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Extending the understanding of Firm Performance of Algorithmic Personalization

Comment: This text is a raw material containing thoughts, ideas, and interesting areas that I am currently investigating to later input into an article or a section of my thesis. I am interested in learning more about contemporary research using IT-business alignment and firm performance as concepts for studying analytics and wish to discuss the theoretical underpinnings of such research.

My thesis explores the topic of algorithmic personalization and its contribution to business value. The motivation of the thesis is to understand if, how and in what ways the application of analytics for personalization within firms leads to improved performance. The thesis is placed in the intersection of technology and business value and the emphasis is on the performance in economic terms. The purpose of the thesis is to deepen and nuance the understanding of how analytics can generate value for firms.

Algorithmic personalization is the use of algorithms and data to tailor something for each individual user. The context of study is digital firms with consumer-facing operations, meaning that the 'individual' is a user or a customer and the 'something' is a product or service offered by the firm. A common tool to personalize is using a recommender system (RS) which is the primary approach studied in the thesis. RS have historically been phrased as supporting users to find the right items. Moving from a customer to a firm focus we shift to understanding recommender systems as selling the right item to the right customer to achieve certain firm goals. This shifts the way to think about RS from a productivity tool assuming efficiency improvements, to viewing RS as a resource for increasing performance (Melville et al., 2004) and more critically assessing the efficiency improvements.

The thesis is exploring the business value as performance in economic terms on organization level, referred to as firm performance. The starting point is the discussion about strategic alignment, or IT-business alignment, originating from the 1990s (Coltman et al., 2015). Research on alignment has historically had a static perspective on alignment, where focus has been on how to be aligned or to what degree the IT strategy and the business strategy are aligned (Luftman et al., 2017). Today, the alignment construct is seen as dynamic and researchers are investigating what alignment, as a dynamic process, means for the firm. (Luftman et al., 2017)

The alignment itself is interesting in relation to the firm performance it generates. The firm is seen to have a set of resources or capabilities to leverage and arrange to generate firm performance. Alignment of analytics capabilities is a strategic capability itself (Akter et al., 2016).

Analytics and firm performance

Analytics in many forms is assumed and often shown to generate value for the firm. Applying machine learning algorithms has generated impressive results given that selected metrics and datasets are used. However, for meaningful scientific contribution beyond isolated business practice the external validity of performance gains in analytics systems research must be considered. (Janiesch et al., 2022) By focusing less on the specific technology and the detailed input itself, and more on the holistic, firm perspective, conclusions on the relevance of algorithmic personalization for business value can be drawn.

A literature review conducted as part of this thesis has identified a research gap in the lack of studies on cost aspects connected to the business value of RS. Previous research has focused on the customer loyalty, the income through sales volume and sales distribution, and partly on profits. Several possible cost measures for analytics connection to firm performance are suggested in the literature, e.g., operating expenses, distribution cost, inventory cost, staff cost (Aydiner et al., 2019; Whitelock, 2018). The research will contribute to detailing the cost aspects which is needed to theorize about the firm performance of algorithmic personalization at large.

Adoption of business analytics is impacting firm performance through the business process performance (Aydiner et al., 2019) and social factors as human resource, management capabilities and organizational culture are also impacting the business value (Oesterreich et al., 2022). To understand firm performance the business processes and its connection to operational performance as well as financial performance will be considered.

Strategic alignment of IT

Strategic alignment of IT originates from the 1990s. When firms started to use information technology (IT) in the business functions and not only as administrative support, the need to strategically manage the IT resources became evident (Henderson & Venkatraman, 1993). The alignment can be explained as 'the degree to which the business strategy and plans, and the IT strategy and plans, complement each other' (Chan & Reich, 2007, p. 300).

IT started to be used for strategic outlooks and shape new ways of doing business. This raised questions around *What are the implications of IT in the operations? What is the role of management for leveraging IT capabilities? How should IT be organized?* (Henderson & Venkatraman, 1993). Strategic alignment, more recently also known as IT-business alignment, offered a way to think about IT as a resource to complement and drive the business' strategy. The underlying assumption of IT-business alignment is that misalignment or a low IT-business strategy 'fit' will impact the firm performance negatively (add reference).

