess crisis response effectiveness. The study applies thematic analysis to identify common patterns in crisis response and brand reputation management. By combining theoretical insights with practical examples, this research provides valuable recommendations for fashion brands aiming to improve their crisis management strategies in the digital age.

2. Theoretical Background

2.1. Nature of Crises and Crisis Management

Crisis management refers to the strategic processes that organizations employ to prevent, respond to, and recover from unexpected disruptions. In the context of social media, crisis management becomes even more complex, requiring brands to address issues in real-time, where every second counts. Benoit's (1997) image restoration theory identifies five strategies that brands can use during crises: denial, evasion of responsibility, reducing offensiveness, corrective action, and mortification. On social media, these strategies play out visibly in front of a global audience, making transparency and authenticity key to effective crisis communication.

2.2. Social Media and Crisis Management

Social media platforms, by their nature, offer both opportunities for engagement and risks of rapid negative sentiment spread. Fashion brands must leverage these platforms not only to respond to crises but also to build a resilient brand narrative that withstands scrutiny. Platforms like Instagram and Twitter, which emphasise visuals and short, impactful messages, have become central to the fashion industry's crisis management efforts (Hertz, 2021).

The fashion industry operates at an intense pace, with trends evolving quickly, leaving little room for error. Brands are increasingly using social media to engage customers, market products, and respond to feedback. However, this same immediacy can lead to brand crises spiralling out of control if not managed properly.

2.3. The Fashion Industry and Crisis Management

Social media crises in the fashion industry often stem from cultural missteps, controversial designs, or perceived insensitivity. Given that fashion is deeply intertwined with personal expression and social values, brands must navigate a careful line between pushing boundaries and respecting consumer expectations. The fashion industry, due to its high visibility and emotional connection with consumers, faces heightened scrutiny during crises, and therefore, requires a refined approach to crisis communication (Ritschel, 2019).

The importance of crisis communication strategies is highlighted when looking at the fashion sector's unique challenges. Consumers in this industry are highly vocal on social media, and their feedback can either elevate or diminish a brand's reputation in a matter of hours. Crisis management in this context involves not just damage control but active engagement with audiences to rebuild trust (Mathur, 2024).

3. Methodology

The methodology for this study is grounded in qualitative case study research, which allows for an in-depth exploration of real-world phenomena within their specific contexts. The case study approach is particularly suitable for examining the occurrences of social media and crisis management in the fashion industry, as it provides a comprehensive understanding of complex issues (Baxter & Jack, 2008).

This research involves a multi-case study focusing on three high-profile crises in the fashion industry: Balenciaga's Ad Scandal (2022), Nike's 'Satan Shoes' controversy (2021), and Gucci's balaclava jumper scandal (2019). These cases were selected due to their prominence, the severity of the public backlash, and the brands' varied responses to the crises on social media platforms. The selection criteria included the visibility of the brand on social media, the level of consumer engagement during the crisis, and the global media coverage each case received.

The data collection process involved gathering publicly available information from social media posts, official brand statements, and media reports. Twitter, Instagram, and TikTok were the primary platforms analysed due to their importance in shaping public opinion and consumer trust during crises. Additionally, relevant documents such as company press releases and statements from key figures within the brands were examined to understand their official crisis response strategies. This multi-source data collection approach enhances the reliability of the findings by triangulating different data points (Denzin & Lincoln, 2011).

The limitations of this study include a reliance on publicly available information, which may not capture internal decision-making processes during the crises. Furthermore, focusing on high-profile, globally recognized brands may limit the generalizability of the findings to smaller or less well-known companies. Despite these limitations, the case study approach offers valuable insights into the evolving role of social media in crisis management within the fashion industry.

4. Results

To further understand the role of social media in crisis management within the fashion industry, we will examine three major case studies involving globally recognized brands. Each case study represents a different crisis and demonstrates how the respective brand leveraged (or failed to leverage) social media to manage public perception, mitigate reputational damage, and engage their audience in real-time. These case studies illustrate both the opportunities and challenges that come with handling crises in an industry where public image and consumer trust are paramount.

4.1. Balenciaga Ad Scandal (2022)

In 2022, Balenciaga faced a severe backlash after releasing an ad campaign that many viewed as inappropriate and offensive. The rapid escalation of criticism on platforms like Instagram and Twitter forced the brand into immediate damage control. However, Balenciaga's initial lack of response further fuelled the negative sentiment, demonstrating how silence on social media can exacerbate a crisis. Eventually, the brand issued an apology and removed the ad, but the delay in addressing the issue caused significant damage to its reputation (Binkley, 2023). This case highlights the importance of swift and transparent communication during a social media crisis. Balenciaga could have mitigated the fallout by issuing an immediate statement, clarifying their intent, and showing accountability.

4.2. Nike's 'Satan Shoes' (2021)

Nike faced a public relations crisis when a collaboration with rapper Lil Nas X produced a custom shoe dubbed the 'Satan Shoes'. Although Nike did not directly endorse the design, the association with the controversial product sparked outrage on social media. Nike quickly responded by distancing itself from the product and filing a lawsuit to stop the distribution of the shoes. This quick action helped the brand regain control of the narrative and protect its image (Smith, 2021).

The Nike case illustrates how brands can leverage social media for damage control, particularly by taking immediate legal and public action. By disassociating from the product, Nike demonstrated a strong commitment to its brand values and appeased its audience (Hertz, 2021).

4.3. Gucci Balaclava Sweater Scandal (2019)

Gucci's 2019 balaclava sweater scandal, where a product was criticized for appearing racially insensitive, serves as another example of a crisis exacerbated by social media. Following an outrage on Twitter and Instagram, Gucci issued a public apology and withdrew the product from shelves. Furthermore, the brand launched a diversity initiative in response to the backlash, aiming to repair the damage by showing a commitment to inclusivity (Ritschel, 2019; Sádaba et al., 2020).

Gucci's response is a prime example of how corrective action, combined with genuine engagement, can help brands navigate social media crises. While the brand initially faced severe criticism, its proactive measures to address the concerns showed consumers that Gucci was listening and taking steps to improve.

5. Comparative Analysis

Transparency and Timeliness. In all three cases, the speed of the brand's response significantly impacted how the crisis unfolded. Balenciaga's delayed reaction worsened its situation, while Nike's swift legal response helped to quickly distance the brand from the controversy (Binkley, 2023).

Engagement with Audience. Social media provides a direct line to consumers, making engagement critical during a crisis. Nike and Gucci successfully used social media to communicate with their audiences, mitigating damage by taking ownership of the situation and offering tangible solutions (Ritschel, 2019; Smith, 2021).

Corrective Action. Brands that took corrective measures, such as Nike's lawsuit and Gucci's diversity initiative, were able to rebuild trust more effectively. This proactive approach demonstrates to consumers that the brand is not only responsive but also committed to long-term improvement (Sádaba et al., 2020).

