Strategic alignment in the healthcare sector: How do health information systems compare to traditional information systems?

A literature study of rigid models in a variable sector

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Abstract

Information technologies (IT) are playing an increasingly important role in organizations. Within organizations, IT can help business reach goals to ultimately gain organizational benefits. This can happen through a process called strategic alignment. Strategic alignment can be achieved with multiple strategy and is not a one-size-fits-all solution for every organization as some organizations prefer to not take risks such as hospitals. High stakes for stakeholders and a dynamic market shape the preference for hospitals to support a working health information system landscape and only innovate when necessary. If hospitals do not like to seek out innovation actively, do general alignment models apply to them, or should different approaches be recommended? This thesis was a literature study that included 17 articles. These articles led to the conclusion that alignment models generally can apply to hospitals, but that market volatility is a factor that needs to be considered. For hospitals it was important that stability was present and that social alignment surpasses intellectual alignment to reach a state of agility. Process level alignment was especially beneficial to organizations like hospitals, because of low risks and a more traditional approach to IT. Results showed that there is a lack alignment research in health context, lack of homogeneity in terminology of alignment research and some outdated theories regarding business strategies.

Keywords: strategic alignment, hospitals, health information systems, agility

Contents

1. Introduction

Back in 2014, the chairperson of the house of representatives in the Netherlands admitted to having to look up what IT meant before presenting a report of mistakes made in IT-projects (NOS Nieuws, 15 October 2014). IT is an abbreviation for information technologies and sometimes it includes information communications (ICT). Even though the chairperson was criticized online for this confession, the lack of knowledge is understandable since the meaning is quite extensive which could make it difficult to understand. In this thesis, the main focus will be on information systems, also known as IS, which are often referred to as IT. As commonly done in literature, IT and IS can be used interchangeably. While the confusion is understandable, the lack of understanding of IT is problematic. Decision makers ranging from business managers to the chairperson of the house of representatives might not be well informed on IT, but are making decisions which impact work of IT managers but also stakeholders. When IT is not correctly managed or improved in sectors like healthcare, it could even have fatal consequences (KRO-NCRV, 14 September 2022).

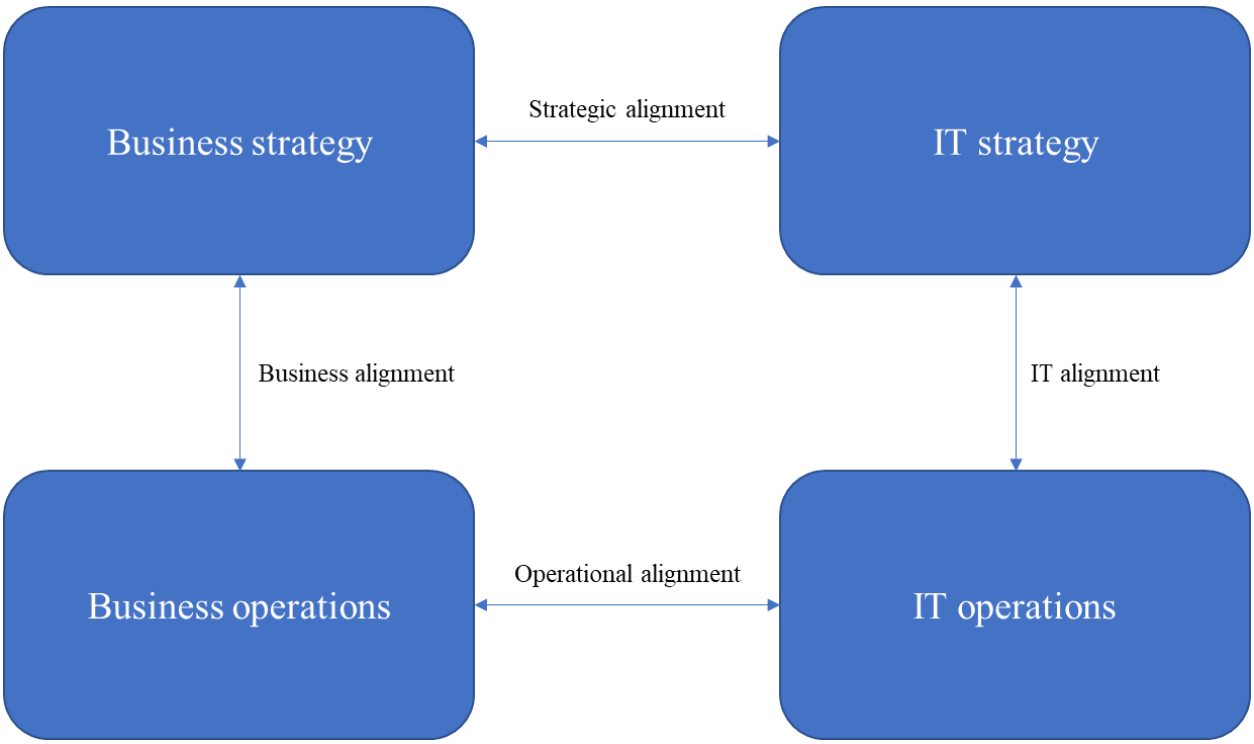
Like the chairperson, not all business units within organizations are aware of the definition of IT. However, the role of IT in organizations is becoming increasingly important, to where IT is seen as a key component in achieving organizational goals (Chan & Reich, 2007; Iveroth et al., 2013). In earlier days, IT was still integrated into business units serving a supporting role in everyday operations. Nowadays, while still offering support to business units, IT is also used to gain a competitive edge by challenging business strategy (Chan & Reich, 2007). The shift of IT from solely being used as support to challenging business strategy led to IT being seen as a separate domain from business units, even though they are still working closely together.

