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Digital Due Diligence

Assessment of Digital Growth Potentials

Digital markets are based on other mechanisms than classic markets. Due diligence analyses the present position and future potential of a business. This research aims to develop a conceptual framework of relevant dimensions that encompasses digital due diligence. Haniel's acquisition of the startup Emma is used to illustrate the practical application of this framework.

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Due diligence (DD) is a process performed before the acquisition or sale of a business. It is a systematic assessment of whether the target company is a good investment on behalf of investors or banks. It supports the investment decision as such investments carry a high degree of risk and uncertainty. Strengths and weaknesses of the target's business model are analysed. Together with market and trend analyses, the growth expectations of the target can be estimated.

DD thus is the basis of any business evaluation. It ensures that key business data, facts and forecasts are correct, complete and collected accurately while being analysed with appropriate care (Howson, 2017). Initially, DD focused on financial figures. Nowadays, market or commercial DD are also common (Harvey & Lusch, 1995).

The Need for Digital Due Diligence

Digital firms have transformed markets fundamentally. Some global driving factors are high-speed internet, growing digital maturity of firms, growing internet usage as well as the global availability of electronic devices.

COVID-19 has accelerated this transition to electronic markets. Current e-commerce penetration rates of most product categories would not have been expected five years ago (Sambol, 2021a). Thus, the importance of online channels for customer acquisition and revenues is growing, especially for B2B firms. Brand reputation is increasingly created online. It enables new business models, such as startups that scale exclusively via online communities and social media platforms. Businesses engage influencers to reach their target groups online (Vrontis et al., 2021). Digital startups, but also incumbent SMEs and corporates with digital approaches are targets for companies that aim to increase their digital competence and technology expertise via mergers and acquisitions (M&A). However, many companies struggle with their digitalisation efforts (Gebauer et al., 2020).

Digital firms differ significantly from traditional ones. For instance, for digital firms IT infrastructure is an integral part of the product itself (Iansiti & Lakhani, 2014). Companies that use best-in-class technologies can increase productivity by a factor of three (Sattler, 2018). Therefore, digital DD must have specific criteria for assessing business value, scalability and potential value improvements for the target's future growth.

Moreover, for digital business there usually is a large amount of data available, allowing for fast and precise adaptations to market developments. This data enables live valuations of key performance indicators (KPIs) and in-depth analyses and predictions via intelligent algorithms (Saura, 2021).

In summary, digital DD is a method to determine and analyse a firm's unique position against competitors, the sustainability of its digital business, the potential risks and the digital growth potential.

Empirical Approach

The goal of this research is to develop a framework which encompasses relevant dimensions for digital DD. The dimensions should be collectively exhaustive and mutually exclusive. While more dimensions would guarantee exhaustiveness, parsimony calls for fewer dimensions with high explanatory power regarding the goal, i.e., estimating a target's future growth. Table 1 shows the research process and methods.

Existing digital readiness frameworks were collected via academic databases

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Table 1: Research Approach

Research Step	Goal	Method	Outcomes
Literature Analysis	Identifying central dimensions for digital due diligence	Comparative analysis of 7 Digital Readiness Frameworks	Preliminary framework
Expert Interviews	Validating digital due diligence dimensions	Qualitative data analysis of 6 expert interviews	Expected number and relevance ranking for digital due diligence dimensions
Refinement	Validating framework	Adjustment, condensation and enrichment of dimensions based on 100 due diligence projects	Refined framework
Survey	Confirmation of relevance of digital due diligence and its dimensions	Quantitative descriptive analysis	Finalisation of digital due diligence dimensions

Source: Own illustration.

and websites of transaction advisory service providers. Highly specific frameworks, e.g., focusing only on SMEs, were excluded. Table 2 lists the seven cross-industry frameworks, each incorporating 3–9 dimensions, that were analysed for the present study. An initial digital DD framework was derived based on the most frequently mentioned dimensions.

A qualitative study was conducted for which a semi-structured interview guideline was developed, pre-tested and used for interviews with six experts. Each expert had considerable business and/or academic experience in DD as well as in digital transformation. Exemplary job de-scriptions are "Head of Corporate Development", "Partner" at a transaction advisory company or a digital consulting company or "Director" at a private equity firm. The interviews were rec-orded, transcribed, and analysed via qualitative data analysis according to Mayring and Fenzl (2022). In summary, the results highlighted the increasing importance of digital DD. Due to time constraints in transactions, the experts advised to have a parsimonious digital DD, i.e., lim-iting the number of dimensions to a maximum of 3–5 KPIs for each dimension. Ultimately, the results of the interviews validated the relevance of the dimensions of the framework.