Table 1. Comparison of case studies

Aspect	Firm		
	Balenciaga	Nike	Gucci
Controversy	Holiday and Spring 2023 campaigns promoting inappropriate themes	Unauthorized 'Satan Shoes' by MSCHF	Wool balaclava jumper seen as racially insensitive
Immediate response	Apologies on Instagram and Twitter, pulled campaigns	Lawsuit clarifying non-involvement	Apologies on Twitter, removed item from stores
Accountability	Took full responsibility, dropped lawsuit against third parties	Positioned as victim of unauthorized actions	Took full accountability, emphasized commitment to diversity
Long-term actions	Partnership with National Children's Alliance	Emphasised legal protection of trademark	Announced initiatives for diversity and cultural sensitivity
Social media strategy	Apologies and updates on Instagram and Twitter, deleted TikTok activity	None	Apologies and diversity announcements on Twitter
Impact on brand reputation	Damaged, especially among parents and child safety advocates	Maintained relatively well due to quick disassociation	Significant negative impact, gradually rebuilding trust
Social media platforms used	Instagram, Twitter	None	Instagram, Twitter
Public apology	Multiple apologies, detailed corrective actions	No direct public apology, relied on legal actions	Public apology, detailed personal regret and future plans

Source: own elaboration.

6. Conclusions and Recommendations

The primary goal of the article was to examine the role of social media in crisis management within the fashion industry, focusing on how brands use platforms like Instagram, Twitter, and Facebook to address public perception and manage crises. Through the analysis of case studies involving major brands like Balenciaga, Nike, and Gucci, this study has highlighted the importance of swift, transparent, and authentic communication during a crisis.

One limitation of this research is its focus on a few high-profile case studies, which may not fully represent smaller fashion brands or those with different crisis management strategies. Additionally, the rapidly evolving nature of social media platforms introduces challenges in drawing universal conclusions, as trends in platform usage and consumer behaviour continue to shift. Another limitation is the exclusion of quantitative data on consumer sentiment before and after these crises, which would provide a more measurable analysis of brand recovery.

Future research could explore a wider variety of brands and crisis types, as well as include quantitative measures such as sentiment analysis or engagement metrics. Additionally, examining how newer platforms like TikTok or emerging social media trends influence crisis management strategies would provide further insight into the evolving role of digital communication in the fashion industry.

Fashion brands must recognize the dual nature of social media as both a tool for crisis management and a platform where crises can escalate. Effective crisis communication requires swift and transparent messaging to maintain trust and credibility. Engaging with consumers actively during crises allows brands to demonstrate accountability and address concerns in real time, mitigating potential damage. Additionally, sensitivity and inclusivity in marketing strategies can prevent controversies before they arise. By implementing comprehensive crisis preparedness strategies, including internal training and social media monitoring, brands can respond proactively rather than reactively. Long-term reputation management should focus on continuous dialogue with consumers, ensuring that corrective actions are not only visible but also aligned with brand values and consumer expectations. In a rapidly evolving digital landscape, adapting to emerging trends and consumer sentiment is crucial for sustaining brand resilience and public trust.

In conclusion, the study highlights the power of social media as both a crisis management tool and a risk factor. Fashion brands must integrate social media into their broader crisis management strategies to enhance resilience in a rapidly evolving industry.

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Rola mediów społecznościowych w zarządzaniu kryzysowym w przemyśle modowym

Streszczenie: Autorka bada związek między mediami społecznościowymi, zarządzaniem kryzysowym a przemysłem modowym. Rozpoczyna od zdefiniowania roli mediów społecznościowych w działalności biznesowej, skupiając się na tym, jak cyfrowe platformy mogą być wykorzystywane do efektywnej komunikacji kryzysowej. Badanie podkreśla wyzwania specyficzne dla branży modowej, zwracając uwagę na znaczenie dostosowania strategii zarządzania kryzysowego do wartości i oczekiwań konsumentów. Opierając się na przykładach znanych kontrowersji – skandalu Gucciego z kominiarką, kampanii Balenciagi i incydentu z „butami Szatana” Nike – w artykule pokazano, jak szybko kryzysy mogą eskalować w mediach społecznościowych, wpływając na reputację marki. Artykuł identyfikuje najlepsze praktyki w radzeniu sobie z kryzysami, takie jak szybkie wydawanie oświadczeń, transparentne zaangażowanie w relacje z odbiorcami i łagodzenie negatywnych nastrojów. Ostatecznie podkreśla znaczenie proaktywnego zarządzania kryzysowego i strategicznego wykorzystania mediów społecznościowych do kontrolowania opinii publicznej, oferując branży modowej wskazówki, jak wzmocnić swoją odporność na dynamicznie zmieniającym się rynku.

Słowa kluczowe: media społecznościowe, przemysł modowy, zarządzanie kryzysowe

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The Impact of Fluctuations in the Number of Economic Entities in Sectors on Inter-Sectoral Dependencies: Application of Predictions in the Leontief Input-Output Model

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Abstract: The objective of this paper is to examine the impact of fluctuations in the number of economic entities across different sectors on inter-sectoral dependencies. The research is based on data from the Central Statistical Office and the application of the Leontief input-output model. The goal of the study is to recognise dependencies between sectors and determine which sectors are most susceptible to changes in other parts of the economy. In the analysis, advanced analytical tools were used, including the input-output model which allows for a precise assessment of inter-sectoral flows. The results of the research indicate notable differences in the resilience of individual sectors to changes, as well as the presence of potential supply gaps that may arise from a reduction in the number of entities in certain sectors. The conclusions drawn from the analyses can serve as a foundation for managerial decision-making and for developing effective risk management strategies.

Keywords: fluctuations, Leontief model, inter-sectoral analysis, economic risk, supply gap, prediction

1. Introduction

Modern economies operate in an extremely dynamic and complex environment, which requires constant analysis and adaptation to changing conditions. The analysis of changes in the number of economic entities across different sectors is therefore essential for assessing the economic health of a country and for effective risk management. This study focuses on examining data from the Central Statistical Office (Główny Urząd Statystyczny – GUS) to gauge these changes and determine their impact on sectoral relations and interactions between sectors.

The main objective of the study is to examine how changes in the number of entities within one sector affect other sectors. The analysis is based on check and quantifying intersectoral dependencies, which allows for determining which sectors are most susceptible to disruptions in other areas of the economy.

However, the time frame (2022-2024) may influence the results, as these years follow the COVID-19 pandemic which caused significant economic disruptions. The post-pandemic recovery period may not fully reflect long-term sectoral dependencies, and further studies should incorporate data from more stable economic periods.

To achieve this goal, advanced analytical tools were used, such as Computable General Equilibrium (CGE) models and the Social Accounting Matrix (SAM) (Shoven & Whalley, 1992), including Wassily Leontief's input-output model (Leontief, 1986). The model was developed by Wassily Leontief, an American economist and Nobel laureate in Economics in 1973 for "the development of the input-output method and for its application to important economic problems" (The Nobel Prize, 1973). Input-output analysis, originally developed by Leontief, has since evolved to address not only linear but also non-linear systems. Sahani and Prasad (2023) explore this complexity in their analysis, providing insights into how this methodology can be adapted for non-linear scientific contexts. Due to its ability to analyse inter-industry flows, the model, after modification, allows for a precise estimation of how fluctuations in one sector, such as a reduction in the number of entities or deregistration from the REGON database, affect other sectors. As a result, it will be possible not only to check sectors with the greatest interdependencies but also those that demonstrate greater resilience to economic shocks.