The investments made in IT were filled with hopes on return on investments from managers, and it was searched for by researchers. While some concerns were raised about a productivity paradox (Brynjolfsson, 1993), it was later established that alignment of IT with business strategy have a positive impact on firm performance (Gerow et al., 2014; Gerow et al., 2015). The increased productivity growth was found when primarily adjusting for lead times before effects were visible (add source).

During the first 25 years, most research assumed alignment as a static construct, to be aligned. In contemporary research the alignment is seen as a dynamic process. It is the managerial behaviors and coordination 'harmonizing' the activities across business and IT domains to create business value (Luftman et al., 2017).

The increased focus on digital strategy raises the question of what it means to be aligned for digital businesses, where analytics is often used in products and services (Coltman et al., 2015). In the literature it is questioned if IT strategy and business strategy are two separate things or the same in digital businesses (add source).

The IT alignment construct

The alignment construct can be conceptualized as either assessing what firms intend to do (strategic plan) or what they actually do (realized strategy) (Coltman et al., 2015). The first conceptualization gives IT the role as supporter and sometimes a 'must have' of current strategy, as detailing IT applications needed to support actual business strategies. The second conceptualization assesses the first-order effects of IT in the business process. Given the firms' different strategies the emphasize of alignment can be in the supplier relation and production, or in the marketing, sales, and customer relations. (Tallon, 2008) The alignment construct is hence multi-dimensional in level of analysis (from firm to process or task) as well as in focus (planned versus realized strategy) (Coltman et al., 2015).

Operationalization of the Alignment construct

The alignment construct is an abstract construct that must be operationalized to be studies. Venkatraman (1989) offer several possibilities for operationalization. Using gestalts provide a multivariate perspective on fit/alignment (Venkatraman, 1989). The gestalts can be seen as clusters of attributes representing different sets of relationships that are 'in balance'. In the organizational design, several states of the variables can be feasible but have widely different implications on the organization. (Venkatraman, 1989) *[to be expanded]*

Resources and capabilities

Big data analytics capability (BDAC) consists of three capability dimensions, the management of analytics, the infrastructure of analytics, and the talent related to analytics (Akter et al 2016).

Kiron et al. (2014) define big data analytics capabilities as "the competence to provide business insights using data management, infrastructure (technology) and talent (personel) capability too transform business into a competitive force". The strategy and capability must be well aligned in order to achieve a competitive advantage. *[to be expanded]*

IT alignment in the Age of AI

Initial research on IT-business alignment emerged when technologies were seen as fixed (Chan & Reich, 2007). The machines were explicitly instructed what to do by human coding. Contemporary IT have evolved to a stochastic behavior, where learning is included in the core technology, and they are ever changing with regards to their environment (Berente et al., 2021; Lyytinen et al., 2021; Ågerfalk, 2020). Especially regarding IT, artificial intelligence (AI), and Machine Learning (ML) we need to be explicit about the different approaches and techniques we study (Ågerfalk, 2020). Following the evolvement of AI from IT call for revisiting the business-IT alignment (Mucha et al., 2023) which must account for the computational capabilities of information systems (Ågerfalk, 2020).

Machine-Learning based Capabilities (MLbC) is an organizational ability to align ML-specific and other resources to provide an activity in a reliable, repeatable, and value-added manner (Mucha et al., 2023). AI alignment is rooted in the past research on organizational and IT capabilities within the Resource Based View (RBV) literature (*see Mucha et al. (2023) for more references*). The process of capability development is an alignment process, in line with previous IT-business alignment literature (Mucha et al., 2023).

Especially, the operational phase of MLbC is lacking comprehensive insights (Mucha et al., 2023). After implementation, ML-models must be monitored by humans (Lyytinen et al., 2021) as the models are error prone in nature (Asatiani et al., 2021).

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