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Digitalization and IT Backsourcing: Towards a Transformational Model for the German Automobile Industry

Kerstin Felser and Martin Wynn
School of Business and Technology
University of Gloucestershire
Cheltenham, UK
Email: kerstinfelser@connect.glos.ac.uk
Email: MWynn@glos.ac.uk

Abstract – Many organisations are now confronted with the new phenomenon of digitalization and are faced with the challenge of formulating and implementing a company-wide digital transformation strategy. Digitalization is associated with significant and extremely rapid change, and, in some cases, even the replacement of established business models. In manufacturing companies, this transformation is part of what is often termed Industry 4.0 and, in large companies, where the provision of information technology (IT) has hitherto been outsourced (in whole or in part), the introduction of these new technologies may be the catalyst for IT backsourcing. This entails bringing previously outsourced activities back in-house to regain ownership and control, in order to be more flexible and respond more effectively to rapidly changing demands. This study reviews the extant literature to assess existing thinking on the motivation for backsourcing, and then examines the potential role of digitalization in driving IT backsourcing in the German automotive industry. A provisional conceptual framework for subsequent research is put forward, using a knowledge-based view of the firm. The study is in its initial stages, but the model is being developed through more in-depth interviews to provide operational guidance for practitioners and subsequent research studies.

Keywords – Backsourcing; digitalization; digital transformation; German automotive industry; conceptual model.

I. INTRODUCTION

A company's IT management must constantly review how it can deliver its services most effectively and efficiently [1]. This includes an on-going assessment of whether IT services are provided by the company's own resources or whether external resources are used. In the latter case, an outsourcing decision is made and a company delegates all or part of its IT services through contractual outsourcing agreements to one or more external vendor [2]. Many different forms of IT outsourcing have emerged, all associated with expectations that the company can better concentrate on its core business, focus on innovation, reduce costs and increase the effectiveness of IT services [3].

As and when such outsourcing agreements expire or the activity is reviewed, the decision has to be made as to whether to continue the agreement, to switch to another vendor, or to backsource the activities. Backsourcing is generally defined as bringing previously outsourced activities back in-house [4]. This definition also implies that the decision on backsourcing

was taken after considering the possibility of renewing or renegotiating the existing contract or switching the vendor [5].

Significant change in the external technology environment - such as digitalization and new automation technologies - can be the catalyst for IT backsourcing. The German automotive industry is the most affected of all industries by digitalization in the German economy [6], and has been chosen as the business environment within which to undertake this research. The aim of the study is to assess current understanding of IT backsourcing and determine what impact digitalization may have in the German automotive industry regarding IT backsourcing. The study explores a relatively unknown field and will contribute to both research and practice, providing new knowledge for researchers and operational guidance for practitioners.

This article has five sections. Following this Introduction, Section 2 looks at the main concepts under study, briefly discusses relevant background issues and sets out three main research questions. Section 3 then outlines the research methodology, which to date has comprised a systematic literature review. Section 4 addresses the three research questions and makes an initial attempt to establish a conceptual framework for the continuation of the research project. Finally, Section 5 provides a summary of the ground covered in the paper to date.

II. BACKGROUND & CONCEPT DEFINITIONS

It is useful to first establish an understanding of the terminology and definitions associated with this study, as certain terms are not used in a consistent way. This applies above all to the terms "IT Backsourcing" and "Digitalization". Backsourcing is one part of the IT-sourcing cycle which can be summarized as "insourcing + outsourcing – outsourcing = backsourcing" [7]. Backsourcing has been defined by Lacity and Willcocks [4] as bringing previously outsourced activities back in-house. "Insourcing" is sometimes used as a general term for performing activities in-house and the literature does not distinguish between insourcing and backsourcing [8]. Many different forms of IT outsourcing have emerged, which can be combined in many ways and lead to a high degree of complexity, there being many possible dimensions to the outsourcing process. The same variety and complexity also applies to backsourcing.