This analysis also aims to examine potential supply gaps that may arise as a result of a decrease in the number of entities in a given sector (Mankiw, 2016). A supply gap, defined as a mismatch between supply and demand for a particular good or service, can result from the elimination of a key supplier from the market. The analysis of such gaps will allow for the development of appropriate remedial strategies, such as stimulating the growth of new entities within the sector or increasing imports.

Changes in the number of economic entities are a natural phenomenon in a market economy, serving as a cleansing mechanism that allows for restructuring and the emergence of new, more efficient entities. However, major changes in the number of entities can also pose a threat to financial stability, especially when they occur in strategic sectors of the economy. Therefore, it is important that the analysis of these phenomena is conducted systematically and comprehensively.

Peter Drucker, one of the most influential business theorists and often regarded as the father of modern management, emphasised the importance of proactive leadership and strategic thinking. A quote frequently attributed to him – "the best way to predict the future is to create it" – although of uncertain origin, reflects the idea that in an economic context, a proactive approach to risk management

and strategic planning is essential for long-term success (Drucker, 1993). Predictive models, which can be developed and tested using advanced econometric tools, such as statistical Machine Learning (ML) methods, and Artificial Intelligence (AI), form the foundation of this approach. They allow not only for better forecasting of future trends but also for more effective resource allocation and support for sectors most at risk.

The economist Joseph Schumpeter introduced the concept of “creative destruction”, (Schumpeter, 1942) emphasizing that technological innovations can lead to the downfall of old economic structures while simultaneously making room for new, more innovative companies. Changes in the number of entities in economic sectors, in this context, are not merely a negative phenomenon but also an essential element of the economic cycle that drives progress and development. An innovative approach to analysing macroeconomic trends can therefore yield important benefits, allowing for the observation not only of risks but also of potential areas for growth.

Key elements of this analysis are intersectoral cooperation, diversification of activities, and educating entrepreneurs in risk management. As observed by Alfred Marshall in *Principles of Economics*, industrial success often depends on firms’ ability to adjust its processes to local and changing conditions. This capacity for adaptation and variation contributes to economic resilience and long-term efficiency. Effective risk management requires not only appropriate analytical tools but also the involvement of all stakeholders in the process of continuous improvement and innovation (Marshall, 1920, p. 268).

People tend to recognize the need for change only in times of crisis. As Taleb (2007) emphasizes, “Black Swans being unpredictable, we need to adjust to their existence rather than naively try to predict them.” Therefore, the development and application of predictive models should not aim to eliminate uncertainty but to support better preparedness and adaptability to unexpected events. Their responsible and long-term implementation – both by the state, which supports the economy in times of instability, and by decision-makers at managerial and ownership levels – can enhance economic resilience and improve the capacity to anticipate structural shifts within the economy.

The study will present a detailed analysis of data from the Central Statistical Office (GUS) aimed at checking the main trends and determinants of changes in the number of entities in the Polish economy. The research methodology, analysis results, and recommendations for risk management and support for sectors most vulnerable to disruptions will also be discussed.

The study is particularly relevant for policymakers, restructuring advisors, and firms in high-risk sectors. By identifying intersectoral dependencies, it supports targeted policy interventions and restructuring strategies aimed at mitigating economic disruptions and enhancing sectoral resilience.

2. Analysis of Quarterly Changes in the Number of Entities in Sectors

In the economic analysis of sectors, it is important to recognize those that show sensitivity to macroeconomic changes as well as the risks specific to their activities. In Poland, the classification of economic sectors is based on the Polish Classification of Activities (PKD 2007) which is consistent with the European NACE Rev.2 classification. The PKD serves a statistical function, used for collecting and analysing data on economic entities.

The PKD consists of five levels of detail, ranging from the general section to division, group, class, and subclass, each differing in the level of specificity in describing economic activities. At the highest level, 21 sectors are distinguished, marked by letters of the alphabet (A-U). This classification is used in the process of registering new economic entities as well as in cases of changing or expanding activities. For the purposes of economic analysis, eight main sectors were identified: industry, construction, trade, transport, accommodation and food services, information and communication, services, and other sectors. Table 1 shows the number of active enterprises in each sector by quarter. This categorisation allows for more focused research, which can reveal the impact of these sectors on the overall economic condition. As a result, it is possible to more effectively monitor areas that are potentially at risk or have the greatest development potential. In detailed analyses, it is possible to refer to specific PKD codes, depending on trade between them and the quantitative and value-based transaction data. This level of detail allows for more effective observation of inter-sectoral dependencies, which serves as the basis for further research using, for example, the Leontief model. Table 2 presents the share of each sector in the total number of entities in the economy.

The 21 sectors, which in the list of sections of the Polish Classification of Activities are marked by successive letters of the alphabet. Within this division, the following categories were distinguished:

- A – agriculture, forestry, hunting, and fishing; 01-03;
- B – mining, open-pit extraction; 05-09;
- C – production, industrial processing; 10-33;
- D – energy supply, production and supply of electricity, gas, steam, hot water, and air for air-conditioning systems; 35;
- E – water supply, water pollution, waste management; 36-39;
- F – construction; 41-43;
- G – wholesale and retail trade, repair of motor vehicles and motorcycles; 45-47;
- H – transportation and storage; 49-53;
- I – accommodation and food service activities; 55-56;
- J – information, communication; 58-63;
- K – financial and insurance activities; 64-66;

- L – real estate activities; 68;
M – professional, scientific, and technical activities; 69-75;
N – administrative and support service activities; 77-82;
O – public administration, defence, compulsory social security; 84;
P – education; 85;
Q – health and social care; 86-88;
R – activities related to culture, entertainment, and recreation; 90-93;
S – other service activities; 94-96;
T – household activities (as an employer), production of goods and household services for own use; 97-98;
U – extraterritorial organizations and bodies; 99.

Table 1. Number of active enterprises

	2022				2023				2024		
	1Q	2Q	3Q	4Q	1Q	2Q	3Q	4Q	1Q	2Q	3Q
Total	3908848	3949844	3974520	3976514	3974072	4022237	4045637	4043243	4057392	4103297	4117233
S1	358626	360521	361408	359623	357542	359655	360901	358931	357964	360127	359784
S2	533605	541752	547789	542060	539367	546849	551945	546012	546190	555015	558489
S3	852004	853538	852294	848141	840154	843564	842714	837083	831983	834543	831770
S4	233500	233395	233928	233738	232232	233128	233592	232112	231369	232171	232320
S5	120205	129078	124901	119984	119086	128727	125068	120279	120091	130291	126509
S6	195768	203743	211934	219155	225805	231590	236633	240496	243941	247042	249932
S7	894129	902016	908428	912148	915413	928789	936668	941173	945424	957112	963732
S8	721011	725801	733838	741665	744473	749935	758116	767157	780430	786996	794797

Source: own elaboration based on data from the Central Statistical Office.