Nowadays, IT has its own department within organizations where they can both challenge and support business strategy. When IT units try to support and challenge business units, it is necessary that what they do contributes to the goal of their organizations. Thus, there is a need for IT strategy and a phenomenon called *alignment*. Alignment is often explained using a rowing analogy: is everyone rowing in the same direction? When the components within an organization work well together to reach organizational goals, these components are aligned (Chan & Reich, 2007; Krey, 2018). According to the commonly used Strategic Alignment Model (SAM), there are four key components in organizations between which alignment can take place:

business strategy and business operations, as well as IT strategy and IT operations (Henderson & Venkatraman, 1989). According to SAM, there are multiple combinations within these operations and strategy of business and IT can be aligned within organizations. Shown in Figure 1 is a simplified version of SAM based on the original model from Henderson and Venkatraman (1989).

Figure 1

Simplified Version of Strategic Alignment Model



Note. From "Strategic Alignment: a Model for Organizational Transformation via Information Technology", 1994, by J. C. Henderson and N. Venkatraman. (pp. 202-220). *Oxford University Press: New York*

Strategic alignment is mostly based on external factors, such as trends and competitors. Without strategic alignment, organizations cannot compete and gain an edge over competitors (Krey, 2018). This is not the only downside to having misaligned business and IT strategies. Misalignment may also lead to higher project costs, because IT-projects are mostly executed with agile project management. This means that projects go through multiple iterative processes in which clients test and critique the output of each cycle. In the case of misalignment, for example when business managers share a low amount of knowledge with IT managers, the

project needs more cycles to reach completion which leads to higher costs. An example is when the Dutch government spent one billion euros more on IT projects than the originally allocated 2.5 billion euros (NOS Nieuws, 2 June 2018). Another example is the improvement of the Dutch online identification system (DigiD) which took three times longer to complete than planned. With alignment, projects are expected to go through fewer iterative cycles and would as a result prevent these types of costs and delays (Krey, 2018).

While there are models to improve strategic alignment and available research to identify misalignment in organizations; the solution to misalignment is not a one-size-fits-all for all organizations. The existing models and approaches which are commonly used in literature to improve alignment and identify misalignment are relatively rigid and might not work for complex and variable organizations such as healthcare organizations (Beerepoot et al., 2019). IT plays an increasingly important role in hospitals, because a lot is dependent on IT. Not only is it responsible for managing clinical software and other administrative tasks, but also ensuring the operation rooms and emergency departments run smoothly amongst other things (AeoLogic, 8 August 2022).

Within the hospital and healthcare sector, a distinction can be made between two types of information systems: health information systems (HIS) and medical informatics. The difference between the two types of information systems is that medical informatics are treatment focused and HIS are for all other information infrastructures. In this thesis, the focus lies on health information systems and not on medical informatics or both. The reason for this decision is twofold. First, while medical informatics are information systems, they cannot be operated by anyone who is not medically trained. Second, the output of medical informatics is eventually processed in HIS. An example of this are the electronic patient records which are HIS, but also contain output from medical informatics such as MRI scans or ECGs.

