

A Work Project presented as part of the requirements for the Award of a Master's degree in Finance from the Nova School of Business and Economics.

Solving the Enigma:
A Feasible Transition to a Sustainable Car Manufacturer

Tom-Benedict Ottmüller

Work project carried out under the supervision of:

João Loureiro Rodrigues

06/10/2023

Solving the Enigma:

A Feasible Transition to a Sustainable Car Manufacturer

Abstract

This thesis provides an in-depth analysis of the challenges and opportunities faced by a simulated automotive company, Enigma, as it transitions from conventional towards electric vehicles. Utilizing a business simulation as a practical arena, the thesis explores the challenges and opportunities in Finance, Operations, and Innovation. It also discusses cross-departmental decision-making and compares Enigma to real-world examples. Furthermore, it explores the author's personal reflections on critical incidents testing team dynamics, emotional intelligence, and effective communication. The paper underscores the importance of agile decision-making and offers valuable insights into navigating the complexities of corporate transitions in the 21st century.

Keywords

Apply theory in practice; Business transformation; Green bonds; Business simulation; Business strategy; Integrate coordinate decisions business functions; Managing a business; Reflective practice; Sustainability and ESG; Team dynamics; Working in teams

This work used infrastructure and resources funded by Fundação para a Ciência e a Tecnologia (UID/ECO/00124/2013, UID/ECO/00124/2019 and Social Sciences DataLab, Project 22209), POR Lisboa (LISBOA-01-0145-FEDER-007722 and Social Sciences DataLab, Project 22209) and POR Norte (Social Sciences DataLab, Project 22209).

1. Company Analysis

1.1. Introduction to the Analysis and Review of Enigma

This analysis intends to provide a comprehensive examination of the strategic and operational decisions made within Enigma, a simulated automotive company undergoing a transformative journey. Enigma's primary challenge lies in its transition from a traditional internal combustion engine manufacturer to a leader in the electric vehicle (EV) market. While the Marketing and Human Resource departments have also been part of the simulation, this analysis focuses on the roles Finance, Operations, and Innovation and their respective Directors.

The Finance section examines the company's capital structure, investment strategies, and key performance indicators, highlighting the importance of the Weighted Average Cost of Capital (WACC) in decision-making and the Value Added, our main target. The Operations section explores the complexities of production planning, factory utilization, and sustainability initiatives, emphasizing the balance between lean manufacturing and market adaptability. Lastly, the Innovation section focuses on the company's R&D investments, product developments, and the challenges and successes in transitioning to electric vehicles.

The paper also discusses the interconnected roles of these departments, illustrating how their cooperation is essential for the company's overall success and compares Enigma to real companies. It concludes with the key learnings and challenges, while also acknowledging the limitations of the analysis. The objective is to offer valuable insights into the complexities and challenges of managing a transitioning automotive company in a rapidly evolving market.

1.2. Review of the Director of Finance Role

Overview of the Finance Director's Responsibilities: This role within an organization cannot be understated, especially in an unpredictable business environment. Finance serves as a support for other directors, providing them with the essential guidance to achieve optimal

financial outcomes. It helps in maintaining a steady capital structure and assists in making complicated investment decisions. Essentially, by achieving profitability and balancing the conflicting needs of operational, investment, and financial cash flows, while minimizing the Weighted Average Cost of Capital (WACC), Finance ultimately aims to create value. Value added, also known as “Economic Value Added” (EVA), is the extend by which investment returns exceed the cost of capital (Shah et al. 2014, p. 704). From the Finance perspective, value can be increased through three different channels outside of the WACC: a) by formal financial decisions, such as capital allocation; b) by strategic investments influenced by other roles within the organization; and c) by ensuring that operational decisions are well taken by other directors. With this overview, three key financial components of Enigma will be addressed. First, Enigma’s strategy regarding the WACC, second, the handling of different kinds of investments, and third, the Key Performance Indicators (KPIs) that were achieved this way.

Management of the WACC in an Ever-Changing Environment: Understanding the Weighted Average Cost of Capital (WACC) is essential, as it serves as the average rate a company expects to pay its investors for using their capital and in this case is direct part of the simulation’s main KPI. In alignment with WACC estimations at different debt ratings (Exhibit 1), Enigma aimed for an A- credit rating, implying a debt ratio of approximately 50%. This decision acknowledged the real-world implications that deviate from Modigliani-Miller’s ideal conditions, such as taxes, information asymmetries, and the cost of bankruptcy (Modigliani and Miller 1958). To maintain this targeted ratio, financing decisions closely followed the Pecking Order Theory as explored by Myers and Majluf (1984). The theory proposes that firms prefer internal financing and will opt for debt over equity if external financing is required. Accordingly, Enigma primarily relied on debt issuance when internal financing was not available and only issued new equity once as the deviation from the targeted A- rating was too profound and a downgrade to a BB rating was imminent in Q12. This decision to prefer debt

was also supported by the favorable interest rates offered by green bonds, underpinned by the growth drivers of the green bond market according to Tolliver et al. (2020, p. 5).

However, as time progressed and the investment landscape changed, Enigma found itself with a high operational cash flow and fewer high-return investment opportunities resulting in a significant increase of the Free Cash Flow (Exhibit 2). This led to a drift from the targeted capital structure. The Pecking Order Theory (Myers and Majluf 1984) suggests in such situations to preferably buy back shares and reduce debt as a second resort. While the firm did manage to reduce total debt, especially traditional loans, the decision was not entirely rational as it signifies the missed opportunity of more share buybacks to keep the leverage up and optimize the WACC. This action was possibly influenced by biases that led to irrational behavior and deviation from the optimum as discussed by Baker et al. (2005, pp. 35–48).

In summary, Enigma's WACC optimization strategy generally adhered to the initial goal of targeting an A- rating and providing stable financing with WACCs between 7.21% and 7.49% (Exhibit 3). However, the shift in investment opportunities and consequently failure to seize the chance for more share buybacks indicate that while the strategy was fundamentally sound, the execution could have been improved in the end.

Enigma's Approach to Financial Investments: The approach was twofold, categorized into strategic investments and quantifiable investments: (a) strategic investments were primarily guided by qualitative reasoning. For instance, investments into Research and Development (R&D) were critical but quite unpredictable in terms of exact cash flows they would generate. The timing of these investments, particularly into new factory lines, could yield vastly different returns depending on market conditions. (b) quantifiable investments include certain or forecastable cash flows, these also included the development of new cars. Furthermore, differentiated WACCs based on the qualification for green bonds were applied. Namely, 7.6% for conventional investments and 6.9% for sustainable ones were the applied WACCs, which

also included a margin for error to provide robustness even in challenging times with a sub-optimal capital structure. Despite careful planning, Enigma did experience some setbacks, notably two diesel cars for which sales had been vastly overestimated.

Furthermore, the Directors of Finance were also facing significant working capital investments, particularly leasing assets, which significantly influenced cash flows. Due to Enigma's growth in revenue, favorable payment terms for customers and suppliers, and the offer of leasing to customers from Q9 onwards led to a quadrupling of working capital from \$4,321M in Y1 to \$17,128M in Y6 (Exhibit 4). Combined with the other necessary investments to support the sustainable transformation, this was a challenging situation especially in Year 4 and 5.

Analysis of the Performance: While no single board member or role is solely accountable for the overall performance of Enigma, analyzing the financial KPIs falls most appropriately within the part of Finance. The primary metric to analyze is the Value Added.

Enigma's performance in this key area has been noteworthy. Despite hitting a low point of \$492M in Q2, there was a rapid recovery, reaching an impressive \$3,568M by Q28 (Exhibit 5). This turnaround can be attributed inputs into the EVA as described in Shah et al. (2014, p. 704). The real catalysts for the explosive growth in Value Added were twofold: a substantial improvement in EBITDA margins (Exhibit 6), which peaked at an impressive 42% in Q28, and an extraordinary surge in revenue, hitting \$9.4bn in Q28 — more than double the revenue of Q4 (Exhibit 7). These achievements overshadowed the fact that firstly, the Net Assets were notably high (Exhibit 8) and, secondly, the WACC (Exhibit 3) not exceptional.