Table 2. Percentage share of the sector in the entire economy

	2022				2023				2024		
	1Q	2Q	3Q	4Q	1Q	2Q	3Q	4Q	1Q	2Q	3Q
	100	100	100	100	100	100	100	100	100	100	100
S1	9.2	9.1	9.1	9	9	8.9	8.9	8.9	8.8	8.8	8.7
S2	13.7	13.7	13.8	13.6	13.6	13.6	13.6	13.5	13.5	13.5	13.6
S3	21.8	21.6	21.4	21.3	21.1	21	20.8	20.7	20.5	20.3	20.2
S4	6	5.9	5.9	5.8	5.8	5.8	5.8	5.7	5.7	5.7	5.6
S5	3.1	3.3	3.1	3	3	3.2	3.1	3	3	3.2	3.1
S6	5	5.2	5.3	5.5	5.7	5.8	5.8	5.9	6	6	6.1
S7	22.9	22.8	22.9	22.9	23	23.1	23.2	23.3	23.3	23.3	23.4
S8	18.4	18.4	18.5	18.7	18.7	18.6	18.7	19	19.2	19.2	19.3

Source: own elaboration based on data from the Central Statistical Office.

Out of the 21 sectors in the classification, eight were distinguished to represent the subsequent model.

S1 – Industry (sections B, C, D, E);

S2 – Construction (section F);

S3 – Trade; repair of motor vehicles (section G);

S4 – Transportation and storage (section H);

S5 – Accommodation and food service activities (section I);

S6 – Information and communication (section J);

S7 – Services (sections K, L, M, N);

S8 – Remaining sections (P, Q, R, S excluding division 94, A,O).

Figures 2-9 present the quarterly number of active entities for each sector S1 to S8.

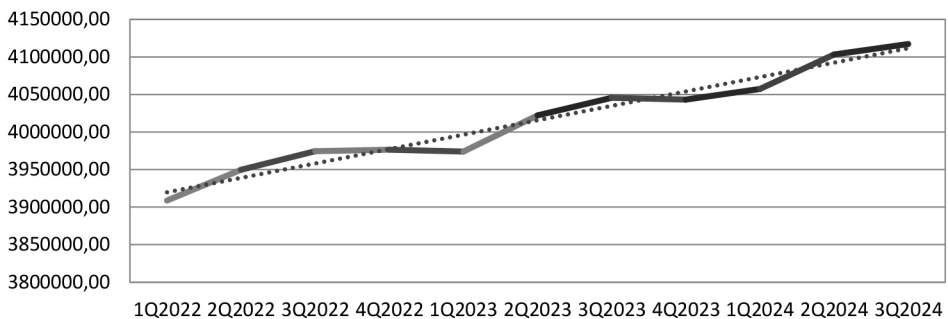


Fig. 1. Total number of active entities with REGON

Source: own elaboration based on data from the Central Statistical Office.

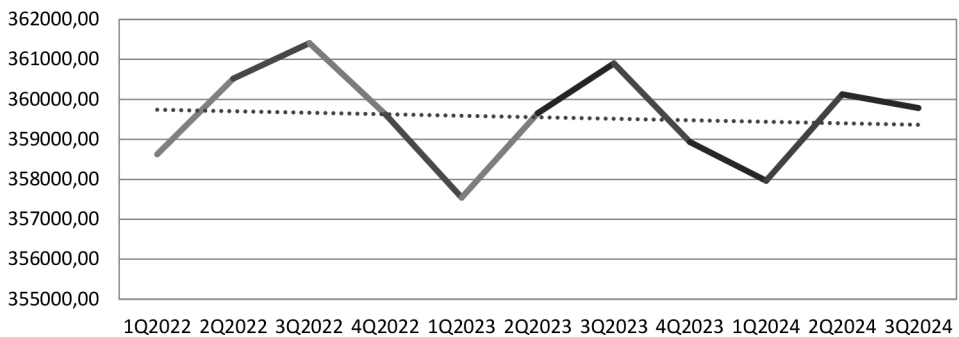


Fig. 2. Total number of entities in the sector S1 – Industry

Source: own elaboration based on data from the Central Statistical Office.

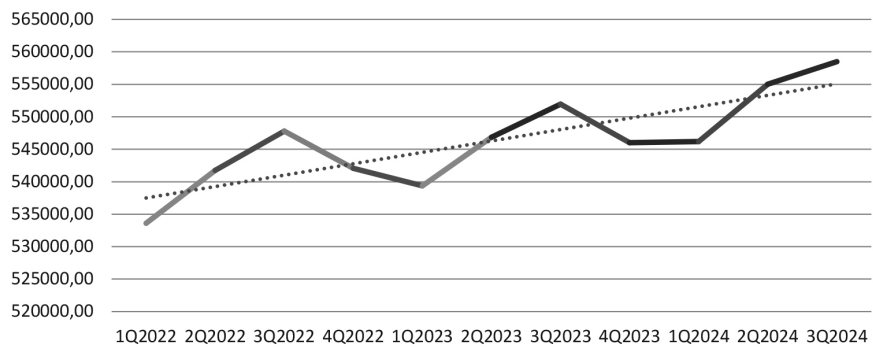


Fig. 3. Total number of entities in the sector S2 – Construction
Source: own elaboration based on data from the Central Statistical Office.

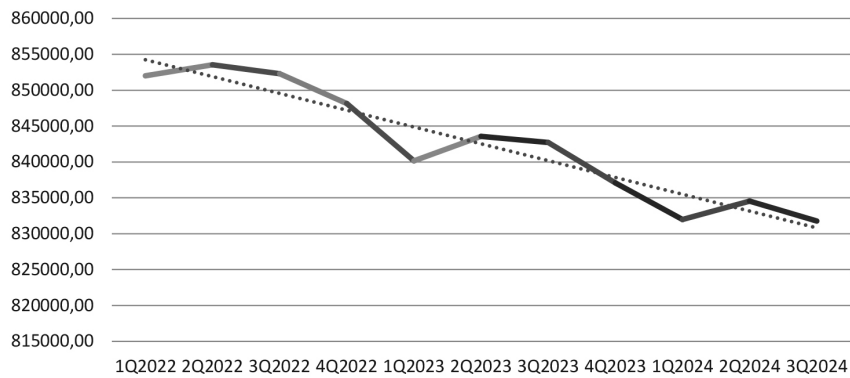


Fig. 4. Total number of entities in the sector S3 – Trade
Source: own elaboration based on data from Central Statistical Office.

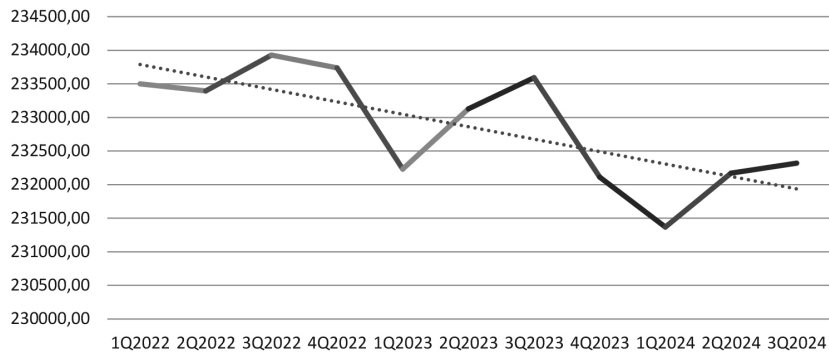


Fig. 5. Total number of entities in the sector S4 – Transportation and storage
Source: own elaboration based on data from the Central Statistical Office.