Table 2: Analysed Digitalisation Frameworks

Author(s)	Name	Number of Dimensions	Source
Back & Berghaus	Digital Maturity model	9	Back and Berghaus (2017)
BCG	BCG Digital Acceleration Index	4	Grebe et al. (2018)
CapGemini	CapGemini Digital Mastery	5	CapGemini (2021)
Deloitte	Deloitte Digital Maturity Model	5	Deloitte (2018)
KPMG	KPMG Business Analytics Digital Readiness	7	KPMG (2021)
PwC	PwC Digital Business Model	6	Geissbauer et al. (2016)
wdp	wdp Digital Due Diligence	3	wdp (2022)

Source: Own illustration.

Additionally, data on the structure of 100 digital DD projects was screened to validate the frequency of the dimensions of the existing models and to further define the specific KPIs. A quantitative online survey with 19 experts was conducted to further validate the relevance of the dimensions and to reduce the complexity, ultimately resulting in a proposed framework for digital DD which encompasses eight dimensions, as shown in figure 1.

In the following, these dimensions will first be discussed and subsequently applied to a case study that focuses on Haniel's acquisition of Emma.

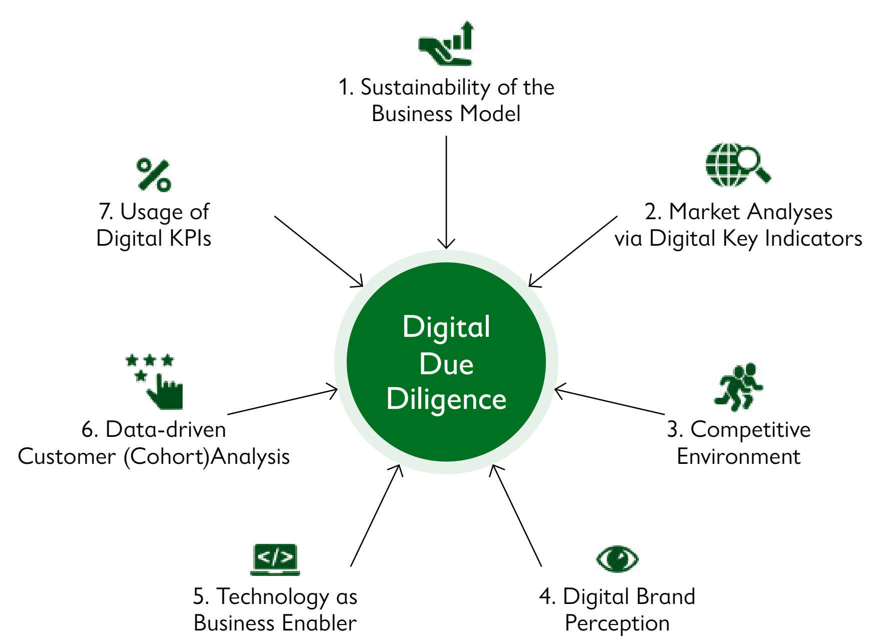
Conceptual Framework for Digital Due Diligence

First, focusing on the *sustainability of the business model*, investors want to assess the resilience of the target company during future growth. Market research insights and trend analyses aim to detect radical changes in the focal markets within the holding period of the asset. The higher the likelihood of changes, the greater the investment risk.

Even without radical changes, a target should show resilience and adaptiveness to market developments. This requires a well designed and executed business strategy with mid- and long-term goals in combination with market observation mechanisms. In digital due diligence, the following criteria are therefore addressed: (I) extent of process digitalisation and automation, (II) digital ecosystem (i.e., the possibility of expanding the product with partners), (III) market development potential, (IV) digital capabilities for being best-in-class, (V) missing digital capabilities compared to competition, and (VI) necessary CAPEX/OPEX investments for closing digitalisation gaps.

Second, *market analyses via digital key indicators* assess market size and growth as crucial factors. Traditional top-down analyses determine the market potential and the market size via existing market research data and forecasts. Target population size and structure as well as relevant competitors are determined. In digital DD, this approach is augmented by examining digital growth opportunities based on the potential expansion of the target's business.

Fig. 1: Conceptual Framework for Digital Due Diligence



Source: Own illustration.

When the total market is growing and more customers are migrating towards digital channels, digital channels will grow faster than the market average. This calls for both the analysis of historic online market penetration and the projection of the digitalisation trend for the upcoming years.