In recent years, the healthcare sector started digitizing their information and communication which means that HIS also have been transforming gradually (Beerepoot et al., 2019). Compared to other organizations, the healthcare sector is slower in adopting new developments in IT (Beerepoot et al., 2019; Wager et al., 2009). Reason for this is that there is a greater variety in the information that HIS have to process, such as text, images and graphs (Bates & Gawande, 2003; Wager et al., 2009). Additionally, the processed information is personal and confidential to patients. These factors influence the way information systems

should be designed for the health care sector (Kuo et al., 2018; Wager et al., 2009). Therefore, transforming HIS with every new technological development might not be safe or feasible.

To summarize, organizations desire to reach a state of strategic alignment to obtain competitive edge and to prevent projects from failing. However, this seems to be a challenge for most organizations, because of a lack of shared knowledge between business and IT managers. While there are models to reach strategic alignment and identify misalignment in organizations, the healthcare sector seems to be slow to adapt to these insights. Reason for this is that health information systems seem to be significantly different from traditional information systems which leads companies in the healthcare sector to not adapt to new technologies as fast. Since alignment is not a one-size-fits-all solution, and HIS are different from information systems in other sectors raises the question whether the models and techniques to attain strategic alignment and organizational benefits in other sectors are also applicable to the healthcare sector or if a different approach should be used.

2. Theoretical Framework

2.1 Alignment in organizations

2.1.1 Pitfalls of alignment

Alignment in organizations can take on several different roles. The early views on strategic alignment saw it as merely a task of connecting the IT strategy to the business strategy (Chan & Reich, 2007). As strategic alignment changed over time, IT became more of a tool to increase performance of the business plan. Nowadays, IT strategy may even be used as a strategic tool for businesses (Avinson et al., 2004; Chan & Reich, 2007; Henderson & Venkatraman, 1994). This implies that the role of IT has grown and still is growing in importance. An example of this outside of IT focused firms, are the bookkeeping firms. The history of accounting will show that balance sheets were previously kept in a handwritten general ledger. As IT grew, so did possibilities for accounting companies. A transformation can be seen from handwritten general ledgers, to these same sheets being processed in software such as QuickBooks. Then web-based accounting emerged where accountants can work remotely and collaborate in real-time with clients. Nowadays, IT has led to Robotic Process Automation software that can automatically update balance sheets when invoices are received or sent (Anand, K., 2023).

However, there are some pitfalls that come with strategic alignment. First, the way strategic alignment is described in literature is rigid (Chan & Reich, 2007). To further elaborate,

according to literature, strategic alignment needs a business strategy, and an IT strategy that is formulated according to business, so a strategy with IT as its main driver is not possible in early alignment literature. This implies that organizations without a formulated strategy cannot reach alignment, which is an outdated take on alignment. Having IT as a driver in organizational strategy can actually make a company more agile by responding to technological innovations (Sha et al., 2020). Secondly, one may argue that IT strategy should challenge business strategy and not just follow it (Chan & Reich, 2007). Conflict between business and IT could lead to more creativity and innovation which ultimately leads to more competitive edge (Krey, 2018). Thus, literature which states IT strategy should only follow business strategy might not always lead to the best results for organizations. For healthcare we can expect that there is no room for errors while looking at confidential records or operations of emergency rooms, thus IT following business strategy would be likely for hospitals.

SQ1: How is strategic alignment achieved for HIS?

2.1.2 Dimensions of alignment

Strategic alignment can be divided into four different dimensions of alignment. The first dimension is intellectual, which is seen as the main dimension in strategic alignment. It refers to the degree to which business and IT strategies complement each other and a strategy is formally documented (Chan & Reich, 2007; Wagner et al., 2014). Generally, intellectual alignment is linked to a degree of rigidity. When a strategy is formally being formulated, it adds a layer of stability which is called inertia (Mikalef et al., 2021). Therefore, it will be more difficult to adapt quickly and flexibly to external factors when a formal strategy has been formulated. Too much intellectual alignment might not be desirable when there is no flexibility for adaptation to opportunities and threats.

Second is social alignment, which is described as the mutual understanding between business and IT units (Schlosser et al., 2015). This dimension together with intellectual alignment are seen as the biggest pillars within strategic alignment. Some literature also describes this dimension as the enabler of intellectual alignment, because no effective strategy can be formulated without mutual understanding (Mikalef et al., 2021). While intellectual alignment is regarded as more stable, social alignment actually makes organizations more flexible. Competencies of resources like staff and technologies are known and will be used

flexibly when external opportunities and threats arise (Chan & Reich, 2007; Mikalef et al., 2021).