These financials tell a story of a company that heavily invested into its sustainable transition on the one hand while at the same time focusing on serving customer needs which supported the growth of Enigma during the transition on the other hand. Once the transition had been completed and the financial burden that came with it had been beard, Enigma was able to improve its financials which finally led to an impressive Value Added.

1.3. Review of the Director of Operations Role

Overview of the Operations Director's Responsibilities: This Director plays a pivotal role in steering the company's production capabilities. They are entrusted with the task of opening and closing production lines, a decision influenced by a multitude of factors such as the product life cycle, market demand, and operational efficiency. Furthermore, they are tasked with optimizing economies of scale. By strategically determining which vehicle lines should be produced in specific global locations — be it Europe, the USA, or China — they aim to maximize operational efficiency. Additionally, they scrutinize production, warehouse, and control data to make informed decisions about the expansion of production capacities. Their role is not just limited to production efficiency; they are also committed to enhancing the company's Environmental, Social, and Governance (ESG) performance. This involves investing in initiatives aimed at reducing Greenhouse Gas (GHG) emissions across Scopes 1, 2, and 3, thereby also enabling the company to invest in green bonds.

The Operations department faces a unique set of challenges, primarily centered around the management of factories and production lines. These decisions are not made in a vacuum but are based on a complex interplay of multiple internal and external inputs. One of the key metrics guiding decisions is the utilization rate which at optimum is at 100% for maximum efficiency. Another crucial metric is the Days of Inventory (DOI), which serves as an indicator of the company's sales and production performance. Balancing these metrics while also considering other role-specific inputs makes the Director of Operations pivotal for the company's success.

Strategic Factory Challenges: One of the most significant decisions in Operations at Enigma was the timing and location for expanding production capacities. At the onset of the simulation, Enigma operated seven production lines — three in the EU, two in China, and two in the USA. Both the EU and China had an additional line under construction. To keep pace with the introduction of new vehicles and meet anticipated growth, the Director of Operations undertook

substantial capacity expansion. New factory lines were added in the USA in Q5 and Q9 and in China in Q6 and Q9, taking 4 and 3 business quarters to complete, respectively. This effectively doubled the operating factory lines from 7 in Q4 to 13 by the end of the simulation in Q28.

However, this expansion was not without challenges. Demand did not keep up with the increased supply, leading initially to an overproduction. This issue manifested in the DOI peaking in Q14 at 64 days (Exhibit 9). To counter this, the Director of Operations chose not to assign all production lines, resulting in a utilization rate of 68% at the lowest point in Q19 (Exhibit 10). Fortunately, due to restructuring in the product portfolio and increased customer demand, these Operations KPIs recovered later in the simulation, achieving a perfect 100% utilization from Q24 onwards (Exhibit 10) and DOI of 32 days in Q28 (Exhibit 9).

The conflict between lean manufacturing and the need for flexibility was a constant challenge. Lean manufacturing aims to eliminate waste and to produce higher quality products more efficiently and at a lower cost. However, varying demand, changing customer preferences, and new models demanded flexibility which is a conflict, as discussed by Müller et al. (2020), who emphasize the importance of stabilized production facilities in automotive manufacturing.

Operational Factory Challenges: From an operational standpoint, the overcapacity in production also led to several unfavorable outcomes. The need to stimulate demand and achieve higher factory utilization led to the introduction of more models, reaching a maximum of 12. This resulted in model cannibalization, where the sales of each model were reduced, impacting economies of scale. According to Celli (2013), economies of scale are crucial for large businesses, and their determinants are complex. Our difficulties in realizing these were in line with Celli's findings, as we struggled to balance the increased lineup with operational efficiency.

Sustainability in Operations – A Multi-Faceted Approach: Sustainability was a cornerstone of Enigma's operational strategy, with investments spanning across Scope 1, 2, and 3 emissions. Scope 1 emissions are direct emissions from company-owned resources. To address these,

Enigma invested in water consumption reduction, waste reduction, and obtained an ISO 14001 environmental management certificate. The ISO 14001 is particularly noteworthy as its implementation enables access to new data, which, according to Hofmann et al. (2017) is crucial in today's automotive industry, especially with the rise of artificial intelligence. For Scope 2 emissions, which are indirect emissions from purchased energy, Enigma invested in energy efficiency measures and installed solar panels. Scope 3 emissions encompass all other indirect emissions that occur in the value chain, both upstream and downstream. To mitigate these, Enigma chose sustainable suppliers. According to a Muzir et al. (2023, p. 2) the transportation sector is one of the most polluting sectors, also leading to health risks for citizen and therefore showcases the industry's responsibility to adopt sustainable practices.

However, a critical reflection on Enigma's sustainability initiatives raises questions about the emphasis on reducing Scope 3 emissions. According to a study published by Park et al. (2022, p. 322), the majority of emissions in sectors including automotive, are part of Scope 3. This prompts the question of whether Enigma's sustainability initiatives were sufficient to address these emissions. On the other hand, Enigma focused its efforts on projects that were also financially viable explaining the lack of Scope 3 investments.

In total, Enigma's sustainability investments exceeded \$1.5 billion, underlining the company's commitment to both environmental and social responsibility. While the efforts were laudable, the focus may need to shift towards more comprehensive strategies that increasingly tackle Scope 3 emissions, as they constitute the majority of the automotive industry's emissions.

Conclusion: The Director of Operations navigated a multifaceted landscape of strategic and operational challenges. The decision to expand production capacities, while theoretically sound, led to operational complexities that demanded a delicate balance between lean manufacturing and market adaptability. Simultaneously, Enigma integrated sustainability into its decision-making, reinforcing its commitment for the environment and positioning itself as a responsible

manufacturer. Moving forward, a more balanced approach across all scopes of emissions and operational metrics will be crucial for achieving both sustainability and operational efficiency.

1.4. Review of the Director of Innovation Role

Overview of the Innovation Director's Responsibilities: The role is also very important as the simulation focuses on transitioning Enigma from solely selling internal combustion engine cars to mainly or exclusively selling electric vehicles (EVs). Innovation is responsible for undertaking research and development (R&D) in different areas like electrification and deciding on which new models to develop. This role is crucial to execute the electrification strategy and has the central role in ensuring the sustainable transformation of Enigma.

Beginning Phase: When Enigma embarked on its transformative journey, the initial strategy was to quickly ramp up investments in R&D. This decision was influenced by several factors:

a) **Sequential Investments:** R&D projects often build upon each other. Completing one project unlocks the next, creating dependencies that require careful planning and a timely execution. Delaying a project could have a domino effect, causing delays in subsequent projects.

b) **Competitive Landscape:** A comparison with competitors revealed that Enigma was lacking in R&D. For instance, Competitor C had already developed a car with connectivity level II and autonomous driving features, while Enigma was still in the initial stages of R&D.

c) **Challenges of EVs:** According to George Crabtree's (2019) research, EVs present unique challenges such as costs due to expensive batteries, charging speeds, and limited availability of charging stations. Making them appeal hence requires substantial investments into R&D.

On the regulatory side, policymakers are increasingly encouraging R&D investments in fuel-efficient solutions. Littlejohn and Proost's research highlights the role of policy in incentivizing such investments (Littlejohn and Proost 2019, p. 43).

To maximize the impact of R&D investments, a tactical approach was adopted. The timing of R&D projects was carefully planned to coincide with the anticipated start of new model developments. This strategy aligns with the punctuated equilibrium model described by Mudambi and Swift (2011, p. 429), where firms shift between periods of low and high R&D activity depending on external conditions. This initial strategy proved to be effective. Enigma made significant progress in R&D and successfully developed cars that met customer needs.

Period of Struggle: Despite initial successes, Enigma faced a period of significant challenges driven by overcapacity in the factories. The pressure to utilize this idling capacity incentivized the rapid development of new cars and an increase in the overall number of models. One of the most significant missteps during the simulation was the decision to develop two new diesel models launching in Q16 and Q18. This choice was backed by customer preference lists, which, although not recently updated, showed diesel cars still occupying top spots.