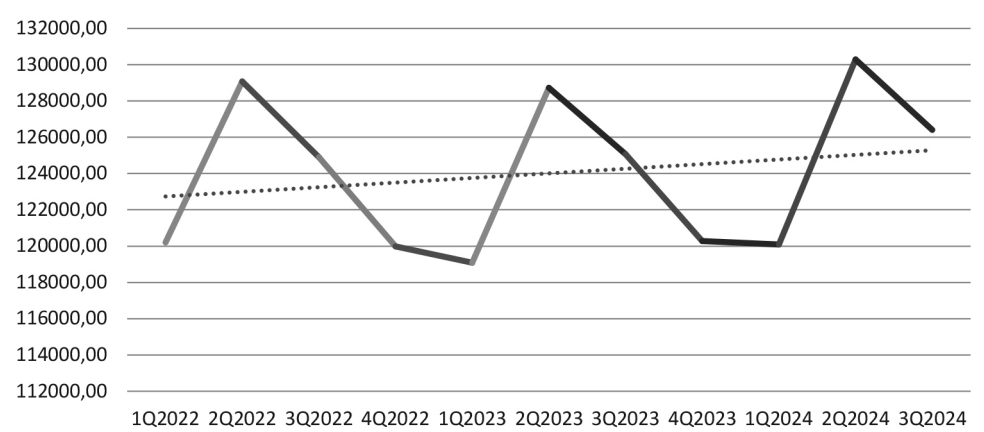


Fig. 6. Total number of entities in the sector S5 – Accommodation and food service activities

Source: own elaboration based on data from the Central Statistical Office.

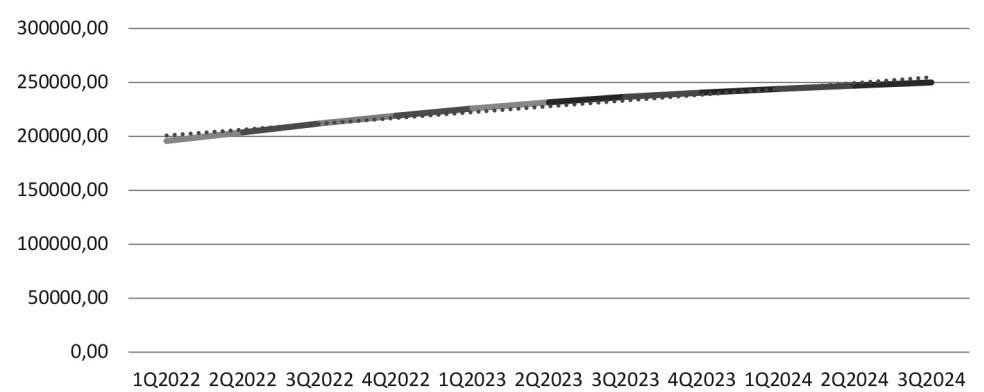


Fig. 7. Total number of entities in the sector S6 – Information and communication

Source: own elaboration based on data from the Central Statistical Office.

In the subsequent part of this study, following the presentation of results in the form of figures and tables, we will conduct a quantitative analysis aimed at using Leontief’s input-output model to examine the relationships between different economic sectors. This model, based on an intersectoral flow matrix, allows for a precise assessment of how changes in one sector affect other sectors, facilitating a more comprehensive evaluation of mutual interactions. Using this approach, we will be able to estimate how changes in the number of entities in one sector such as declines due to bankruptcies may impact other sectors through both direct

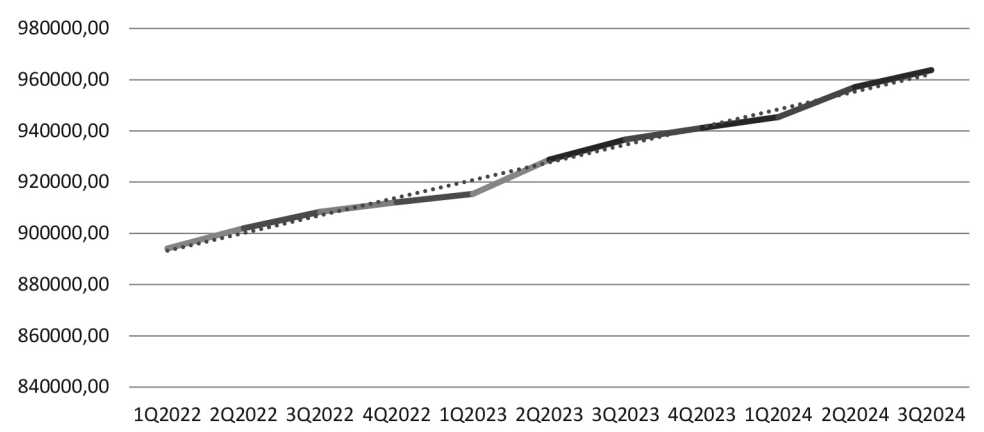


Fig. 8. Total number of entities in the sector S7 – Services

Source: own elaboration based on data from the Central Statistical Office.

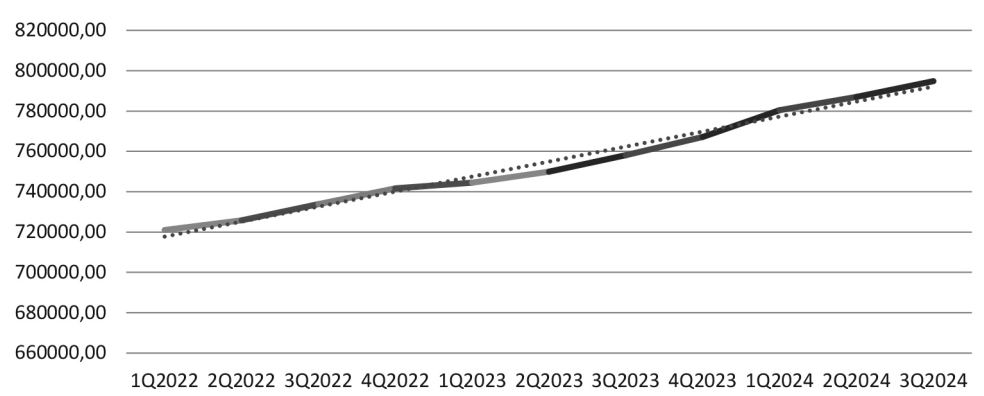


Fig. 9. Total number of entities in the sector S8 – Remaining sections

Source: own elaboration based on data from the Central Statistical Office.

and indirect linkages. Leontief’s model allows for an analysis of both the immediate effects and the long-term consequences of these changes.