Terms, such as backshoring, reshoring, onshoring or relocating, are sometimes used synonymously with back sourcing. However, Nujen et al. [9] underlined that these terms imply a change in location and, therefore, back sourcing is the only term that determines a change in ownership. A distinction can also be made between total and selective outsourcing/back sourcing. Lacity and Hirschheim [10] defined total outsourcing as being when more than 80% of IT budgets are outsourced to an external provider. Similarly, total insourcing occurs when more than 80% of the IT budget remains within the company. Finally, selective sourcing describes a degree of outsourcing of between 20% and 80% of the IT budget. Selective outsourcing has been the most popular and the most successful outsourcing strategy [11]. This study applies the same definitions to back sourcing, which can be both the back sourcing of a single IT service, such as a datacenter, or a bundle of applications, and the partial or complete back sourcing, where a company rebuilds the previously outsourced IT organization.

There is some overlap in the literature of the terms “digitization”, “digitalization” and “digital transformation”. Digitization is a more technical interpretation and refers to the conversion of information from an analog to a digital storage medium [12]. It also equates to the transfer of tasks to the computer that were previously performed by humans. Thus, digitization also refers to a special form of automation. The focus is on digital technologies, for which the term “SMACIT” (social, mobile, analytics, cloud, and Internet of Things) has been coined [13]. This has been widened by some authors to also encompass Big Data, artificial intelligence, digital twin, 3-D-Printing, augmented and virtual reality, and robotics. Many of the technologies mentioned are not new or revolutionary on their own. Rather, their innovative potential stems from their significantly enhanced efficiencies, their intensive networking possibilities and their increasingly widespread use [14].

The term digitalization is more broadly defined and is intended to express the fact that digitalization now affects all economic and social areas [12]. Riedl et al. [15] define digitalization as “the process of introducing digital technologies, which essentially deal with changes caused by information technologies”. Koch, Ahlemann and Urbach [16] define four conditions for this. First, the technologies used do not have to be new, rather the newness is created in the context of business and value creation models; second, digitalization is data-driven and is based on an increased generation, processing and analysis of often new types of data; third, digitalization means that the character of the value added or the business model changes significantly as a result; and fourth, that there is an association with a clear strategic dimension, as companies expect competitive advantages from it.

Digital transformation is a result of digitalization and describes the development steps towards new, disruptive business and value creation models [17]. For Singh and Hess [18], this requires a company-wide digital transformation strategy to guide a company through the transformation process. However, there is no uniform definition of this term to date. Vial [19] reviewed 282 digital transformation related

academic publications and found 23 different definitions. Based on the existing definitions, he developed a conceptual definition of digital transformation as “a process that aims to improve an entity by triggering significant changes to its properties through combinations of information, computing, communication, and connectivity technologies” [19].

Industry 4.0 can be viewed as part of digitalization, encompassing the entry of complex digital technologies and architectures into manufacturing processes. A generally accepted definition has not yet been established in the literature, but the definition of Roth [20] is used in the context of this research. “Industry 4.0 comprises the networking of all human and machine actors along the entire value chain as well as the digitalization and real-time evaluation of all relevant information with the aim of making processes and value creation more transparent and efficient in order to optimize customer benefits with intelligent processes and services.” Industry 4.0 is also sometimes called the “fourth industrial revolution” or Industrial Internet of Things (IIoT), where the focus is on the strong integration of Internet-based information and communication technology (cyber-physical systems) into industrial processes [20].

Industry 4.0 has its roots in the concept of the Smart Factory and this is viewed as the starting point and main purpose of Industry 4.0 [21]. People, machines and products to be manufactured are connected in a network. The aim of this network is to achieve the overall optimization of quality, lead time and utilization of resources. It is considered a decisive innovation that all data are available in real time, providing a permanently up-to-date, virtual image of reality which allows complex manufacturing processes to be better controlled [21]. The Smart Factory represents an adaptable system in which flexible production lines automatically adjust their processes to different types of products and changing conditions [22].

In recent years, digitalization has become one of the most important topics in social, scientific and economic life [12]. Digital technologies are regarded as major technical changes or breakthroughs and the associated digital transformation is seen as a driver for significant and extremely rapid change, in some cases even leading to the replacement of established business models [23]. The term “transformation” reflects the variety and complexity of the measures that may need to be taken when companies are confronted with these new and disruptive technologies [18]. Some companies may see this as requiring a company-wide digital transformation strategy, which can encompass all business areas as well as products, processes and organizational structures.