However, the reality was different. Upon launching, it became evident that the projected demand for diesel cars far exceeded the actual demand. Even worse was that we had doubled down on this strategy, developing two model before waiting for sales data from the first model. In hindsight, this was a grave miscalculation; we had underestimated the speed of the transition from internal combustion engines to electric vehicles.

Recovery through Restructuring: Realizing the divergence between our assumptions and market reality, a strategic reevaluation was undertaken. Starting from Q19, all newly developed cars would be 100% electric, aligning with apparent customer demand. Contrary to our initial assumptions, the adoption of EVs followed a steeper "S-curve", as described by Everett Rogers (1983, p. 243) than anticipated. This faster adoption rate on the other hand meant our electric cars could perform exceptionally well, validating our early R&D investments.

To address the persistent issue of factory overcapacity, a diversified approach was adopted. We aimed to cater to all market segments by offering various types of electric cars. In the case of

SUVs and convertibles we even decided to have two electric models each, targeting different customer segments. This strategy was backed up by the "Blue Ocean Strategy" by Renée Mauborgne & W. Chan Kim, which advocates for targeting untapped market spaces, "Blue Oceans", rather than competing in saturated markets, "Red Oceans" (Kim and Mauborgne 2005, p. 27). Specifically, we developed a high-end model with advanced features and a more affordable model with reduced features targeting different segments. Still, we were able to reduce the number of models in our lineup from a peak of 12 in Q19 to just 8 from Q24 onwards.

Conclusion: While Enigma did make a significant mistake in the Innovation department by launching two diesel models that did not meet market demands, the overall picture is positive. The Innovation department in the other cases excelled in creating cars that customers wanted while also contributing to more sustainability through electrification. This success is evidenced by the exceptional revenue of \$9.4 billion in Q28, almost the double of Q4 (Exhibit 7). Moreover, from Q24 onwards, Enigma exclusively sold 100% electric vehicles, marking the successful completion of its transformative journey driven by the Director of Innovation.

1.5. Interconnectivity of Innovation, Finance, and Operations

Bilateral Links: While the individual roles of the Director of Innovation, the Director of Finance, and the Director of Operations have been analyzed separately, it's crucial to understand how these roles are interconnected to execute Enigma's overarching strategy.

Starting with the bilateral connections, the Director of Innovation and Director of Operations are closely aligned. Innovation is responsible for developing new cars, and it's essential that these developments are synchronized with Operations to ensure sufficient production capacity on the one hand and avoid waste of capacities on the other hand.

Similarly, the relationship between Innovation and Finance is vital. Innovation's role involves significant investments in R&D and car developments. These investments need approval from Finance, which additionally must ensure that there is sufficient liquidity to fund these projects.

The link between Operations and Finance is similar as Operations also requires approval and funding from Finance for investments into new production capacity and sustainability projects.

Multilateral Links: However, there are instances where bilateral decision-making is insufficient, and a multilateral approach is necessary. A prime example in our case was the issue of factory overcapacity. This problem presented three possible solutions, together involving the three analyzed roles and different challenges:

- a) Produce on stock: this would increase inventory and DOI, which would bother Finance and Operations due to less working capital efficiency.
- b) Leave factory lines unoccupied: this would be a waste of valuable resources, making both Operations and Finance unsatisfied due to low utilization and idling resources.
- c) Develop more car models earlier: this would be suboptimal for Innovation and Finance, as the timing for development would not be ideal, and the investments likely less profitable.

Especially in such complex situations with conflicting interests, it's essential to involve all relevant stakeholders. This allows for a balanced view that leads to an optimal solution, taking into account the various interests and constraints of each department.

Conclusion: While many decisions in the simulation can be made bilaterally, the issue of overcapacity perfectly illustrates what the simulation aims to teach: the contributions from all parties and their interests are crucial. It's only by working together as a cohesive team that we can balance these interests and achieve optimal results for Enigma.

1.6. Comparison to Real Automotive Companies

Similarities with Volkswagen Group: Enigma's approach in the simulation mirrors the strategy of real-world automotive companies, most notably the Volkswagen (VW) Group. Enigma targets a broad range of customers with a very diverse vehicle lineup. From the micro, a very small city car, to SUVs designed for countryside driving, the range is extensive. The

lineup also includes a practical compact car appealing to rational buyers on the one hand and a luxurious two-seater for those with a bigger budget on the other hand. Furthermore, an Executive model targeting professionals and simultaneously Convertibles targeting leisure drivers.

This diverse offering is further nuanced by introducing high-end and more affordable models within some vehicle type. This strategy aligns closely with the VW Group, which houses various brands like VW, Audi, and Skoda, catering to different market segments (Volkswagen Group 2023a). For instance, VW offers small and affordable cars like the VW up! (Volkswagen 2023), while Audi provides electric luxury SUVs like the Audi Q8 e-tron (Audi 2023).

Moreover, Enigma's strategy was not to lead the transition to electric vehicles but to take a pragmatic approach, selling internal combustion engine cars as long as there is customer demand. This approach is similar to VW's current strategy. Although VW is investing heavily in transitioning to electric cars (Eddy 2023), they still primarily sell conventional cars, with only 6.9% being electric in 2022 (Volkswagen Group 2023b). Their goal is to reach 20% electric by 2025 (Eddy 2023) and to go fully electric in Europe by 2033 (Waldersee 2022).

Different Speed of Transition: The exit strategy from conventional cars also leads us to a significant difference between Enigma and real-world companies like VW which lies in the speed of the transition to electric vehicles. Enigma transitioned to 100% electric vehicle sales by Q24, equivalent to the fourth quarter of 2025. In contrast, VW's goal is to achieve transition in Europe by 2033. According to Motavalli from Forbes (2021), most major traditional car manufacturers plan to go fully electric no earlier than 2030, with Volvo leading the way.

This accelerated transition in the simulation is also a factor in our miscalculation in predicting the demand for the two conventional cars. The beforementioned "S-curve" of technological adoption in the simulation, as described in "Diffusion of Innovations" by Everett Rogers (1983, p. 243), drastically outpaced the adoption in reality.

Conclusion: Enigma's strategy in the simulation is most similar to the real-world approach of the Volkswagen Group. In particular, both entities offer a broad range of vehicle types catering to a wide array of customer needs. Moreover, both have adopted a nuanced approach within each vehicle category, offering high-end and more affordable models to further meet market demands. This alignment extends to the transitional strategy, where a pragmatic approach is taken to continue serving customer demand for conventional cars while gradually shifting towards electric vehicles. Despite different transition speeds, the Volkswagen Group serves as a real-world parallel to Enigma, especially in the areas of product range and transitional strategy.

1.7. Conclusion

The journey of Enigma, as detailed in this comprehensive analysis, serves as a microcosm of the challenges and opportunities that contemporary automotive companies face in a rapidly evolving landscape. The analysis has dissected the roles of Finance, Operations, and Innovation, revealing the intricate web of decisions that shape the company's trajectory.

The **Finance department** played a pivotal role in guiding Enigma through a labyrinth of investment decisions, capital structures, and performance metrics. While the strategy was fundamentally sound, aiming for an A- credit rating and a balanced WACC, the execution revealed room for improvement. The failure to optimize the capital structure by not buying back more shares when the opportunity arose indicates that even well-laid plans require agile execution.

Operations faced the task of scaling production capacities to meet anticipated demand, only to be met with the realities of overproduction and underutilization. The department had to navigate between lean manufacturing principles and market adaptability, all while integrating sustainability into its core strategy. The challenges were manifold, but the eventual recovery in KPIs like utilization rate and Days of Inventory (DOI) suggest a learning curve that was steep and valuable.

Innovation was the linchpin in Enigma's transformative journey towards electrification. Despite initial successes, the department faced setbacks, most notably the miscalculation in the demand for conventional cars. However, the rapid course correction and the eventual transition to 100% electric vehicles by Q24 demonstrated the department's resilience and adaptability.

The **bilateral and multilateral links** between Finance, Operations, and Innovation were not just theoretical constructs but practical necessities. The issue of factory overcapacity served as a case study in the need for cross-departmental cooperation to achieve solutions that balance conflicting interests and constraints.