Third is cultural alignment, which is considered as more of an informal structure within strategic alignment. It entails that the strategy which is formed needs to align with the organizations' current identity and values (Chen & Reich, 2007). This means that it would be unlikely that a highly hierarchically structured business adopts a strategy that is mostly used with companies that are structured more horizontally.

Lastly, structural alignment is also part of strategic alignment. It is influenced by the hierarchy of organizations. This makes centralization or decentralization of decision making a key factor in the alignment of business to IT strategy (Chan & Reich, 2007). It also ties together well with cultural alignment.

2.1.3 Models for alignment

There are several theoretical models to describe alignment. The most influential model is Strategic Alignment Model (SAM), as named earlier. In short, according to SAM strategic alignment can be reached whenever business strategy supports and is supported by IT strategy (Avinson et al., 2004). This is a classic view on alignment in organizations, which means it has some limitations. The largest limitation of the model is that it does not take into account the degree to which organizations use IT (Chan & Reich, 2007).

Because of the rigid nature of SAM, other researchers have extended this model. For example, more dimensions in technical and architectural requirements have been added. Furthermore, a more practical implication of SAM has been constructed, so managers have ways to attain alignment or have ways to notice misalignment.

The Baets model is another model which is used frequently in alignment research. This model is an adaptation of an earlier model called the MacDonald model (Baets, 1992). The MacDonald model entails that alignment can be obtained in an iterative process of two cycles (MacDonald, 1991). In the first cycle, strategy is proposed based on trends and in the second cycle the proposal of the first cycle is reviewed. The Baets model adds a broader context, for example competitors and human resources (Chan & Reich, 2007). Thus, the Baets model and MacDonald model see alignment as a process instead of an end goal like SAM does.

The theories above imply that alignment happens firm-wide, however this does not need to be true. Organizations can also be aligned on lower levels, such as within business units. The

condition that needs to be met to achieve this so-called process level alignment is that this alignment should reflect the goals and ambitions of the firm (Tallon et al., 2016). For example, IT within an organization can be aligned towards the bigger picture, without having the mutual understanding of other business units (Chan & Reich, 2007; Tallon et al., 2016). This means that the *locus of alignment* is within the IT process.

SQ2: Does alignment within healthcare companies mostly occur at the process or the business level?

2.2 Organizational Benefits

Alignment is the desired state for organizations, because of organizational benefits. When business' goals are aligned with the strategy, so when all units are rowing in the same direction, it is believed to lead to better performance (Chan & Reich, 2007; Mirani & Lederer, 1998). There are several components to keep in mind when evaluating alignment in organizations, such as inertia, emergent cooperation and agility (Mikalef et al., 2021). These components will be clarified in the following part.

2.2.1 Agility

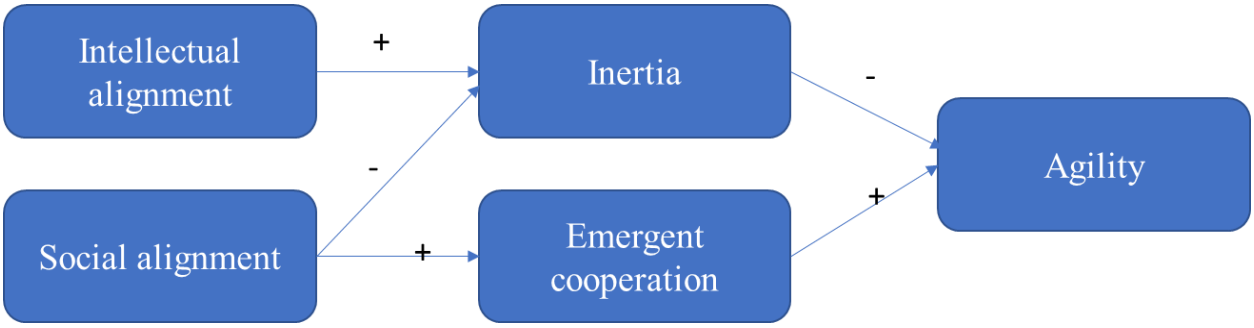
Organizational benefits stem from the extent to which organizations are agile (Luo & Park 2001; Wong-MingJi & Millette, 2002). Agility in organizations often manifests as the degree to which one can respond effectively to market opportunities and threats. In order to achieve agility in organizations, they need to be more flexible than they are stable which indicates that social alignment needs to be higher than intellectual alignment (Zhang & Wang, 2022). Social alignment needs to be higher than intellectual alignment, because intellectual alignment decreases agility while social alignment has the opposite effect.