If pre-existing IT strategy is aligned with the business, IT can be seen as an enabler for digital transformation [24]. Companies may review their IT sourcing strategies and governance models and consider alternatives for existing outsourcing arrangements [25]. This in turn may lead to a move towards IT back sourcing. Many companies have already established innovation labs, digital factories or technology accelerators in recent years in order to keep up with the increased demands of digitalization [26]. Volkswagen, for example, strengthened its IT department

with 1,000 new IT employees from various disciplines [27]. At Daimler, too, there are signs of a part move away from the IT sourcing strategy that has been pursued for years, aimed at increasing its own contribution to IT from 25% to 35% [28].

The significance of digitalization as a factor in the back-sourcing of IT provisions has received little attention in the scientific literature so far. In contrast to insourcing and outsourcing, IT back-sourcing generally lacks scientific studies [29]. The literature that does exist deals mainly with the reasons and decision-making processes for IT back-sourcing in relation to contract problems that have led to failure [30]. Internal or external organizational changes are only explained using individual examples of high profile / large-scale events, which have received press attention but cannot support generalization [31].

The German automotive industry consists of the Original Equipment Manufacturers (OEMs) and a three-tier supplier network. The industry is facing serious external organizational changes, which are leading to four megatrends in the automotive industry: Connectivity, Autonomous Driving, Shared & Services, Electric [32], for which the acronym C.A.S.E. is often used.

Each of the C.A.S.E. elements has the power to radically change the industry and undermine existing business models. The challenge will be to combine them in a way that delivers a comprehensive and seamless package to the customer. Digitalization and Industry 4.0 and the associated connection of the physical with the digital world, as well as the networking of the entire value chain, are the drivers of this change [33].

Digitalization and digital transformation affect all areas of a company. The aim of the study is to analyze to what extent digitalization has influenced the German automotive industry's strategy regarding IT back-sourcing and provide new insights concerning the decision making and values created by IT back-sourcing. The current study addresses three Research Questions (RQs):

RQ 1: What does the extant literature reveal regarding current thinking on the rationale for IT back-sourcing?

RQ 2: To what extent has digitalization influenced the German automotive industry's strategy regarding IT back-sourcing and what are its potential benefits?

RQ 3: How can an operational framework be developed and applied to aid practitioners in back-sourcing IT in the German automotive industry?

This article presents initial findings from the study that are now being pursued through in-depth interviews with industry practitioners. In general, current evidence for IT back-sourcing, as presented in the existing literature, brings only partial answers the research questions of this study.

III. RESEARCH METHODOLOGY

To date, a systematic literature review has been undertaken. The search for existing and relevant literature was carried out in three stages. As the selection of search terms (keywords) has a significant impact on the search results [34], an initial exploratory search was undertaken in April 2019 in order to ascertain key terminologies and concepts used in the

literature. A combination of keywords was used in the search string when identifying relevant literature.

A second systematic search was carried out in May 2019 using complex combinations of keywords, and a third search was undertaken in July/August 2019, after reformulating the research questions. Keyword searches were conducted in the Science Direct, IEEEExplore, Business Source Complete (EBSCO), AIS Electronic Library and Google Scholar databases, restricting the publication dates to be within the year 2008 and after, because the topic of digitalization was not a current issue before 2008.

A practical screening was performed [35], and after deleting duplications and separating all non-relevant ones, 22 publications were selected. Backward and forward searches based on references and authors were performed to uncover seminal publications on the subject of IT back-sourcing [36]. The backward search showed no further results. The forward search resulted in 5 more articles from Sage journals, SpringerLink, Emerald insight and Researchgate. Of the 27 articles in total, 13 are peer reviewed. Practice-oriented publications such as the frequently published magazines MIT-Technology report, CIO magazine or reports from the Association of German Automobile Manufacturers (VDA) as well as from international IT consulting and supplier organizations were also reviewed.

IV. PRELIMINARY FINDINGS

RQ1: What does the current literature reveal regarding current thinking on the rationale for IT back-sourcing?

The reasons for individual back-sourcing decisions are a focus in both the academic and practitioner literature. The practitioner literature highlights cost savings, quality improvements, and increase in control and flexibility as the three most important reasons [37]. The academic literature looks at a broader picture and distinguishes between the three important categories: contract problems, internal organizational changes and external environmental changes, to which individual reasons are assigned [2]. Contract problems emerges as the main reason for back-sourcing until now (Table I).