The **comparison** with the Volkswagen Group adds an extra layer of depth to the analysis, highlighting the similarities in product range and transitional strategy. However, the speed of Enigma's transition to electric vehicles outpaced real-world counterparts, serving as both an opportunity and a cautionary tale in the case of our two failed conventional cars.

Acknowledging **limitations** is also important for this paper. Due to constraints in length, some topics could not be explored in great detail. For instance, the forecast of investments within Finance, the complexities of optimal worldwide production planning in Operations, or the rationale behind equipping cars with specific attributes at particular times in Innovation could not be explored in depth. However, the paper aimed to provide a comprehensive overview and focus on the most pressing and interesting challenges experienced during the simulation.

In **summary**, despite limitations, this analysis paints a nuanced picture of a company in transition towards sustainability, faced with challenges but also with a multitude of opportunities which enabled Enigma to achieve a very respectable Value Added. It underscores the importance of agile decision-making, cross-departmental cooperation, and a willingness to adapt and learn. As Enigma moves forward, these lessons will be valuable in navigating the complexities of corporate transitions in the 21st century even beyond the automotive industry.

2. Personal Reflection on Critical Incidences

2.1. Introduction to the Critical Incidences

The business simulation experience served as a practical arena for applying theoretical business concepts, allowing our team to step into the roles of a company's board of directors. Within this simulated corporate environment, we were faced with a variety of challenges that tested not only our business acumen but also our abilities to work together as a team.

Two incidents stand out as particularly impactful learning experiences as they offer a lens through which to explore the complexity of collective decision-making, emotional intelligence, and effective communication. The first incident involved the launch of two new car models that required us to reevaluate our strategy and team dynamics in the face of financial adversity, while the second incident revolved around a communication breakdown resulting in an inventory issue emphasizing the critical role of clear communication. Both incidents serve as case studies for understanding the challenges and implications of working in a team-based business setting.

The essay is structured to provide a detailed record of each incident, followed by an analysis of my emotional and cognitive responses. This is then reflected upon to finally draw the implications and lessons learned. The aim is to offer insights into the complex interplay between individual psychology and team dynamics, thereby contributing to a deeper understanding of effective business practice. Given the unique challenges and learnings that each incident presented, they are concluded individually rather than being consolidated into a single overarching conclusion.

2.2. Incident 1: Launch of Conventional Cars

Introduction and Background: This reflective thesis part focuses on a critical incident that occurred during the middle of the business simulation. Our team, characterized by a high level of synergy and shared belief in our strategic direction, was performing exceptionally well. We

had been repeatedly securing the top spot on the Value Added leaderboard, solidifying our confidence in our strategy and encouraging us to continue pushing our boundaries.

As a result of our successful strategy and supported by an atmosphere of optimism, we decided to launch two new cars equipped with combustion engines. This decision was not made easily; it was the product of an intense collective discussion and an ultimately shared conviction.

However, as the cars had been launched, it quickly became evident, that the sales figures and profit contributions were far below our predictions. Considering the significant financial investments, we had to undertake to launch the cars, this marked a turning point in our so far very successful track record and strategy.

My Reaction and its Analysis: The disappointing sales figures and profit contribution for our newly launched cars sparked a cascade of emotions within me. I initially responded with surprise, marked by an air of disbelief, as our previous successes had given us a strong conviction in our team's strategy. Our performance until then had convinced me of the potential of these new models, creating a cognitive dissonance when the harsh reality materialized.

Yet, in the face of our downfall, I found myself seeing joy in the irony. The unexpected predicament of being a successful team confronted with a stark failure in a venture we were all so confident about was so peculiar that it struck me as ironically amusing. While this mental response provided a form of emotional buffer amidst the initial shock, it also fostered a cloud of emotional turmoil that temporarily stalled my ability of analytical reasoning.

As Kahneman (2011) explains, our cognitive process is governed by two systems: a fast, intuitive one (System 1), and a slow, deliberative one (System 2). In my case, the fast-reacting System 1 was initially dominated by surprise and humor, effectively delaying the more deliberative System 2, which was needed to analyze and understand the situation.

When the emotional fog started to dissipate, my System 2 took over, gradually unravelling the need for immediate attention to the dismal sales figures. An increasingly pragmatic perspective replaced my initial reactions, leading me to acknowledge that we had a miscalculation in our decision to launch these cars. What seemed like a promising undertaking had backfired, necessitating a swift and rational response.

This realization, however, was not easily accepted by my System 1, which was still influenced by the optimism and confidence of our initial successes. Acknowledging the failure meant overturning our shared belief in the success of these cars, making the decision emotionally difficult despite its analytical obviousness. Upon recognition, we collectively agreed on discontinue the models, marking an end to an emotionally charged episode and signaling a return to strategic decision-making based on empirical evidence, not emotions or beliefs.

Viewing our team's decision-making process through Lencioni's (2022, pp. 212–216) lens of the five dysfunctions of a team, this incident unveiled a latent dysfunction: avoidance of accountability. While our initial successes made us celebrate our strategy, the abrupt downturn caused us to resist acknowledging the failure of our new launches. This fourth dysfunction surfaced when the objective analysis of our failure was temporarily clouded by our emotional reactions.

This analysis of my reaction to the critical incident illustrates the complex interplay between emotion and rational analysis, and individual and team responses. It underscores the importance of mindful reactions and thoughtful analysis in dealing with challenging situations.

Reflection on my Reaction: The immediate aftermath of the disappointing results posed a significant challenge to my composure and decision-making abilities. As a personality type that typically thrives on data interpretation, my reaction was unsettling. Faced with the stark contrast between our anticipated success and the reality of our failure, I found myself momentarily frozen, entangled in a web of cognitive dissonance. This unexpected turn of events led to a

substantial blow to my confidence in our team and our strategy. Having ardently advocated for the combustion engine models, the sudden downfall profoundly shocked me.

During this critical period, emotions got hold of me, stalling my ability to assess the situation rationally and promptly. Ironically, as I reflect on this, I realize that my use of humor was, in reality, a coping mechanism to manage my disappointment. Using humor helped me to temporarily shield myself from the gravity of our situation, allowing me to maintain a positive demeanor in the face of adversity. However, this emotional buffer also disrupted my immediate analytical processing of the situation, indicating a paradoxical relationship between coping mechanisms and objective decision-making.

Gradually, as I began to grapple with the reality of our failure, my analytical thinking started to re-emerge. This realization was, however, slower than I would have expected, taking nearly half an hour. Reflecting on this delay, I now discern the influence of the sunk cost fallacy as explored by Arkes and Blumer (1985). We, as a team, had invested so much in these car models, both emotionally and financially, that it was difficult to face the fact that our strategy had failed. My profound belief in our strategy, coupled with the sunk cost fallacy, manifested as a stubborn resistance to change our course, despite the growing evidence of failure.

In the face of disappointing simulation performance, my emotional journey from surprise to despair significantly impacted my decision-making as Finance Director. While I employed humor to maintain team morale and demonstrate leadership, this approach also clouded the situation's severity, delaying a timely response. My emotional turmoil, compounded by the sunk cost fallacy, hindered my ability to quickly discontinue underperforming car models, revealing the complex interplay between emotions and analytical reasoning in critical business decisions.

Learnings and Outlook: Reflecting on this critical incident, I've been presented with several valuable insights that will undoubtedly shape my decision-making processes moving forward. It has become evident how powerful the interplay between emotions and analytical thinking is

in the decision-making process. From initial disbelief to humor-based coping, my reactions undoubtedly influenced my analytical processing, a realization that carries significant implications for my future leadership style.

I've learned the pivotal role that surprise and disappointment can play in impeding data-driven decision-making. Despite my 'Conscious' personality implying a strong inclination towards logical reasoning (Beedu 2021, pp. 25–27), I was not immune to the effects of these emotions. As such, I now see the importance of managing emotional responses swiftly, particularly in situations that necessitate immediate decisions. Delayed decision-making in such scenarios could lead to detrimental outcomes.

The incident also exposed the potential pitfall of my humor-oriented coping mechanism. While successful in keeping group morale high, this approach could also unintentionally minimize the gravity of a situation, resulting in delayed responses. In this context, I resonate with Bushe's (2009) principles of clear leadership, particularly the need for positive partnerships on the one hand to support driving performance on the other hand. Striking this sometimes ambivalent balance will be a crucial area of focus for me in future leadership endeavors.