The results of this analysis will serve as a foundation for further research into the resilience of individual sectors to shocks and their role in shaping supply gaps resulting from the elimination of suppliers or producers due to bankruptcy, industry shifts, or business closures. Utilizing an intersectoral flow matrix will formalize these dependencies and allow for precise estimation of potential economic impacts, providing a basis for predicting future changes and developing effective risk management strategies.

Such an approach is particularly important given the complexity of a market economy, where fluctuations in the number of enterprises can lead to important changes in the flow of goods and services, with far-reaching consequences for many interconnected sectors.

3. Calculation of the Leontief Matrix

3.1. Objective and Theoretical Basis

The Leontief input-output model, used in economic analysis, allows for assessing sectoral dependencies based on interindustry transactions. Its advantage lies in its ability to quantify direct and indirect effects of sectoral fluctuations. However, its static nature and reliance on historical data limit its capacity to capture dynamic economic changes, such as technological shifts or rapid market disruptions. Despite these constraints, it remains a robust tool for structural economic analysis, particularly in evaluating supply chain vulnerabilities.

3.2. Calculation of sectoral shares

To determine the indicators used in constructing the Leontief matrix, I based the analysis on the number of entities in each sector for every quarter. For each sector, I calculated its percentage share of the total number of entities in the economy. The formula used to calculate this share is:

$$a_{ij} = \frac{\text{number of entities in the sector in a given quarter}}{\text{total number of entities in the economy in a given quarter}}.$$

Example: for the industry sector in q1

$$a_{ij} = \frac{358626}{3908848},$$

$$a_{ij} = 0.0917.$$

These calculations were performed for each sector and each quarter.

3.3. Average Sector Coefficients

For each sector, I calculated the average share in the economy based on data from 10 quarters (from the first to the tenth quarter). The average share of each sector serves as the basis for constructing the technical coefficient matrix (**A**).

Example for the industry sector

$$\text{average share of the industry sector} = \frac{0.0917+0.0913+\dots+0.0874}{11} = 0.0898.$$

3.4. Construction of the Technical Coefficient Matrix (A)

The technical coefficient matrix (**A**) was constructed by creating an 8×8 matrix (for 8 sectors), where each element a_{ij} was calculated as the product of the average shares of the sectors. The value a_{ij} represents the influence of sector i on sector j , under the assumption that all sectors are interconnected within the economy and their percentage shares may indicate mutual interactions.

Example: if the average share of the industry sector was 9% (0.0898), and the average share of the services sector was 23% (0.2307), then the element $a_{\text{industry, services}}$ will be:

$$a_{\text{industry, services}} = 0.0898 \times 0.2307 = 0.0207.$$

The results for each sector are shown in Tab. 3.

Table 3. Results for each sector

	S1	S2	S3	S4	S5	S6	S7	S8
S1	0.0080	0.0122	0.0188	0.0052	0.0028	0.0051	0.0207	0.0168
S2	0.0122	0.0185	0.0286	0.0079	0.0042	0.0077	0.0314	0.0256
S3	0.0188	0.0286	0.0441	0.0122	0.0065	0.0119	0.0485	0.0394
S4	0.0052	0.0079	0.0122	0.0034	0.0018	0.0033	0.0134	0.0109
S5	0.0028	0.0042	0.0065	0.0018	0.001	0.0018	0.0071	0.0058
S6	0.0051	0.0077	0.0119	0.0033	0.0018	0.0032	0.0131	0.0107
S7	0.0207	0.0314	0.0485	0.0134	0.0071	0.0131	0.0534	0.0434
S8	0.0168	0.0256	0.0394	0.0109	0.0058	0.0107	0.0434	0.0353

Source: own elaboration.

Having the normalised values, we proceed to construct the matrix.

3.5. Construction of Matrix A and Matrix L

$$A = \begin{bmatrix} 0.0080 & 0.0122 & 0.0188 & 0.0052 & 0.0028 & 0.0051 & 0.0207 & 0.0168 \\ 0.0122 & 0.0185 & 0.286 & 0.0079 & 0.0042 & 0.0077 & 0.0314 & 0.0256 \\ 0.0188 & 0.0286 & 0.0441 & 0.0122 & 0.065 & 0.0119 & 0.0485 & 0.0394 \\ 0.0052 & 0.0079 & 0.0122 & 0.0034 & 0.0018 & 0.0033 & 0.0134 & 0.0109 \\ 0.0028 & 0.0042 & 0.0065 & 0.0018 & 0.0001 & 0.0018 & 0.0071 & 0.0058 \\ 0.0051 & 0.0077 & 0.0119 & 0.0033 & 0.0018 & 0.0032 & 0.0131 & 0.0107 \\ 0.0207 & 0.0314 & 0.0485 & 0.0134 & 0.0071 & 0.0131 & 0.0534 & 0.0434 \\ 0.0168 & 0.0256 & 0.0394 & 0.0109 & 0.0058 & 0.0107 & 0.0434 & 0.0353 \end{bmatrix}.$$

$$I = \begin{bmatrix} 1 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 1 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 1 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 1 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 1 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 1 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 1 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 1 \end{bmatrix}.$$

Matrix $L = (I - A)$:

$$(I - A) = \begin{bmatrix} 1 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 1 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 1 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 1 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 1 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 1 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 1 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 1 \end{bmatrix} - \begin{bmatrix} 0.0080 & 0.0122 & 0.0188 & 0.0052 & 0.0028 & 0.0051 & 0.0207 & 0.0168 \\ 0.0122 & 0.0185 & 0.286 & 0.0079 & 0.0042 & 0.0077 & 0.0314 & 0.0256 \\ 0.0188 & 0.0286 & 0.0441 & 0.0122 & 0.065 & 0.0119 & 0.0485 & 0.0394 \\ 0.0052 & 0.0079 & 0.0122 & 0.0034 & 0.0018 & 0.0033 & 0.0134 & 0.0109 \\ 0.0028 & 0.0042 & 0.0065 & 0.0018 & 0.0001 & 0.0018 & 0.0071 & 0.0058 \\ 0.0051 & 0.0077 & 0.0119 & 0.0033 & 0.0018 & 0.0032 & 0.0131 & 0.0107 \\ 0.0207 & 0.0314 & 0.0485 & 0.0134 & 0.0071 & 0.0131 & 0.0534 & 0.0434 \\ 0.0168 & 0.0256 & 0.0394 & 0.0109 & 0.0058 & 0.0107 & 0.0434 & 0.0353 \end{bmatrix}$$

$$(I - A) = \begin{bmatrix} 0.9910 & -0.0122 & -0.0188 & -0.0052 & -0.0028 & -0.0051 & -0.0207 & -0.0168 \\ -0.0122 & 0.9815 & -0.286 & -0.0079 & -0.0042 & -0.0077 & -0.0314 & -0.0256 \\ -0.0188 & -0.0286 & 0.9966 & -0.0122 & -0.065 & -0.0119 & -0.0485 & -0.0394 \\ -0.0052 & -0.0079 & -0.0122 & 0.9966 & -0.0018 & -0.0033 & -0.0134 & -0.0109 \\ -0.0028 & -0.0042 & -0.0065 & -0.0018 & 0.999 & -0.0018 & -0.0071 & -0.0058 \\ -0.0051 & -0.0077 & -0.0119 & -0.0033 & -0.0018 & 0.9968 & -0.0131 & -0.0107 \\ -0.0207 & -0.0314 & -0.0485 & -0.0134 & -0.0071 & -0.0131 & 0.9466 & -0.0437 \\ -0.0168 & -0.0256 & -0.0394 & -0.0109 & -0.0058 & -0.0107 & -0.0434 & 0.9647 \end{bmatrix}$$