As regards contract problems, one of the main motivators for back-sourcing is dissatisfaction with the quality of services provided by the vendor. Moe et al. [38] state a lack of communication between client and vendor, the inability to provide the necessary knowledge and skilled resources, a high turnover of employees on the vendor side and cultural problems such as different understandings of responsiveness and punctuality. Gorla and Lau [39] have analyzed how negative experiences in outsourcing affect future outsourcing decisions. They conclude that competence and coordination problems with the vendor have a stronger influence on back-sourcing and future outsourcing decisions than unexpected costs. According to Kotlarsky and Bogner [40] low service quality is typically linked to poor responsiveness or a lack of professionalism on the vendor's side. The relationship between client and vendor, as well as trust, also plays a significant role in either changing vendors or taking back-sourcing into account [41]. The gap between expected and actual cost reductions through outsourcing is another

important driver for back-sourcing. As Kotlarsky and Bognar [40] point out, cost savings through outsourcing tend to be overestimated and hidden costs such as transition costs, rising wages in the outsourcing destination country or staff turnover are not sufficiently taken into account. Another critical factor is losing control over the vendor's activities or over certain functions [8]. This can be risky if security or intellectual capital is involved, or if it turns out that outsourced systems have a strategic value.

Kotlarsky and Bognar [40] stated that a knowledge mismatch is one reason for loss of control if the vendor knows more about the systems than the client does or the vendor only barely understands the client's business. One more factor for back-sourcing is when the vendor does not respond to the latest technologies which deliver the best value to the customer [42]. Losing control also leads to limited flexibility for the client compared to in-house operations [43]. Benaroch et al. [44] contend that in times of increased demand uncertainty, there is a tendency among clients towards back-sourcing or insourcing decisions, as opposed to vendors' view that these situations would be motivators for outsourcing. They also claim that companies would prefer the flexibility of contracts in increased demand uncertainty, e.g. the possibility to pay a lump sum as a penalty to ease back-sourcing. However, without the flexibility built into the original outsourcing contract, the probability of back-sourcing is limited.

The most recent studies show, however, that contract problems and the resulting operational difficulties are no longer major drivers of back-sourcing. Könnig, Westner and Strahinger [31] analyzed over 1,000 sourcing deals in Austria, Switzerland and Germany between 2006 and 2017 and show that the companies are able to manage a large number of IT vendors. They also mention that companies use international sourcing consultancies (e.g. ISG, Accenture, BCG, Deloitte, KPMH, PwC) to design tenders and contracts, support the transition process, the provision of global delivery models and advise on the processes for the constant monitoring of the various vendors and services. A review of the German automotive industry shows that, on the one hand, the depth of service in the in-house provision of IT services is generally between 20% and 30% of the overall IT budget [28], while at the same time companies have employed thousands of IT employees worldwide [45]. These IT organizations have also developed and implemented comprehensive process models to minimize contractual and operational risks in outsourcing [46]. However, Solli-Saether and Gottschalk [47] refer to the Sourcing Circle and the stages-of-growth model to determine whether a formerly in-house function has a higher degree of maturity when it comes back after years of outsourcing. They argue that the outsourcing phase is not a waste of time, "it is not a return to the beginning, but something that has been altered" [47].

The literature on internal organizational factors for IT back-sourcing focuses on the discussion of strategic reorientation in the company, the intensive debate about the value of IT and internal power-political behaviour, which are more subjective and therefore more difficult to assess [48]. In this context, the role of IT and the sourcing strategy of IT are repeatedly reassessed. According to Butler [48], the proper

alignment between business and IT strategy is the link to re-position IT from commodity to IT as strategic and leads to appropriate back-sourcing decisions. He also points out that not all IT functions are core business or non-core business, but the challenge is to categorize IT functions as either commodity or strategic in order to adjust the IT sourcing strategy. Qu, Oh and Pinsonneault [49] also emphasize that companies should make more efforts to assess the strategic value of IT, rather than considering IT as a non-core activity. Benaroch et al. [50] add that strategic considerations play an important role in transaction- and information-intensive processes with volatile demand and that back-sourcing increases the capabilities for innovation and competitive advantages.