Collective decision-making, while fostering team unity, was also revealed to have its drawbacks. As we all shared the belief in our initial strategy, cognitive biases were amplified and led to a resistance to change, even in the face of clear empirical evidence of the contrary. To mitigate this risk in the future, I aim to encourage diverse opinions and an environment where questioning the status quo is welcomed.

Moving forward, I have delineated a more structured methodology to adeptly navigate situations rife with emotional turbulence. This involves explicitly documenting the unembellished facts at hand, thereby fostering a conscious disentanglement of my emotional responses from the objective circumstances. Subsequently, engaging the situation with unbiased analytical reasoning could help mitigate the impact of emotional biases. By adopting this

method, I intend to leverage the tenets of effective emotional management and clearer decision-making processes.

This experience has underscored the importance of swiftly transitioning from emotional responses to analytical thinking, particularly in time-sensitive situations. The insights gained will inform my approach to future decision-making processes. In essence, this incident has served as a catalyst for my growth in strategic thinking, reinforcing the need for a balanced emotional and analytical approach to decision-making.

2.3. Incident 2: Failure to Halt Production

Introduction and Background: Our company was facing turbulent circumstances. Following a period of promising performance, we were suddenly plunged into a difficult phase, necessitating a strategic reorientation of our car portfolio. Key to this transition was the task of determining which car models to discontinue based on cost-benefit analysis. As the Finance Directors, it was our role to assess the financial viability of each model, determine the optimum time to halt production, and effectively communicate these decisions to the team. Our team dynamic was rooted in individual autonomy within one's role, coupled with a commitment to transparency and forthright discussion of potential issues or significant decisions.

One critical incident illustrates how vulnerable this balance is. Our decision to soon discontinue a certain car model, based on our cost projections, was communicated to the team with the plan to sell off the existing inventory first over one quarter. The decisions were made, the plans set, and the group informed, but the execution did not go as anticipated.

As we transitioned into the next period, we were confronted with an unexpected inventory surplus of the model we had planned to cancel as production had not been halted as anticipated.

My Reaction and its Analysis: The moment of realization was sudden and startling, the unexpected surplus of stock was a direct consequence of the Operations Director's failure to

halt production. This incident was a clear example of 'interpersonal mush,' as described by Bushe (2009), where the lack of clear communication leads to misunderstanding and conflict within the team. My initial reaction was an immediate rush of adrenaline, igniting an intensity of emotions amplified by our recent performance struggles. The seemingly obvious action of stopping production post-discussion had been neglected, sparking an intense argument. I found myself blaming the Operations Director, a practice known to foster a toxic work culture according to our leadership sessions, for what I perceived as a clear oversight. This response contrasted with my usual interaction style, as evidenced by my team's evaluation in the peer assessment where my "interacting with teammates" was rated a commendable 4.4 out of 5 (Exhibit 11). This rating typically indicates an ability to maintain positive communication and collaboration within the team. However, under the strain of this critical incident, my reaction deviated from the level-headed and harmonious approach my peers had appreciated.

Emotions surged, alertness sharpened, and a sense of urgency got hold of me. According to the Emotional Intelligence Theory (Goleman 2006, p. 62), self-awareness forms the bedrock of handling such emotionally-charged situations. However, the sudden turn of events led me to act impulsively ("System 1"), contradicting the analytic, thoughtful, and reserved nature ("System 2") (Kahneman 2011) typical of my 'Conscious' personality as per the DISC personality test explored by (Beedu 2021, pp. 25–27). As a 'Conscious', I value logic, information, organization, and strive for quality and competency, taking time to ponder and assess before acting. Thus, the abruptness of the incident and my out-of-character reaction further fueled my emotional upset.

The Operations Director resisted my accusations, coupled with his counter-blame that no one told him to act, exacerbated an already tense situation. In an attempt to seek validation and confirmation of my perspective, I initiated a quiet conversation with my fellow Finance Director. While this might have been perceived as divisive, it was an instinctive reaction to clarify our shared understanding of the previously agreed-upon plans. The support from my

fellow Finance Director, however, didn't dampen my emotions. The insistence of the Operations Director on his innocence further aggravated my frustration and anger, leading me to try to suppress my feelings to maintain team equilibrium.

Despite the high tension, I later in that quarter attempted to diffuse the situation with a pointed joke aimed at the Operations Director by being overly precise in my instructions what he should do now. Although he took it light-heartedly, this act was a reflection of my frustration, an again somewhat unusual expression of my 'Conscious' personality, which typically resorts to logic and facts rather than humor (Beedu 2021, pp. 25–27). While it eased the situation momentarily, the undertone of unresolved emotions lingered. The Affective Events Theory (Weiss and Cropanzano 1996, pp. 3–13) posits that workplace events trigger emotional reactions that subsequently influence attitudes and behaviors. This incident left a lasting impact on my emotions and subsequent interactions with the Operations Director, shown by my attempts to organize and regulate our interactions in a more structured, analytical, and less personal manner.

Reflection on my Reaction: Reflecting on this critical incident, the emotional turmoil experienced was multifaceted, from initial surprise to anger, frustration, and, later, a sense of dissatisfaction. At the heart of my reaction was my haste to attribute blame on the Operations Director. The Attribution Theory (Heider 1958) posits that we instinctively try to attribute cause and effect, and my immediate reaction mirrored this, attributing the stock excess to what I perceived as the Operations Director's oversight. However, upon reflection, it becomes clear that this rapid attribution was less of a thoughtful analysis but a product of heightened emotions.

The quiet conversation I initiated with my fellow Finance Director during the conflict was intended as a sanity check. However, I now recognize that it could have been interpreted as exclusive or even divisive by the rest of the team. In hindsight, an open group discussion to dissect the miscommunication would have been more productive and with less potential to damage the team dynamics.

The emotional labor required in the aftermath of the incident was significant. In this scenario, despite my anger towards the Operations Director, the necessity to maintain a functional working relationship required me to suppress and manage my feelings. I had to continue interacting professionally while internally dealing with a range of emotions.

The joking remark I made to the Operations Director also warrants reflection. Transactional Analysis (Berne 1958) suggests that transactions, or interactions, between individuals can shift from "Adult-Adult" to "Parent-Child," leading to potential misunderstandings and conflict. My joking remark, while meant to lighten the situation, actually displayed a "Parent-Child" transaction, with me 'instructing' the Operations Director, a possible extension of my frustration and need to assert control.

Moreover, my withdrawal from interacting with the Operations Director following the incident indicates the effect of the conflict on the teamwork. It's noteworthy that the incident did not have a significant long-term financial implication nor changed our strategy. However, the interpersonal conflict did impact team dynamics and disrupted our usually effective team cohesion, emphasizing the profound impact emotions can have in a team setting. Furthermore, the case of Google's quest for the perfect team, as described by Duhigg (2016, p. 13), revealed that psychological safety, characterized by interpersonal trust and mutual respect, is crucial for team effectiveness. The emotional turmoil experienced during the incident may have temporarily harmed our team's psychological safety, creating an atmosphere of tension and consequently hindered our effectiveness.

In retrospect, the incident highlighted the missed opportunity for a structured approach to conflict resolution, emphasizing its long-term impact on team cohesion and performance.

This valuable learning experience has led to critical reflections on team dynamics, including the importance of clear communication and the pitfalls of 'side conversations.' It also

underscored the need for controlled emotional expression and a well-defined conflict resolution strategy.

Learnings and Outlook: This incident provided several insightful learnings. First, it reiterated the importance of open communication. My 'sidebar' conversation disrupted the dynamics within the team and may have fostered feelings of exclusion. In the future, I aim to maintain inclusive, and foster a space where all perspectives can be heard and respected.

I also recognized the need to better manage emotional reactions. The incident stirred strong emotions within me, leading to premature attributions, as explained by Heider's (1958) Attribution Theory. This incident underlined the necessity of always remaining composed and separating personal feelings from professional judgments, to make well-balanced decisions.