The path from alignment to agility is however not a direct one. There are influencing factors which are inertia and emergent cooperation (Liang et al., 2017). Inertia follows out of intellectual alignment, which means that stability is a main priority. In turn, inertia negatively influences agility because organizations that prioritize stability are not able to act agile (Liang et al., 2017; Wong-MingJi & Millette, 2002). Emergent cooperation on the other hand indicates the extent to which organizations are able to explore and exploit their resources, such as IT. Exploring new resources allows organizations to jump onto trends early and adapt while exploiting resources allows organizations to use current resources to combat threats. This makes emergent cooperation a positive influencer of agility. In Figure 2, a model by Liang et al. (2017)

shows the relationship between the mentioned factors. Structural and cultural alignment are not included in this model, because there is no evidence of these factors influencing agility.

Figure 2

Influential factors in the process from alignment to agility by Liang et al. (2017).



2.2.2 Dynamic Capability View

Continuing on emergent cooperation which describe the exploration and exploitation of an organization's resources; *Dynamic Capability View* is a theory which suggests that organizations' resources can be shaped and used to cope with internal and external threats and opportunities and to match or create market change (Vogel & Güttel, 2013). According to this theory, not all resources are able to be used strategically. In order to use resources effectively for organizational benefits and competitive advantage, resources should be valuable, rare, inimitable (unique) and non-substitutable (VRIN resources). Other resources that do not meet these requirements such as real-estate do not necessarily lead to competitive advantage and can be disregarded by this theory.

Seeing as this theory connects to emergent cooperation, it can be seen as another enabler of agility and competitive advantage especially for volatile markets (Luo & Park, 2001; Vogel & Güttel, 2013). Volatile markets are subject to changes, innovations, competition and trends which means they are less stable. A less stable market mostly calls for a more agile approach, which is why this theory is relevant. Even stable markets have a need for dynamic capabilities in order to keep up with competition, despite the market not being very dynamic.

The healthcare sector is known for being in a dynamic or volatile market, because of constant innovation in medicine and treatments. This also means that the *Dynamic Capabilities View* is relevant in this sector. The hospital buildings themselves might not fall under VRIN

resources, but what takes place inside might. Specialists, treatments, equipment and information technologies are examples of VRIN resources in the healthcare sector.

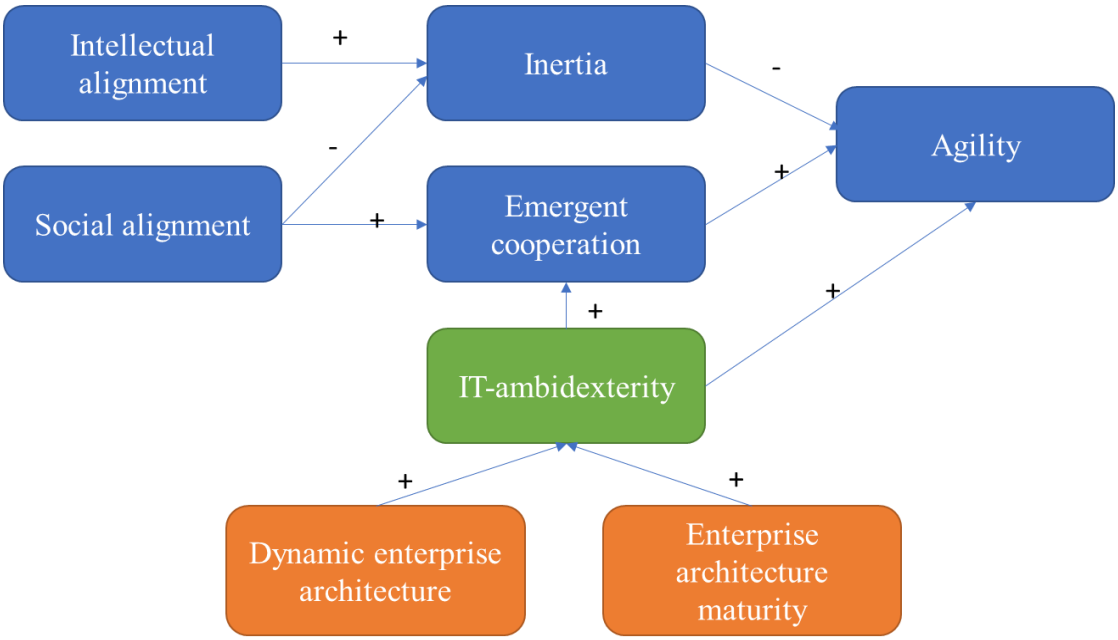
2.3 Information Technology in organizations

2.3.1 IT ambidexterity

IT-ambidexterity is an influential factor for enabling flexibility in organizations. It can be described as the simultaneous exploration and exploitation of IT resources specifically and can be seen as an enabling factor of emergent cooperation (Van de Wetering et al., 2022; Jöhnk et al., 2022). When organizations are more ambidextrous, they can sense and respond to external opportunities and threats more effectively (Van de Wetering, 2021). Thus, organizational benefits can be achieved through IT-ambidexterity by gaining competitive advantages and market leadership (Sha et al., 2020; Van de Wetering et al., 2022).