3.6. Calculating the Inverse of the Matrix $(I - A)^{-1}$ and Determinant Calculation

To calculate the inverse matrix, we first need to find its determinant. Inverting a matrix requires that it be square and have a non-zero determinant. The determinant is a numerical value that indicates whether the matrix is invertible; if the determinant is 0, the matrix is singular (non-invertible). We calculate the cofactor matrix: This is a matrix in which each element is the algebraic complement corresponding to an element of matrix A . Then, we transpose the cofactor matrix to obtain the transposed cofactor matrix, and divide it by the determinant of A .

$$A^{-1} = \frac{1}{\det(A)} * (\text{transposed cofactor matrix}).$$

The determinant is 0.0833, which means we do not need to perform further calculations to eliminate any potential singularity.

3.7. Calculation of the Inverse Matrix in Excel

I used the function (`MINVERSE`) in Excel to calculate the inverse matrix. The result was:

$$(\mathbf{I} - \mathbf{A})^{-1} = \begin{bmatrix} 1.0096 & 0.0146 & 0.0226 & 0.0062 & 0.0033 & 0.0061 & 0.0248 & 0.0202 \\ 0.0146 & 1.0222 & 0.0343 & 0.0095 & 0.0050 & 0.0093 & 0.0377 & 0.0307 \\ 0.0226 & 0.0343 & 1.0529 & 0.0146 & 0.0078 & 0.0143 & 0.0582 & 0.0473 \\ 0.0062 & 0.0095 & 0.0146 & 1.004 & 0.0021 & 0.0039 & 0.0161 & 0.0131 \\ 0.0033 & 0.0050 & 0.0078 & 0.0021 & 1.0011 & 0.0021 & 0.0086 & 0.0070 \\ 0.0061 & 0.0093 & 0.0143 & 0.0039 & 0.0021 & 1.0039 & 0.0157 & 0.0128 \\ 0.0248 & 0.0377 & 0.0582 & 0.0161 & 0.0086 & 0.0157 & 1.0640 & 0.0521 \\ 0.0202 & 0.0307 & 0.0473 & 0.0131 & 0.0070 & 0.0128 & 0.0521 & 1.0424 \end{bmatrix}.$$

Having the Leontief inverse matrix, I proceed with the actual analysis. To evaluate the accuracy of the model, we need to determine the change vector \mathbf{d}'

$$\mathbf{x}' = \mathbf{L} * \mathbf{d}',$$

where: \mathbf{x}' – a prediction of the percentage change in the number of entities in the respective sector, \mathbf{L} – Leontief inverse matrix, \mathbf{d}' – change vector.

Vector \mathbf{d}' will represent the percentage change in the number of entities over successive quarters, as shown in Tab. 4.

Table 4. Quarterly percentage change in the number of entities

	(q2–q1)/ q1	(q3–q2)/ q2	(q4–q3)/ q3	(q5–q4)/ q4	(q6–q5)/ q5	(q7–q6)/ q6	(q8–q7)/ q7	(q9–q8)/ q8	(q10–q9)/ q9	(q11–q10)/ q10
S1	0.0053	0.0025	–0.0049	–0.0058	0.0059	0.0035	–0.0055	–0.0027	0.0060	–0.0010
S2	0.0153	0.0111	–0.0105	–0.0050	0.0139	0.0093	–0.0107	0.0003	0.0162	0.063
S3	0.0018	–0.0015	–0.0049	–0.0094	0.0041	–0.0010	–0.0067	–0.0061	0.0031	–0.0033
S4	–0.0004	0.0023	–0.0008	–0.0064	0.0039	0.0020	–0.0063	–0.0032	0.0035	0.0006
S5	0.0738	–0.0324	–0.0394	–0.0075	0.0810	–0.0284	–0.0383	–0.0016	0.0849	–0.0298
S6	0.0407	0.0402	0.0341	0.0303	0.0256	0.0218	0.0163	0.0143	0.0127	0.017
S7	0.0088	0.0071	0.0041	0.0036	0.0146	0.0085	0.0048	0.0045	0.0124	0.0069
S8	0.0066	0.0111	0.0107	0.0038	0.0073	0.0109	0.0119	0.0173	0.0084	0.099

Source: own elaboration.

Prediction for q11:

Vector $\mathbf{d}' = (\mathbf{q10} - \mathbf{q9})/\mathbf{q9}$:

$$d' = \begin{bmatrix} 0.0060 \\ 0.0162 \\ 0.0031 \\ 0.0035 \\ 0.0849 \\ 0.0127 \\ 0.0124 \\ 0.0084 \end{bmatrix},$$

$$x' = \begin{bmatrix} 1.0096 & 0.0146 & 0.0226 & 0.0062 & 0.0033 & 0.0061 & 0.0248 & 0.0202 \\ 0.0146 & 1.0222 & 0.0343 & 0.0095 & 0.0050 & 0.0093 & 0.0377 & 0.0307 \\ 0.0226 & 0.0343 & 1.0529 & 0.0146 & 0.0078 & 0.0143 & 0.0582 & 0.0473 \\ 0.0062 & 0.0095 & 0.0146 & 1.004 & 0.0021 & 0.0039 & 0.0161 & 0.0131 \\ 0.0033 & 0.0050 & 0.0078 & 0.0021 & 1.0011 & 0.0021 & 0.0086 & 0.0070 \\ 0.0061 & 0.0093 & 0.0143 & 0.0039 & 0.0021 & 1.0039 & 0.0157 & 0.0128 \\ 0.0248 & 0.0377 & 0.0582 & 0.0161 & 0.0086 & 0.0157 & 1.0640 & 0.0521 \\ 0.0202 & 0.0307 & 0.0473 & 0.0131 & 0.0070 & 0.0128 & 0.0521 & 1.0424 \end{bmatrix} \times \begin{bmatrix} 0.0060 \\ 0.0162 \\ 0.0031 \\ 0.0035 \\ 0.0849 \\ 0.0127 \\ 0.0124 \\ 0.0084 \end{bmatrix} = \begin{bmatrix} 0.0073 \\ 0.0180 \\ 0.0059 \\ 0.043 \\ 0.0854 \\ 0.0135 \\ 0.0155 \\ 0.0110 \end{bmatrix}.$$

The obtained change vector is multiplied by the number of entities in q10, and then q10 is added to obtain the prediction for q11.

$$x'q11 = \begin{bmatrix} 362743 \\ 565013 \\ 839500 \\ 233159 \\ 141412 \\ 250373 \\ 971961 \\ 795635 \end{bmatrix}.$$

Table 5. Prediction results and accuracy rates

	Actual value	Prediction L	Measurement error (%)
S1	359784	362743	0.82
S2	558489	565013	1.17
S3	831770	839500	0.93
S4	232320	233159	0.36
S5	126409	174745	11.87
S6	249932	280373	0.18
S7	963732	971961	0.85
S8	794797	795635	0.11

Source: own elaboration.