Thakur-Wernz [51] combined the two theoretical lenses - Transaction Cost Economics (TCE) and Resource Based View (RBV) - and concluded that companies decide back-sourcing for two reasons: short-run total costs and internal capabilities. She contradicts earlier research, which assumes that costs and capabilities play a complementary role and are intertwined, especially in the long run. Based on a back-sourcing topology, however, Thakur Wernz [51] claims that costs and capabilities are independent of each other, especially in the short-term. The reason for this assumption is that companies would not be in a position to change or expand their capabilities at short notice. She concludes that companies are less likely to undertake back-sourcing when the total short-term costs of back-sourcing are higher, and more likely to go for back-sourcing when internal reintegration capabilities are higher.

Oshri et al. [52] stated that dissatisfaction with an outsourcing agreement is an even stronger driver for back-sourcing decisions than cost considerations. They used the behavioral theory as a lens, which is based on realistic assumptions about human cognition and relationships. The theory suggests that decision making in companies is characterized by the limited rationality and organizational politics of decision makers. The assumption is that problem-driven managers tend to make irrational decisions rather than based on a systematic assessment of long-term opportunities and risks. The transition from outsourcing and especially from offshoring to back-sourcing means a radical change of strategy with significant economic consequences. Those responsible would do well to first consider a detailed feasibility study.

Qu et al. [49] postulate, from the knowledge-based view, that IT back-sourcing would create value and competitive advantage. Best practice processes require the integration of IT and business knowledge and this interaction increases the alignment between IT and business objectives. Shared knowledge and smooth coordination between IT and business is not a commodity, which can be bought on the market. This in-house knowledge only evolves over many years and is part of the corporate culture.

External environmental changes such as economic cycles with volatile demand, financial crises, changes in the structure of the industry that redefine the overall business strategy of the company are identified by some authors as the catalyst for back-sourcing [52]-[54]. Regarding mergers and acquisitions, several authors cited the example of how JP Morgan Chase

terminated its large-scale outsourcing contracts after the merger with Bank One or Bank of Scotland merged with or Halifax Building Society because the mergers gave rise to new internal capabilities to provide in-house IT services more effectively. In addition, changes on the vendor side are triggers for back-sourcing, when the vendor redefines its business strategies or its organizational structure, which is often the result of mergers and acquisitions between vendors. German companies have been affected by the wave of concentration on the vendor side, which can also be assumed as a reason for back-sourcing.

Thakur-Wernz [51] refers to the bandwagon effect mentioned by Lacity and Hirschheim [10]. Outsourcing was widespread, many companies did it and therefore more companies followed suit. There was significant increased risk that the outsourcing decision was not adequately researched and assessed, and back-sourcing is the correction of outsourcing failures. Ironically, the bandwagon effect could now also happen with back-sourcing. Finally, and most significantly for this study, Wong [43] and Von Bary [55] state that new and disruptive technologies, lead to a repositioning of the value of IT and trigger back-sourcing decisions.

TABLE I. SUMMARY OF REASONS FOR IT BACKSOURCING BASED ON LITERATURE REVIEW

Contract Problems: Outsourcing agreement did not meet expectations
<ul style="list-style-type: none"> • Higher than expected costs • Poor service quality • Poor transition planning • Loss of control over the core business • Loss of flexibility • No benefits from outsourcing • Disagreement with vendor • Loss of know-how • Incompetence of the vendor (e.g. missing innovations on the vendor side hinders the client's business success)
Internal Organizational Changes
<ul style="list-style-type: none"> • New or changed executive management • Structural changes in the company (e.g. new business line, new corporate entity) • New business strategies • Recognition of IT as business enabler • New/changed importance of outsourced activities • Changes in IT strategy due to mergers and acquisitions • Power and politics
External Environmental Changes
<ul style="list-style-type: none"> • Changes in the environment of the company • Economic cycles • Bandwagon effect • Changes in vendor organization • Technology changes ("break-through" technologies)

RQ2: To what extent has digitalization influenced the German automotive industry's strategy regarding IT back-sourcing and what are its potential benefits?