Thirdly, I learned to be more cautious in my interactions with colleagues. My joking remark, interpreted through the Transactional Analysis by Berne (1958), possibly shifted the conversation to an unintended "Parent-Child" transaction, which could have negatively affected the Operations Director's perception of me. Going forward, I will strive to maintain a respectful, "Adult-Adult" interaction style to maintain positive and productive professional relationships.

Lastly, this incident showed me the need for a structured conflict resolution approach. It became clear that while the financial implications of the conflict were not significant, the impact on team dynamics was substantial. Reflecting on Toegel's and Barsoux's (2016) suggestions for preempting team conflict, it was evident that the establishment of agreed-upon rules for conflict resolution could have mitigated or, at least, better managed the situation.

Looking forward, these learnings will play a significant role in shaping my professional interactions. Recognizing the importance of managing emotions, ensuring open communication, being aware of the transactional dynamics, and implementing structured conflict resolution strategies will undoubtedly improve both my personal effectiveness, resilience, and the overall team performance.

Bibliography

- Arkes HR, Blumer C (1985) The psychology of sunk cost. *Organ Behav Hum Decis Process* 35:124–140. [https://doi.org/10.1016/0749-5978\(85\)90049-4](https://doi.org/10.1016/0749-5978(85)90049-4)
- Audi (2023) Audi Q8 e-tro. <https://www.audi.de/de/brand/de/neuwagen/q8-e-tron/q8-e-tron.html>. Accessed 10 Sep 2023
- Baker MP, Ruback RS, Wurgler JA (2005) Behavioral Corporate Finance: A Survey. *SSRN Electron J*. <https://doi.org/10.2139/ssrn.602902>
- Beedu GK (2021) A Study on the Effectiveness of DISC Personality Test. *Selinus University of Sciences and Literature*
- Berne E (1958) Transactional Analysis: A New and Effective Method of Group Therapy. *Am J Psychother* 12:735–743. <https://doi.org/10.1176/appi.psychotherapy.1958.12.4.735>
- Bushe GR (2009) Clear Leadership : Sustaining Real Collaboration and Partnership at Work
- Celli M (2013) Determinants of Economies of Scale in Large Businesses—A Survey on UE Listed Firms. *Am J Ind Bus Manag* 03:255–261. <https://doi.org/10.4236/ajibm.2013.33031>
- Crabtree G (2019) The coming electric vehicle transformation. *Science (80-)* 366:422–424. <https://doi.org/10.1126/science.aax0704>
- Duhigg C (2016) What Google learned from its quest to build the perfect team. *N. Y. Times Mag*. NA-NA
- Eddy M (2023) Volkswagen Will Invest \$193 Billion in Electric Cars and Software - The New York Times. In: *New York Times*. <https://www.nytimes.com/2023/03/14/business/volkswagen-electric-vehicles-batteries-investment.html>. Accessed 10 Sep 2023
- Goleman D (2006) *Emotional Intelligence*. bantam Books, New York

- Heider F (1958) The psychology of interpersonal relations. John Wiley & Sons Inc, New York
- Hofmann M, Neukart F, Bäck T (2017) Artificial Intelligence and Data Science in the Automotive Industry
- Kahneman D (2011) Thinking fast and slow. Farrar, Straus and Giroux, New York
- Kim WC, Mauborgne R (2005) Blue Ocean Strategy: From Theory to Practice. Calif Manage Rev 47:105–121. <https://doi.org/10.1177/000812560504700301>
- Lencioni P (2022) The Five Dysfunctions of a Team: A Leadership Fable. Jossey-Bass, San Francisco
- Littlejohn C, Proost S (2019) What role for electric vehicles in the decarbonization of the car transport sector in Europe? Munich
- Modigliani F, Miller MH (1958) The Cost of Capital, Corporation Finance and the Theory of Investment. Am Econ Rev 58:261–297
- Motavalli J (2021) Every Automaker's EV Plans Through 2035 And Beyond. In: Forbes. <https://www.forbes.com/wheels/news/automaker-ev-plans/>. Accessed 10 Sep 2023
- Mudambi R, Swift T (2011) Proactive R&D management and firm growth: A punctuated equilibrium model. Res Policy 40:429–440. <https://doi.org/10.1016/j.respol.2010.10.014>
- Müller M, Lehmann M, Kuhn H (2020) Measuring sequence stability in automotive production lines. Int J Prod Res 0:1–21. <https://doi.org/10.1080/00207543.2020.1790685>
- Muzir NAQ, Hasanuzzaman M, Selvaraj J (2023) Modeling and Analyzing the Impact of Different Operating Conditions for Electric and Conventional Vehicles in Malaysia on Energy, Economic, and the Environment. Energies 16:1–31. <https://doi.org/10.3390/en16135048>
- Myers SC, Majluf NS (1984) Corporate financing and investment decisions when firms have information that investors do not have. J financ econ 13:187–221.

[https://doi.org/10.1016/0304-405X\(84\)90023-0](https://doi.org/10.1016/0304-405X(84)90023-0)

Park Y, Kim J, Kyung D, Park H-S (2022) Characterization of Greenhouse Gases Emissions by Economic Sectors Using Environmentally Extended Input-Output Analysis (EEIOA).

J Korean Soc Environ Eng 44:308–335. <https://doi.org/10.4491/KSEE.2022.44.9.308>

Rogers EM (1983) Diffusion of Innovations. Free Press of Glencoe

Shah R, Haldar A, Rao SVDN (2014) Economic value added: A financial flexibility tool. Corp Ownersh Control 12:703–708. <https://doi.org/10.22495/cocv12i1c8p2>

Toegel G, Barsoux JL (2016) How to Preempt Team Conflict. Harv Bus Rev 94:78–84

Tolliver C, Keeley AR, Managi S (2020) Drivers of green bond market growth: The importance of Nationally Determined Contributions to the Paris Agreement and implications for sustainability. J Clean Prod 1–47. <https://doi.org/10.1016/j.jclepro.2019.118643>

Volkswagen (2023) Volkswagen up! <https://www.volkswagen.de/de/modelle/up.html>. Accessed 10 Sep 2023

Volkswagen Group (2023a) Volkswagen Group Brands. <https://www.volkswagen-group.com/de/marken-15811>. Accessed 10 Sep 2023

Volkswagen Group (2023b) Transformation progressing: Volkswagen Group delivers 26 percent more all-electric vehicles in 2022. <https://www.volkswagen-newsroom.com/en/press-releases/transformation-progressing-volkswagen-group-delivers-26-percent-more-all-electric-vehicles-in-2022-15412>. Accessed 10 Sep 2023

Waldersee V (2022) Volkswagen brand will only produce electric cars in Europe from 2033 - brand chief. In: Reuters. <https://www.reuters.com/business/autos-transportation/volkswagen-brand-will-be-electric-only-carmaker-europe-2033-brand-chief-2022-10-26/>. Accessed 10 Sep 2023

Weiss H, Cropanzano R (1996) Affective Events Theory: A Theoretical Discussion of The

Structure, Cause and Consequences of Affective Experiences at Work. Research in
Organizational Behavior. Res Organ Behav 18:1–74.
<https://doi.org/10.4135/9781483386874.n10>