Third, the aspect *competitive environment* focuses on direct and indirect competition. Direct competitors have comparable offerings. Indirect competitors have different offerings but target comparable search engine traffic. Therefore, indirect competition also affects customers' buying behaviour and customer acquisition costs. Considering different local market entry barriers (i.e., country-specific certificates, particular customer demands, etc.) and the different competitive levels they might lead to is also important for digital DD, as startups often seek to expand internationally quickly. Furthermore, there can be very tough digital competitive structures. For instance, Amazon runs a marketplace but also acts as an independent seller on this marketplace. Thus, Amazon can prioritise its own products in customers' search results and strengthen its competitive position.

Consequently, core competitors must be closely analysed. Online visibility (i.e., the SEO Visibility Index that shows the visibility of a website in organic search results), number of ranking keywords, social media presence, sentiment analyses (i.e., recognising sentiment towards a product in texts and commentaries) are important key indicators. The target's market position and potential can be assessed via online channel performance, digital market shares and organic and paid marketing channel development.

Fourth, *digital brand perception* focuses on the impact of digital channels on the target's brand equity. Brand equity is determined by factors such as brand recognition, customer perception, customer loyalty and brand reputation (Swaminathan, 2016). For digital channels, the more known and popular a brand is, the sooner and easier the target can generate organic traffic. This reduces customer acquisition costs due to paid traffic.

Besides brand strength, the target's ability to generate and retain customers via a variety of online channels is assessed. This includes social media channels fitting the brand positioning, utilisation of influencers, organic performance on search engines, paid acquisition channels, and digital sales channels, such as web shops, marketplaces or mobile apps.

The target's resilience is also affected by its brand equity. Search algorithms

Management Summary

Digital markets are based on more complex rules than classic distribution channels. Therefore, companies with a high dependency on digital value creation must conduct their due diligence process by employing additional key figures and evaluation criteria. Haniel, a private equity firm which – following an extensive digital due diligence process – invested in a mattress startup called Emma, serves to illustrate this procedure in practice.

are changing continuously and the role of social media platforms changes over time with different demographic groups. Regulatory actions affect central tracking technologies such as cookies, which allow for user profiling. Many browsers nowadays have built-in anti-tracking tools. Google is a major player enforcing the European General Data Protection Regulation (GDPR). The phasing out of third-party cookies can result in conversion rate decreases of up to 30% (Sambol, 2021 b). Companies with digital business must therefore employ alternative ways of generating user data, such as first-party data, which are obtained via the brand's own channels.

Fifth, *technology as business enabler* focuses on the advantages of IT, which is fundamental for digital business. For instance, nearly 100 percent website uptime, flexible scalability, the security of the IT infrastructure or dynamic real-time pricing are central factors (Iansiti & Lakhani, 2014). For investors, IT capabilities are a central driver of market equity (Demling & Jahn, 2021). However, many companies overestimate their IT capabilities. Thus, digital DD must assess the target's digital maturity carefully.

The IT infrastructure has to be scalable for growth at transparent costs while supporting agile work structures. Therefore, external partners and service providers often deliver best-in-class approaches. For instance, cloud computing as a managed solution is scalable at low initial investment costs.

Leveraging the newest IT also requires clear governance and security rules. User data collection and analysis must adhere to local legislation and requires secure solutions. Digitalised firms extensively use tools for video chats, collaborative project work or shared documents. Defining standard procedures minimises risks while supporting agile work approaches.

Sixth, *data-driven customer (cohort) analysis* focuses on identifying customer value. Some questions for analysing customers are: (I) When does a customer become profitable? (II) How many customers buy repeatedly? (III) How many customers leave? (IV) What is the average number of returns?

The overall goals are minimising customer acquisition costs (CAC) while maximising customer lifetime value (CLV) (Zeithaml et al., 2001). Digital DD should analyse the development of these KPIs and compare them across customer cohorts. Customer cohorts divide the customer base into groups based on the time of their first purchase. Differing behaviour between cohorts can be explained by mixed channels and, more importantly, changes in the user interface impacting the user experience. Precise and continuous optimisation via frequent A/B testing is important for maximising customer equity (Hahn et al., 2020). To collect this data, state-of-the-art business intelligence software, ERP and CRM systems are important.

A central element for increasing CLV are personalised CRM campaigns. In combination with forecasting KPIs, such as digital market growth, future pay-offs of such customer loyalty initiatives in terms of sales growth can be estimated.