Germany is the second largest outsourcing market in the western world [56] but is under-represented in the academic literature, although online sources provide evidence of a number of failures in large outsourcing deals in German industry. In addition, digital technologies are regarded as major technological changes, and the associated digital transformation is seen as potentially leading in some cases to the replacement of established business models. The German automotive industry as a manufacturing industry and the most important German industrial sector is particularly affected by these changes. New digital business models are becoming the starting point for the future competitiveness of the German automotive industry on the world market [57]. According to Veltri et al. [2] and others, external environmental changes are seen as motivators for IT back-sourcing because the core competencies of a company need to be redefined. These dependencies and effects have not yet been specifically investigated by researchers using the example of an entire industry in Germany.

Researchers have applied various theories, such as TCE, RBV or Knowledge-Based View (KBV), to explain and demonstrate the benefits of IT back-sourcing. However, there is some debate concerning the extent to which these theories are useful in evaluating IT back-sourcing decisions and providing practical guidance. According to Wernerfelt [58] and Barney [59], the RBV considers an organization from the inside and the central thesis of the RBV is that companies generate sustainable competitive advantage by introducing strategies that exploit their internal strengths. The RBV was later enhanced by contributions from various authors to the KBV and it has been argued that competitive advantages are achieved not only on the basis of physical or financial resources, but also through knowledge-based capabilities [60]. Teece, Pisano and Shuen [61] published the theory of Dynamic Capabilities (DC) in 1997, which extends the internal view to the market and defined the DC as "the firm's ability to integrate, build, and reconfigure internal and external competences to address rapidly changing environments" (p. 516).

According to Teece, Pisano and Shuen [61] markets can be divided into moderate and highly dynamic markets. Moderate dynamic markets are characterized by continuous changes. These are relatively easy to predict. Moderate markets are transparent and stable. Resources, organizations and processes are generally based on existing skills, knowledge and abilities. Highly dynamic markets, on the other hand, are characterized by rapid changes, have unstable structures and the resources of a company are based less on existing skills than on situation-specific knowledge, skills and abilities that can be quickly developed and newly created. The static approach of the RBV is not suitable for this field of operation [62]. The RBV would only apply to firms in predictable environments.

Since the German automotive industry is in a highly dynamic market because of the digital transformation, the theories applied to answer the question of whether IT

backsourcing contributes to a sustainable competitive advantage or not should be extended to include the DC approach. A review of the existing literature shows that there is no analysis and evaluation with the DC theory on IT backsourcing.

Previous research on IT backsourcing deals with IT technology and IT systems in general. In the context of the strategic alignment between business and IT, there is a need to examine which outsourced IT functions, technologies or applications are brought back in-house, particularly against the background of digital transformation, in order to achieve sustainable competitive advantages. There is clearly a link to the core production process as many manufacturing companies have outsourced parts of their production, especially to offshore locations such as China. It is to be expected that digitalization and Industry 4.0 will lead to backsourcing of production to some extent [63]. The new technologies provide opportunities for production to be more flexibly and cost-effectively re-located in the home country again because the cost advantages that originally resulted in offshoring can be neutralized and, secondly, the application of Industry 4.0 technologies then increase flexibility in the production process. This would also have implications on outsourced IT services for manufacturing processes. Backsourcing does not necessarily mean that the affected functions and capacities are locally returned to the headquarters of the mother organization. The German automotive industry has worldwide access to resources and know-how and has the opportunity to network resources and knowledge with modern forms of agile cooperation [27].

RQ3: How can an operational framework be developed and applied to aid practitioners in backsourcing IT in the German automotive industry?

The existing literature partly shows in individual case studies the challenges of knowledge transfer during outsourcing and provides overviews of the requirements for knowledge re-integration during backsourcing or switching vendors. An overall framework that offers guidance to practitioners involved in backsourcing in the German automotive industry is missing.