Figure 3

Expanded theoretical model of agility



Note: based on research of Liang et al. (2017) and expanded with research by Van de Wetering et al. (2022), Van de Wetering (2021) and Bradley et al. (2012).

Furthermore, there are two factors which indirectly lead to organizational benefits through IT-ambidexterity. First is dynamic enterprise architecture, which is a high-level view of business processes and IT-systems and the extent to which different parts of the organization use

these systems, so how widespread IT is within organizations (Van de Wetering, 2021). It is used to provide value in the process of aligning business objectives with IT resources and can thus be seen as a positive influence of a business' process innovation, firm performance and business-IT alignment (Jöhnk et al., 2022; Van de Wetering, 2021). In the case of hospitals, as shown in research by Wu et al. (2021) organizational benefits achieved through dynamic enterprise architecture were mostly lower operational costs and a higher return on assets.

Enterprise architecture (EA) maturity refers to the current state of the way IT is used in organizations, this concerns the depth or complexity of IT. There are four stages of maturity of enterprise architecture which are shown in Table 1. As maturity increases, the main focus of IT is less for daily operations and more as a tool to attain alignment. Research shows that a higher level of maturity has a positive impact on strategic alignment, IT effectiveness and organizational agility. This makes the stage that organizations are in, important for strategy and alignment. Most hospitals find themselves in the standardized technology stage of EA maturity, which means that IT is still used mainly for daily operations (Bradley et al., 2012). Reason for this might be because of the risk averse behavior which hospitals adopt when it comes to innovation.

Table 1

Stages of enterprise architecture maturity, from low to high levels of maturity, studied for US hospitals by Bradley et al. (2012)

Stage	Strategic value of IT to organization
Business silo stage	Functional system development
Standardized technology stage	Systems integration and data sharing
Optimized core stage	Focus on data management and infrastructure development
Business modularity stage	Interorganizational alignment and strategic agility

2.4 Business strategies

2.4.1 Forming strategies

There are two patterns in which strategies can be formulated: IT-strategy driven and business-strategy driven (Sha et al., 2020). Both patterns start and end with social alignment. But, the former shapes business strategy based on recent technological innovations while the latter clarifies how business creates its own strategy and assesses how IT resources can be used to achieve organizational goals. Business-strategy driven alignment occurs continually and evaluates whether business strategy is supported by IT (Sha et al., 2020). The choice of either pattern originates from the availability and utilization of IT or management resources, and the current state of the market.

2.4.2 Miles & Snow Typologies

Business strategy is one of the two elements in strategic alignment according to SAM, besides IT strategy. However, there are endless ways to run a business which makes it more difficult to attain alignment, because a different business strategy needs a fitting IT strategy. Miles and Snow have identified four archetypes of business strategies to categorize and simplify these strategies. The four typologies of Miles and Snow are: defenders, prospectors, analyzers and reactors (Sabherwal & Chan, 2001).

The first of the four typologies, the defenders, tend to be organizations in a stable and niche market (DeSarbo et al., 2005). These organizations are prized for their operational excellence and thus do not feel pressure to innovate frequently (Sabherwal & Chan, 2001). In contrast, organizations with a defender strategy prefer to avoid change and maintain their stable share of the market. To achieve their goals, IS are used as tools for efficiency, which contributes to operational excellence (Sabherwal & Chan, 2001; Thomas & Ramaswamy, 1996).

The second type of the typologies are prospectors. Organizations that take on this typology are usually technologically innovative and are actively trying to reach new markets (DeSarbo et al., 2005). The implementation of new technologies and the entering of new markets happen fairly quickly for prospectors, even if they have to take risks (Thomas & Ramaswamy, 1996). To support creating change in the market, IS are mostly used as a tool for flexibility (Sabherwal & Chan, 2001).