Seventh, the *usage of digital KPIs* is a central factor for assessing the target. For digital business there are numerous data points for the evaluation and preparation of forecasts. Up to 100 KPIs may be used to evaluate the efficiency and scalability of digital channels; e.g., the number of website visitors during a given period is an indicator of sales potential. All channels have to be analysed to determine whether customer traffic is generated via paid search, organic search, direct contacts, affiliates, social media or other campaigns (e.g., mail marketing). This helps to assess the customer base and its profitability when combined with conversion rates and the average size of orders.

Eight, *AI readiness* is critical for the value and potential of target businesses. This encompasses processes, products, and people. For instance, process mining tools can optimise workflows to remedy bottlenecks and inefficiencies. Also, AI tools help identify customer satisfaction drivers in order to improve product quality in the product lifecycle. In the digital content industry, AI can

With the right focus on consistent digitalisation within the business model and a well-trained team, an increase of 20 to 30 percent in EBITDA is possible.

automatically tag and categorise stock images, improve search and discovery functionalities, and enable companies to offer more personalisation. However, AI also poses business disruption risks for incumbent companies in industries such as digital marketing, software development or financial services. Companies that fail to embrace AI and to attract talent can be overtaken by AI-savvy competitors with improved efficiency, customer experience or product innovation.

Case Study: Haniel Acquires a Majority of the Sleep-tech Startup Emma

In early April 2020, Franz Haniel & Cie. GmbH (Haniel) acquired 50.1 % of equity in Emma – The Sleep Company (Emma). 24.95 % of the equity remained with the two founders (Wer-zu-Wem, 2019).

The acquisition of Emma by Haniel, a traditional family enterprise, was an investment in a fast-growing startup specialising in online mattress sales. This case study focuses on the digital DD executed by the specialised digital strategy consulting firm OMMAX. The framework developed above was applied to analyse the business data, forecast growth and prepare the transaction. The case study shows the transition from commercial DD to digital DD and highlights specific insights.

Haniel: A Family Enterprise with a Long Tradition

Haniel was established in 1756 and is one of the oldest German family-owned equity companies, headquartered in Duisburg. In 2020, Haniel had around 20'400 employees and achieved sales of EUR 3.1 billion. Currently, Haniel's portfolio encompasses six divisions, which operate independently (Haniel, 2022). Haniel focuses on sustainability goals, communicating their ambition to "exclusively invest in companies that, besides profit expectations for their portfolios, also make a positive contribution to a livable future" (Haniel, 2019). All investments are aligned with the UN sustainability goals (United Nations, 2022).

Emma: A Strongly Growing Sleep-Tech Company

Emma was initially founded as Bettzeit by Dr. Dennis Schmoltzi and Manuel Müller in 2013. Emma develops and sells mattresses and sleep accessories, such as pillows, toppers and bedding, via a direct-to-customer sales model (D2C). It operates mainly online, with more than 350 employees, and is active in 21 countries. Emma quickly became a major market player and reached the break-even point as early as 2017. Its sales grew from EUR 80.5 million in 2018 to more than EUR 405 million in 2020 (Haniel, 2020). It received a Tech5 Award in 2017 and 2018 (Emma, 2022).

Main Propositions

1. Digital markets differ from traditional markets in core mechanisms.
2. Digital due diligence must factor in these differing mechanisms.
3. A parsimonious but powerful digital due diligence framework focuses on seven dimensions.
4. Each dimension focuses on specific areas and KPIs.
5. The diligent analysis of these seven dimensions can substantiate investment decisions in the digital age.

Digital Due Diligence

In 2020, Haniel screened Emma as a target. The market was volatile and entry barriers for mattresses were low. Established offline brands started to compete with digital startups. Therefore, growth projections had to be based on diligent research.

Interestingly, some of Emma's direct competitors were developing negatively. In 2019, the US-based Casper achieved a unicorn valuation of more than USD 1.1 billion. In 2020, the valuation decreased so that Casper had to lower the price per share from initially USD 17–19 to USD 12–13 for its stock market listing (Finanznachrichten, 2020). Berlin-based Muun declared bankruptcy in 2018 and was acquired by the competitor Matrazzo (Voss, 2019). Bett1, an online shop, achieved high brand recognition via TV advertising but struggled to gain market shares.