The proposed conceptual framework (Figure 1) represents the theoretical basis for answering the research questions in this study. It uses the theory of dynamic capabilities to investigate the value of IT backsourcing. The concept of dynamic capabilities can be divided into the ability to identify and shape opportunities and threats, the ability to seize opportunities and the ability to maintain competitiveness by improving, combining, protecting and reconfiguring the assets of the business [64]. Therefore, sensing, seizing, reconfiguring and transforming are the main components of dynamic capabilities. This theory is combined with the knowledge-based view of the firm, since it is assumed that digital transformation requires significant change in the knowledge-base of the company to increase its innovative

capacity [65]. However, in combining these theoretical perspectives, three main dimensions of change relating to the new digital technologies, the change in processes relating to IT backsourcing and the necessary enhancement of people skills and capabilities will be used as an operational model to identify critical success factors and a staged action plan to achieve competitive advantage from the backsourcing process. This aligns with other studies of change and innovation relating to the introduction of new technologies into organizations [66]. IT backsourcing may thus be viewed as a strategic decision of a company to respond to the rapidly changing external environment and provide a source of sustainable competitive advantage. This is especially the case when this enables important innovation, increases flexibility to respond very effectively to new business requirements, introduces emerging technologies to achieve new capabilities and facilitates the rapid placement of new digital business models, products or services in the marketplace.

The knowledge-based view has received a great deal of interest in the literature because it recognizes the fundamental economic changes that have resulted from the accumulation and availability of knowledge over the last two decades [67]. The economy has undergone a structural change in the productive paradigm. The transition from production to service in most developed economies is based on the manipulation of information and not on the use of physical products [68]. Knowledge has become one of the most important assets for creating a sustainable competitive advantage [69].

This trend becomes even more pronounced with digitalization. The digital future means everything is expressed in terms of data. A central element of digitalization and of Industry 4.0 is the generation of huge amounts of data with cyber-physical systems and the storage and linking with technologies such as Big Data. However, data itself are of little value. The data from many different sources are only transformed into valuable information through comprehensive analyzes and correlations to become a strategic value. Therefore, what matters is the management of information and the intelligent usage of this information for new business models and processes, interlinking the company with its ecosystems, for cognitive solutions, virtual reality, predictions and robotics. New core competencies and unique knowledge becomes the critical success factor.

The conceptual framework and underlying philosophy of the study is therefore based on the author's belief that the digital transformation of a company is an eminently knowledge-based issue. The theory of the knowledge-based view of the firm assumes that a company exists because it has advantages in the market through the generation of knowledge and innovations [70]. In addition to the dynamic capabilities, in responding to changes in the external environment, knowledge is also a key resource for achieving sustainable competitive advantage.