Third, there are organizations with the analyzer typology. These companies do adapt to changes in the industry, but only after it has been proven to work in other organizations

(Sabherwal & Chan, 2001; Thomas & Ramaswamy, 1996). Analyzers like to follow change and prefer a second-but-better strategy (DeSarbo et al., 2005). IS for comprehensiveness is a strategy these organizations tend to take on. This means that these types of organizations use their information systems to have an overview of the market they are currently working in, their customers and their supply chain (Sabherwal & Chan, 2001).

Lastly, organizations can be categorized as reactors. These organizations are left out often when discussing the typologies of Miles and Snow, because they lack a stable IS strategy. Reactors adapt quickly to changes, however act inappropriately to pressure from the markets. This means that they are often outperformed by the other three typologies (DeSarbo, 2005).

Categorizing hospitals within the typologies of Miles and Snow proves to be a challenge. Within hospitals, a distinction can be made between medical informatics and health information systems. Hospitals mostly self-report as prospectors, however this mostly applies to medical informatics and health technology rather than health information systems (Haux, 2006).

There is limited current research on the self-reporting of hospitals regarding their information systems. However, while considering the descriptions of the typologies hospitals seem to fit the defender typology. These organizations are characterized by prioritizing efficiency over innovation. Research by Beerepoot et al. (2019) mentions that efficiency is a priority in most hospitals' information systems. Eventually, hospitals do follow new technologies when innovation has been proven useful. For example, when software for digitization of information processing had been successfully implemented in other sectors, HIS eventually followed (Bates & Gawande, 2003; Wager et al., 2009). These examples match an analyzer typology, which might imply that hospitals might fit two different strategies when considering Miles and Snow's pure typologies. However, for now we assume that most hospitals can be categorized as defenders, because of their priority for efficiency, their generally lower EA maturity levels and risk averse behavior.

SQ3: Which business typology do hospitals tend to take on?

3. Method

To answer the research question, a literature study has been conducted. To collect literature, multiple methods have been applied. First general keywords such as 'health information systems' and 'strategic alignment' were put into Google Scholar to get a general overview of available literature. This resulted into millions of results combined. While skimming through the

first pages of relevance and recent available literature, more specific keywords were formed based on terms that were frequently used, and based on literature by Van de Wetering (2021) in which IT-ambidexterity is introduced (Table 2 and Table 3). These searches each resulted into approximately 100 to 200 results per search in Google Scholar in a time period of the last 15 years. The scoped searches were also put into WorldCat, Web of Science and MedLine. WorldCat did not provide sufficient relevant literature as it was mostly focused on humanities and MedLine results were focused too heavily on medicine and procedures which is why the main method used in this thesis is snowball sampling via Google Scholar.

Table 2

Scoped keywords based on general overview of alignment research

Searching keywords
“Defender strategy” AND alignment AND hospital -"hospitality"
“Intellectual alignment” AND health information systems
"Business-IT strategy" AND alignment AND healthcare
"Business-IT strategy" AND alignment AND medical
"Defender typology" AND "business strategy" AND IT
"Defender typology" AND "strategic alignment"

Table 3

Scoped keywords based on IT-ambidexterity research by Van de Wetering (2021)

Keywords
"IT ambidexterity" AND medical AND hospital
"IT ambidexterity" AND defender strategy
"IT exploration" AND exploitation AND hospitals
IT-ambidexterity AND agility AND hospitals

The snowball sampling method was started by a paper from Chan and Reich (2007) called ‘IT alignment: what have we learned?’ which was published in Journal of Information Technology. This article provided a good starting point for the snowball sample, because the article contained pitfalls, models and advice for future alignment research. Additionally, this article has been cited over 1500 times in other published work. Chan, co-author of ‘IT-alignment: what have we learned?’ has written more literature on strategic alignment. The same snowball method has been applied to more recent work, and their most cited work on alignment research. This snowball sample executed with the scoped keywords from Table 2 and Table 3 in the cited articles of a paper by Chan and Reich (2017). These resulted into 4 up to 55 articles per search. From these results, the entire selection could not be formed, so the keywords from Table 3 have also been used outside of the cited articles which resulted into 110 up to 180 hits per search. This helped complete the set of articles used in this thesis.

There were some exclusion criteria. While executing searches about HIS, a significant amount of literature is about research in developing or eastern countries. The reason for excluding research in non-western countries is twofold. First, research on traditional information systems is conducted mostly in western countries. Second, research by Goldschmidt (2005) claims that healthcare lags behind most other sectors in regards to information technology by ten to fifteen years. Literature from non-western countries is not easy to combine and generalize with western literature which is also why they have been excluded. While this study has some exclusion criteria, it did not exclude non-peer reviewed literature. When excluding these articles,

a lot of especially recent literature were not in the searching scope anymore. This is why non-peer reviewed articles were included for this thesis.