Thus, Haniel required DD based on the highly competitive market. Data sources involved digital tools (e.g., Google Analytics, Google Keyword Planner, various social media channels), data banks (e.g., OMMAX Business Intelligence Structure, Statista, SEMrush, Sistrix, various link research tools), market studies (e.g., Bed & Mattresses Report, Statista Bedroom Furniture Report), and online sources (e.g., business websites, press articles). Also, internal information of Emma was collected for a period of three years.

Market analyses via digital key indicators. The global market potential for mattresses was estimated to reach EUR 80 billion in 2023. Market growth assumptions showed an annual compound growth rate (CAGR) of ~1 % for the period of 2020 to 2023. The online market share was growing faster: 20 % of mattresses were sold online, with a growth rate of ~10–15 %. Search volume and search terms showed that established brands, like Emma, had a competitive advantage.

Regarding local factors, the British market – in which Emma was strongly established – showed higher growth rates. In Germany, customers rely strongly on certificates, such as those issued by "Stiftung Warentest", where Emma ranked number one in 2019.

Besides the core mattress market volume, the global sleep tech market, which includes sensors and apps, was estimated to reach EUR 520 billion in 2024. As Emma focused on this market, DD factored this in.

Competitive environment. In the mattress market, there are traditional retailers and startups operating a D2C sales model. During the DD, retailers owned ~84% of the market but faced strong competition from startups who offered a more convenient buying experience. The DD assessment showed a strong competitive position for Emma in European markets and potential in the United States. The SEO Visibility Index showed a positive development of Emma in every core market.

Technology as business enabler. Emma showed solid, scalable, and state-of-the-art technical infrastructure and data analytics. The shop system, along with the connected data, warehouse monitoring and tracking system, were set up very efficiently. Along with sophisticated data governance directives, this represented an important factor in the DD.

Data-driven customer (cohort) analysis. Naturally, for mattress sellers it is difficult to establish close customer relationships because customers buy on average only every nine years. However, Emma had promising customer journey forecasts, with several planned projects for multi-channel marketing. With the help of intelligent multi-touch attribution software, Emma could address potential customers cost-efficiently via a broad channel mix. Thus, Emma could scale in a sustainable manner with lower customer acquisition costs than direct competitors.

Usage of digital KPIs. In each of the core markets, central parameters such as website traffic, conversion rate and the number of resulting transactions, had increased continuously over the previous three years. The well-constructed website, clear design, convenient checkout process, and mobile implementation also yielded a good user experience.

Fig. 2: Exemplary Results of Emma Digital Due Diligence

✔ **Market Analyses via Digital Key Indicators**
- Stable market growth that is clearly stronger in the online segment than stationary sales.
- The market for accessories has substantial potential, with Emma already established as a well-known brand.

✔ **Competitive Environment**
- Emma is well positioned, especially locally and in Europe, with further international growth potential.

✔ **Technology as Business Enabler**
- State-of-the-art technical infrastructure and data analytics.

✔ **Data-driven Customer (Cohort) Analysis**
- Effective use of several online channels, both paid and organic.
- Excellent customer feedback and key customer figures.

✔ **Usage of Digital KPIs**
- Positive trend and promising solid future sales growth when looking at KPIs such as website traffic and conversion rate.

The Investment Decision

As figure 2 shows, central factors of the framework were assessed favorably.

Additionally, Emma had better management with fewer investments than its competitors. Also, Emma showed a focus on R&D and optimising supply chain design, allowing it to outperform competitors in terms of cost efficiency.

This led to a positive investment evaluation by Haniel, who planned to focus on strengthening and advancing Emma's international expansion and developing new business areas within the sleep tech category.

Implications

The box "Lessons Learned" shows the implications of this article for investors, managers of targets and consultants in the digital DD process.

The findings of digital DD provide valuable market insights. In contrast to traditional business audits, digital DD considers key digital data, digital market development and online potential. However, digital DD must be carried out with great care and profound expertise of digital strategies and practices, as digital KPIs are not easily interpreted and sometimes misleading. Digital KPIs frequently suffer from strong fluctuations, mutual dependencies and are subject to higher dynamics than traditional business data.

In the illustrated case study, digital DD endorsed the acquisition of Emma by Haniel.

Lessons Learned

1 Investors, consultants and managers should understand the growing importance of digital due diligence.

2 Investors, consultants and managers should know the seven dimensions of digital due diligence.

3 Investors, consultants, and managers should know the key analysis areas within the seven dimensions of digital due diligence.

4 Managers of startups and established companies should assess their own business model with regard to digital due diligence.

5 Consultants should consider developing traditional commercial due diligence towards digital due diligence.

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