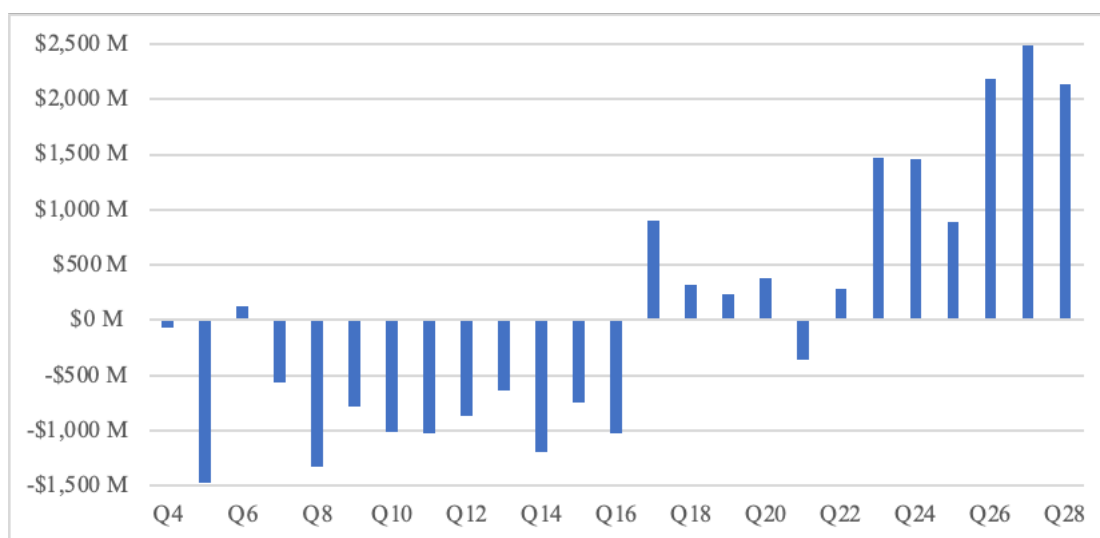
Exhibits

1. WACC Estimations at Different Debt Ratings

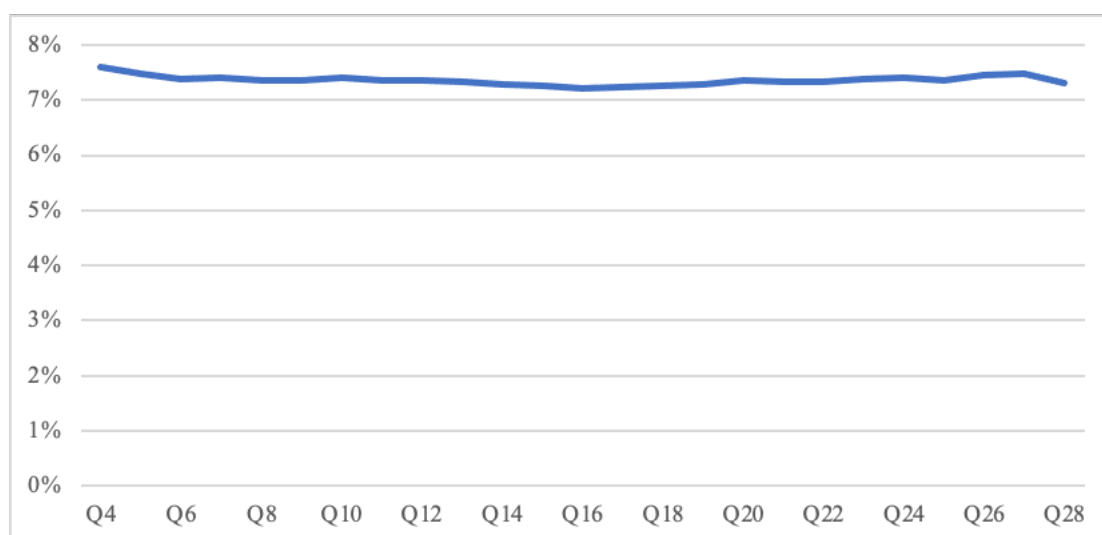
Rating	Current equity	Current debt	Add. debt for worse rating	Add. debt to keep rating	Impl. max debt ratio	Impl. min equity ratio	Cost of debt	Est. Cost of equity	WACC	WACC + erro
A-	\$10,811	\$9,600	\$1,282	\$1,232	49.93%	50.07%	4.85%	11.51%	7.46%	7.60%
BBB	\$10,811	\$9,600	\$3,648	\$3,598	54.86%	45.14%	5.35%	12.26%	7.59%	
BB+	\$10,811	\$9,600	\$6,705	\$6,655	59.95%	40.05%	6.75%	13.25%	8.14%	
BB	\$10,811	\$9,600	\$9,860	\$9,810	64.12%	35.88%	7.10%	14.27%	8.31%	

Based on empirical observations from leveraging high Assumption: Worse rating debt - 50k Assumption: Linear development with equity ratio. Data from table above

2. Free Cash Flow



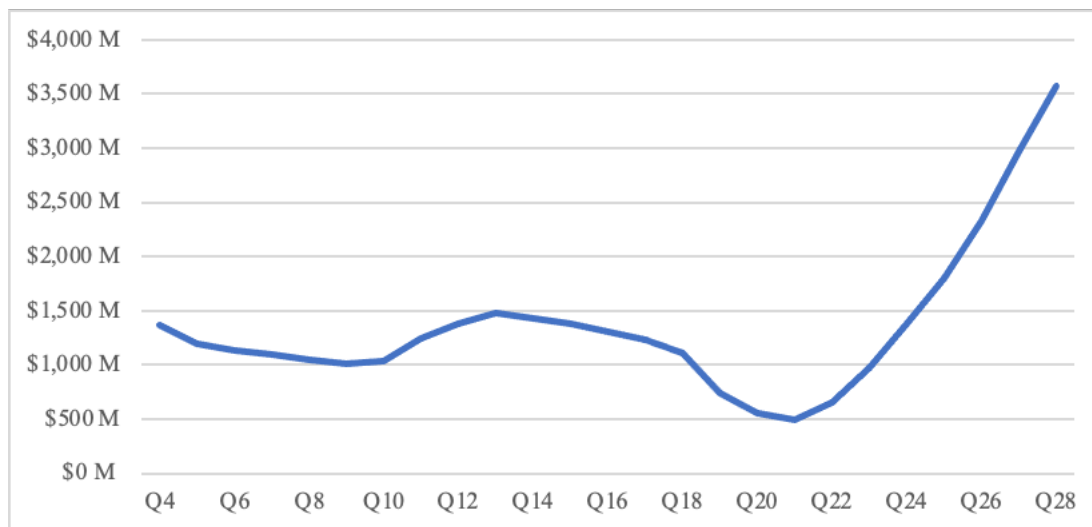
3. Weighted Average Capital Costs (WACC)



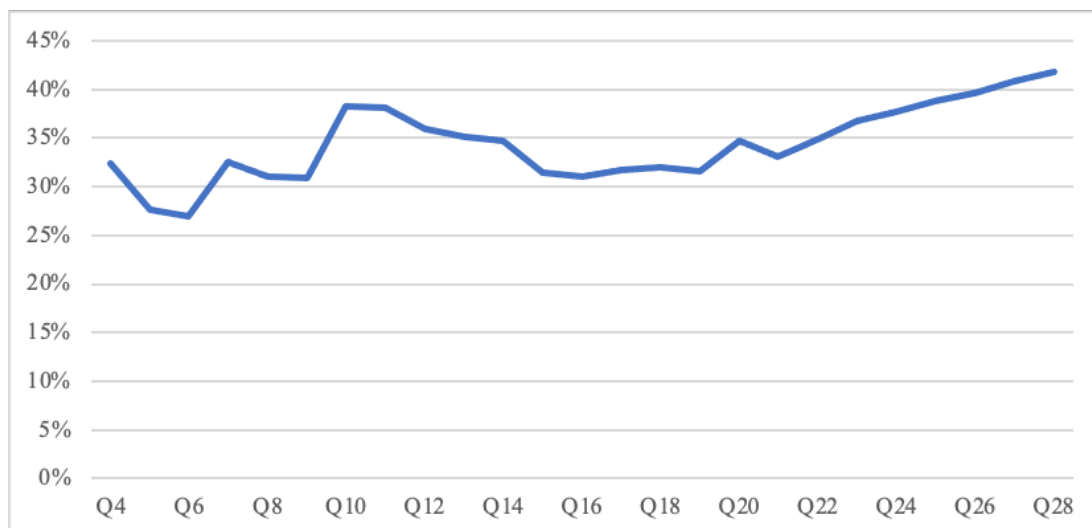
4. Working Capital

	Year 1	Year 6
+ Receivables	\$2,749	\$5,149
+ Inventory	\$2,423	\$3,288
+ Leasing Assets	\$0	\$9,522
- Payables	\$851	\$831
Working Capital	\$4,321	\$17,128