3.8. Results and Interpretation

The mean predictive absolute error is 2.04% from the last sector. From testing all quarters, the error is 1.29%.

The predictive model demonstrates a high level of accuracy in most cases, with prediction errors below 1% for 6 out of 8 examples. This indicates the model's strong ability to forecast outcomes effectively. However, the analysis reveals significant discrepancies in certain instances, particularly for sample S5 which exhibited the highest prediction error at 11.87%. This outlier suggests the possibility of inaccuracies in the input data, specific anomalies, or the model's mismatch with this particular case. It highlights the need for further investigation, potentially involving the refinement of input data or the inclusion of additional variables in the modelling process.

Conversely, sample S6 showed a minimal prediction error of just 0.18%, underscoring the model's exceptional accuracy for this observation. In the remaining cases, including S1, S2, S3, S4, S7, and S8, the model performed consistently, achieving errors in the range of 0.11% to 1.17%, which is a satisfactory outcome in predictive modelling.

To improve the model's performance, particularly in outlier cases like S5, it is essential to conduct a thorough analysis to identify the root causes of the high error. These could stem from the quality of input data, such as erroneous quantitative data sourced from public registries like Central Statistical Office, or unique patterns in the dataset that the model is not equipped to handle. Employing more advanced modelling techniques or optimizing existing parameters could also enhance overall results.

In conclusion, the model can be considered a reliable predictive tool for the majority of cases. Nevertheless, specific anomalies, such as S5, must be carefully addressed to prevent significant deviations in future predictions and to maintain overall accuracy and robustness.

4. Summary and Conclusions

This study contributes to economic research by applying a modified Leontief input-output model to analyse sectoral dependencies based on the density of entities within specific PKD classifications. By focusing on fluctuations in the number of firms rather than transaction flows, the study offers a new perspective on structural economic shifts. While the research is rooted in economics, its findings have managerial applications, particularly in restructuring advisory and strategic risk assessment for firms operating in highly saturated or vulnerable sectors.

Due to the lack of directly comparable studies, the findings cannot be benchmarked against traditional input-output analyses, which primarily focus on transaction flows rather than structural firm dynamics. While the study is based on data from the Polish economy, similar methodologies could be developed for other countries with well-documented business registry systems. Future research should

explore cross-country comparisons to determine whether sectoral dependencies follow similar patterns in different economic environments.

The analysis shows that different sectors vary in their resilience to fluctuations in other parts of the economy. In particular, sectors such as accommodation and food services (S5) exhibit greater variability, resulting in higher prediction errors. This suggests the need for further model optimization, taking into account the specific characteristics of the sectors and additional variables, such as verifying the accuracy of data obtained from the Central Statistical Office with REGON, KRS, and CEIDG databases. Dividing enterprises within a given sector into micro, small, medium, and large firms (based on the number of employees) will allow for more precise determination of correlation coefficients necessary for constructing the Leontief matrix. The conducted research also identified potential supply gaps that may arise as a result of significant declines in the number of entities in some sectors. Analysing such gaps is important for developing effective risk management strategies and supporting sectors most vulnerable to disruptions.

The conclusions drawn from the analysis can serve as a valuable basis for making management and policy decisions aimed at strengthening economic stability.

In the context of the modern economy, where technological innovations and the ability of enterprises to adapt are fundamental for building a competitive advantage, an approach based on forecasting future changes and actively managing uncertainty becomes a factor for long-term success. The dynamically changing market environment requires the use of advanced analytical models that not only enable the prediction of future trends but also allow for the adjustment of operational strategies to evolving conditions. Such an approach, integrating the analysis of historical data with current risk assessment, promotes increased resilience and flexibility of both enterprises and the entire economy, which, in the long term, is crucial for maintaining their stability and growth.

Ultimately, as Adam Smith emphasised whose theories we reference in relation to general equilibrium models it “is not from the benevolence of the butcher, the brewer, or the baker that we expect our dinner, but from their regard to their own interest” (Smith, 1776, p. 26). Efforts to minimize the risk of bankruptcy are not merely a moral issue but, above all, an economic necessity. This study, by indicating a course of action and the importance of predictive models, makes a significant contribution to building a stable and resilient economy.

5. Limitations and Future Research Directions

This study has certain limitations that should be acknowledged. First, the time frame (2022-2024) may not fully capture long-term sectoral dependencies, as it includes a post-pandemic recovery period that could distort structural patterns. Additionally, this period coincides with the implementation of the KRZ (Krajowy Rejestr Zadłużonych – National Register of Debtors) portal which came into effect

on December 1, 2021, streamlining bankruptcy and restructuring proceedings. The increased efficiency in handling insolvency cases may have influenced the observed fluctuations in firm numbers, making it necessary to account for this institutional change in future studies. Second, the model relies on firm registration and deregistration data, which, while valuable, does not account for other factors influencing sectoral dynamics, such as technological shifts, policy changes, or external macroeconomic shocks. Further studies could enhance the model by integrating additional economic indicators to refine predictions and improve robustness. Third, a more precise assessment of intersectoral correlations requires further refinement, particularly in terms of the scale of interactions between entities. The model does not currently differentiate between the impact of small sole proprietorships (JDGs) and large corporations, nor does it account for transaction volumes between sectors. Future research should incorporate these factors to better quantify the strength and asymmetry of intersectoral dependencies. Lastly, the study is limited to the Polish economy. While the approach can be adapted to other countries with similar business registry systems, cross-country comparisons have not yet been conducted. Future research should explore the applicability of the model in different economic environments to validate its broader relevance.

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Wpływ wahań liczby podmiotów gospodarczych w sektorach na zależności międzysektorowe: zastosowanie prognoz w modelu przepływów międzysektorowych Leontiefa

Streszczenie: Celem niniejszego artykułu jest zbadanie wpływu wahań liczby podmiotów gospodarczych w różnych sektorach na zależności międzysektorowe. Badania oparto na danych Głównego Urzędu Statystycznego oraz zastosowaniu modelu przepływów międzygałęziowych Leontiefa. Celem badania jest rozpoznanie zależności międzysektorowych i określenie, które sektory są najbardziej podatne na zmiany w innych częściach gospodarki. W analizie wykorzystano zaawansowane narzędzia analityczne, w tym model przepływów międzysektorowych, który pozwala na ich precyzyjną ocenę. Wyniki badań wskazują istotne różnice w odporności poszczególnych sektorów na zmiany, a także występowanie potencjalnych luk podażowych, które mogą wynikać ze zmniejszenia liczby podmiotów w niektórych sektorach. Wnioski wyciągnięte z analiz mogą stanowić podstawę podejmowania decyzji zarządczych i opracowywania skutecznych strategii zarządzania ryzykiem.

Słowa kluczowe: wahania liczby podmiotów gospodarczych, model Leontiefa, analiza międzysektorowa, ryzyko gospodarcze, luka podażowa, prognozowanie