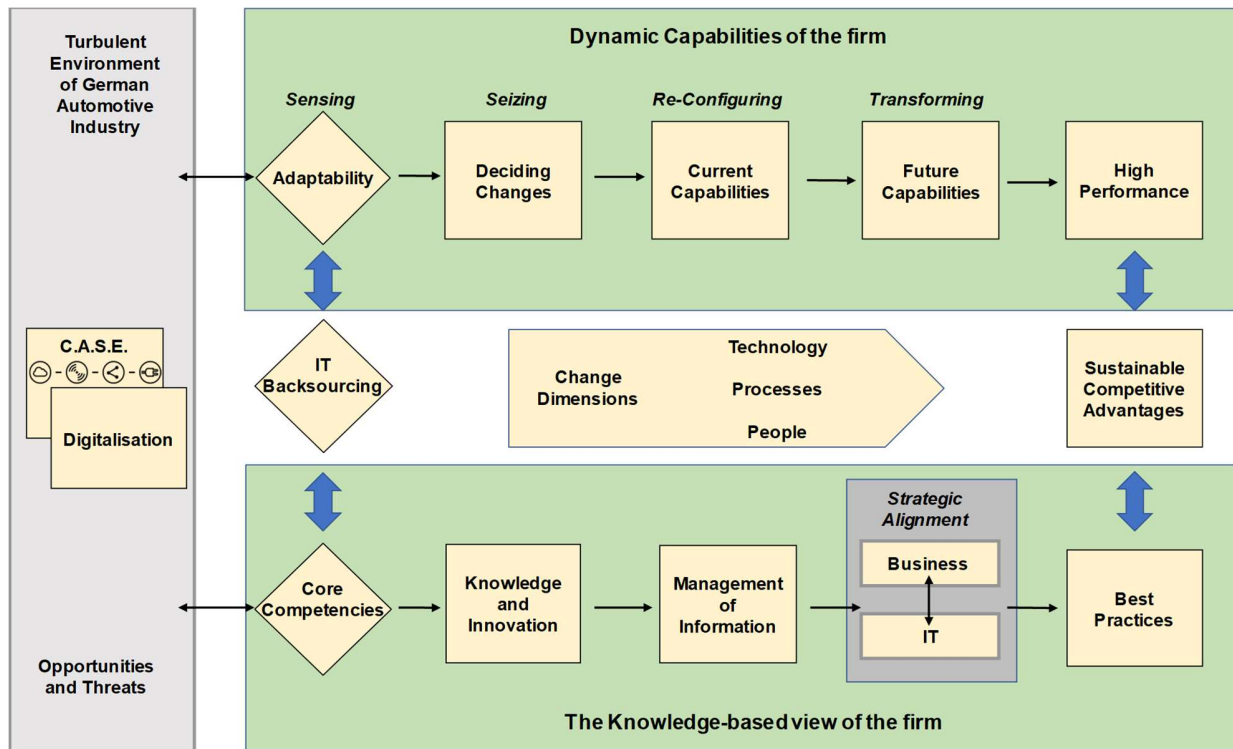


Figure 1. Provisional Conceptual Framework

As outlined above, the provisional conceptual framework (Figure 1) constitutes an initial model for addressing the research questions and provides the basis for discussion in expert interviews. Interview findings will help determine if digitization is encouraging IT backsourcing, and to what extent this can be seen as a source of competitive advantage. Any such correlations and conclusions will need to take account of other influencing entrepreneurial factors. The underlying logic is that digitalization leads to extremely rapid change, in some cases even the replacement of established business models. The German automotive industry must demonstrate appropriate capabilities in two directions. They must have dynamic capabilities to react flexibly to the accelerating changes in the external environment. At the same time, they must have the internal capabilities in terms of resources and knowledge in order to drive and support the necessary innovation. This can provide the basis for a company-wide digital transformation strategy, encompassing possible repositioning in the marketplace, reworking of sourcing agreements, and implementation of necessary change in terms of technologies, processes and people competencies.

V. CONCLUSION

The literature review indicated that there are three main motivations for IT backsourcing: unsolvable contractual problems, internal organizational changes and external

environmental changes, with the advent of digitalization being a potentially significant driver in future in the last named category. Digitalization has the potential for new, disruptive business and value models and requires companies to shape the digital transformation process.

In particular, the German automotive industry is affected by four megatrends due to serious external changes, for which digitalization is one of the main triggers. Given these developments, and drawing on a combination of existing theories, a provisional conceptual framework was devised to determine the context in which IT backsourcing should be seen, and which will now be applied to identify critical success factors and key actions for the successful adoption of a backsourcing strategy.

IT backsourcing arguably creates better conditions for the interaction between IT and business and for sharing and integrating IT and business knowledge, which can underpin the adoption of best practice [49]. Through IT backsourcing, mission critical knowledge can be brought back in-house; the protection of intellectual property and security issues are taking on a new significance in the context of digitalization and may be seen as driving IT backsourcing.

The contribution of this research to theory has several aspects. First, it will provide an informed view on whether digitalization is encouraging IT backsourcing – currently a gap in the extant literature. Second, it will explore and explain how companies in the German automotive industry justify decisions for IT backsourcing within the framework

of a company-wide digital transformation strategy. This will allow key issues regarding IT back-sourcing to surface - for example, the need to develop dynamic capabilities and redefine core competencies in order to achieve sustainable competitive advantages in the so-called digital age. Research results will also establish the methods used by companies to forge a strategic link between digitalization and IT back-sourcing and to determine the resulting value.

In terms of contribution to practice, the project aims to provide decision makers with operational guidance to assess the scenarios of IT back-sourcing as part of a digital transformation strategy. This will improve knowledge for practitioners about the various factors to be considered for identifying the strategic value contribution of IT back-sourcing. The study will provide illustrative examples of the practices, procedures and organizational change needed for re-establishing IT services in-house. Finally, an operational framework and associated strategy checklist will provide practitioners with the tools to assess the impact of IT back-sourcing decisions on the overall performance of a company, and guide priority-settings for IT back-sourcing projects as an enabler for digitalization.

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