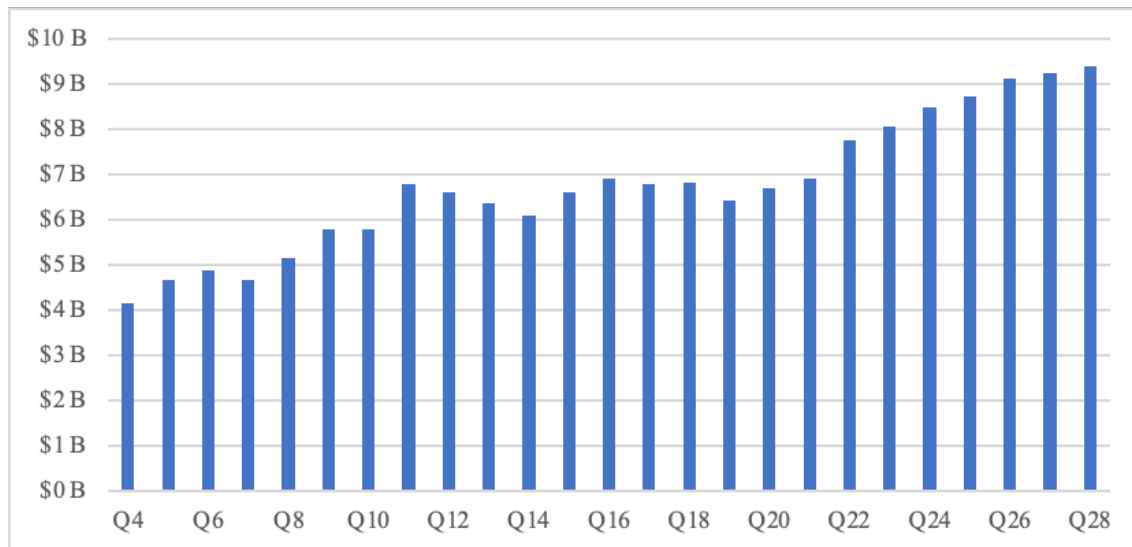
5. Value Added



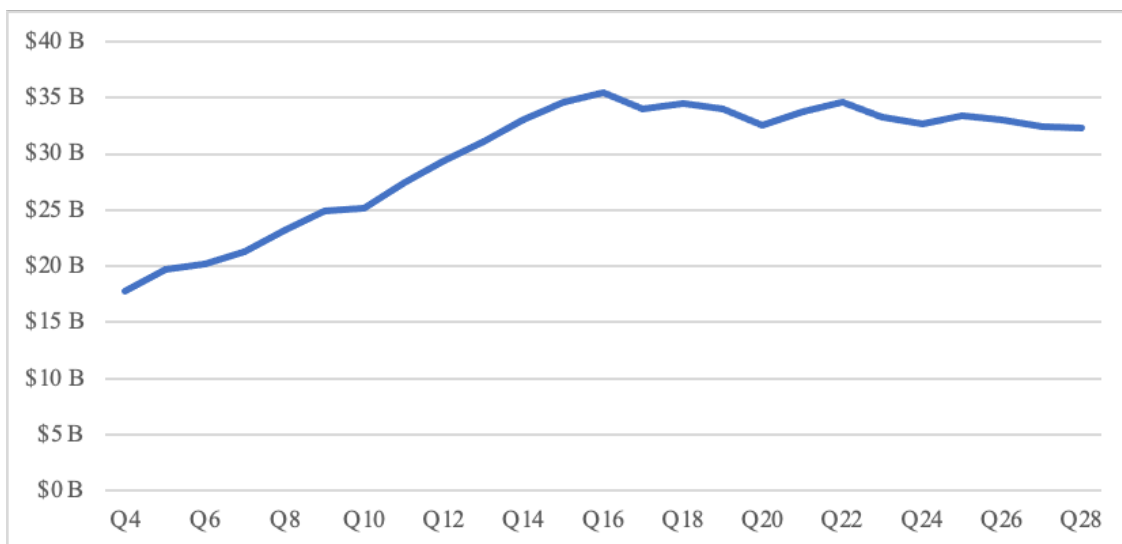
6. EBITDA Margins



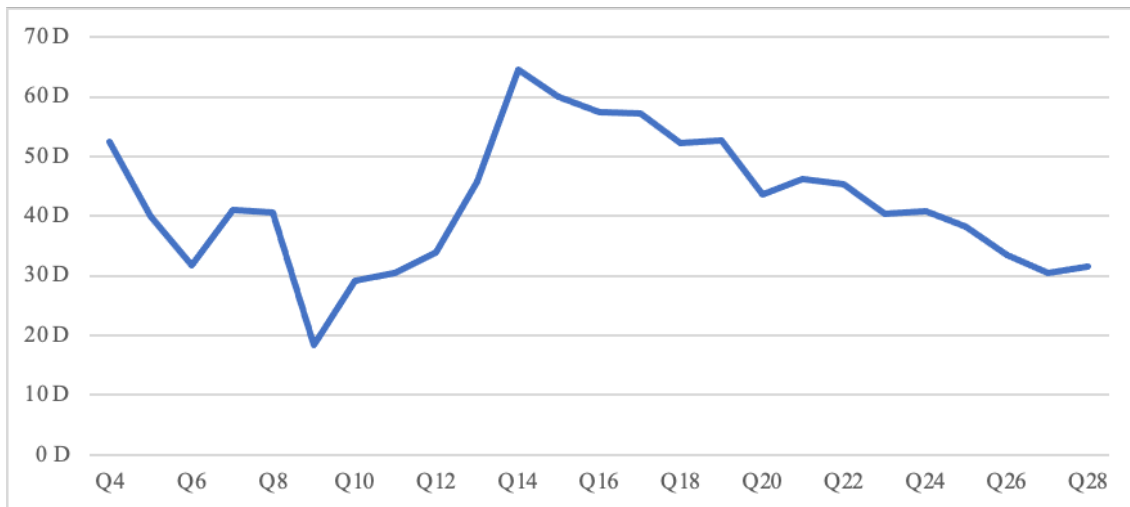
7. Revenues



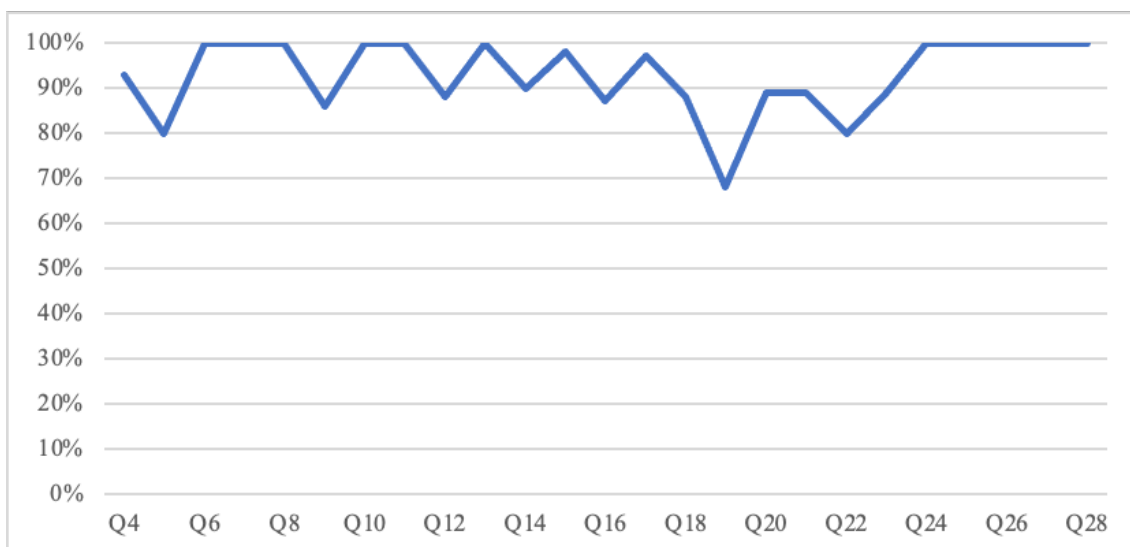
8. Net Assets



9. Days of Inventory (DOI)



10. Factory Utilization Rate



11. Peer Assessment Results