Another point of interest is the amount of literature that is included in this thesis. While there were hundreds of results, only 17 were used in the analysis phase. As mentioned, there was an abundance of literature on hospital in non-western countries, which was excluded. Furthermore, literature on the relationship between strategic alignment and health information systems was scarce. Because of the lack of literature specifically on the topic of this thesis, another approach is used in the analysis phase. Firstly, literature on specifically defender typologies and alignment because of the assumption that hospitals are generally defenders. Secondly, literature was mostly focused on inertia and emergent cooperation or IT-ambidexterity, but lacks literature on all of these parts in one. This is why literature is included which does not fill in the total picture of Figure 3, but is supported with other literature that fill in the gaps of Figure 3 to create a complete image on alignment in hospitals.

Lastly, the literature included in this study is not all research on hospitals even though this study is about hospitals specifically. Nine out of 17 literature pieces included in this study are not specific to just hospitals. In Appendix A the topics of chosen literature is shown. The reason why these were included is either the topic allows the context to be non-specific, or because the context includes hospitals or similar organizations. For example, research by Lu and Ramamurthy (2011) is done in the context of 128 medium sized American organizations. This group did contain some health organizations, which is why the paper was included in the study. Furthermore, two studies on Chinese shipbuilding companies were included. Reason for this is because the Chinese shipbuilding industry is in a very dynamic market where IT is used as competitive leverage (Zhang & Wang, 2022). This dynamic market is one that is similar in volatility levels to the healthcare sector, which is why these two articles are included.

4. Results

In total, 17 research papers were included in the analysis. Eight of these papers were hospital specific (Appendix B). Eleven of these papers were based on surveys, so they were mostly quantitative research.

The first subject to discuss in the results is the connection between defenders and alignment. Earlier, we concluded that hospitals generally match the description of defending organizations when considering Miles and Snow's typologies of strategy. These organizations rarely jump on external opportunities for innovations and are praised for their operational stability. Because of the nature of services hospitals provide, risk aversion is fairly high. In case of hospitals, a flaw of judgment can lead to difficulties for in-care patients which could possibly lead to casualties.

4.1 Defenders and alignment

The benefits that organizations obtain from having IT and business strategy aligned differ with each strategy archetype. Five out of 17 papers included in the analysis discuss the connection between defender strategies and alignment (Table 6). Research indicates that defenders might not benefit from alignment the way other organizations do (Tallon, 2007). Tallon (2007) and Van de Wetering (2021) found a positive correlation between alignment and firm performance for every strategy, except for defenders. While defenders are unable to benefit from organizational alignment, they are able to benefit from process level alignment (Sha et al., 2020; Tallon, 2007; Van de Wetering, 2021). Defenders have no urgency to align the value chain, which addresses product and service enhancement and marketing, the way prospectors do for example (Tallon, 2007). For defenders, locus of alignment is especially important (Helmig et al., 2014). This means that the process where alignment is tightest must reflect an organization's strategic goal, which shares its description with intellectual alignment (Helmig et al., 2014; Liang et al., 2017).

Table 6

Literature on defender strategies and alignment

Authors	Year	Topic	Research type	N
Tallon	2007	Process-based strategic alignment	Survey	241
Van de Wetering	2021	Dynamic capabilities	Survey	299
Sha et al.	2020	Dynamic alignment	Case study	1
Helmig et al.	2014	Miles and Snow strategy choice extension	Survey	409
Liang et al.	2017	Process from alignment to agility	Survey	241

Research by Helmig et al. (2014) and Zacharia et al. (2009) however states that the typologies that Miles and Snow have proposed might not be nuanced enough for some organizations (Helmig et al., 2014; Zacharia et al., 2009). There are organizations that make some decisions outside of their current strategy, without adopting a full new strategy. An example of Miles and Snow's pure strategies not representing some organizations sufficiently is provided by Helmig et al. (2014) in the form of hospitals. When self-reporting for pure strategies, hospitals mostly reported as either defenders or prospectors. But when being presented with hybrid strategies, more hospitals fit within an analyzer strategy where they were categorized as either defending or prospecting analyzers (Helmig et al., 2014). From these hybrid strategies, hospitals reported as defending analyzers. This suggests that organizational strategies might be more complex and cannot be categorized in only one of four typologies.

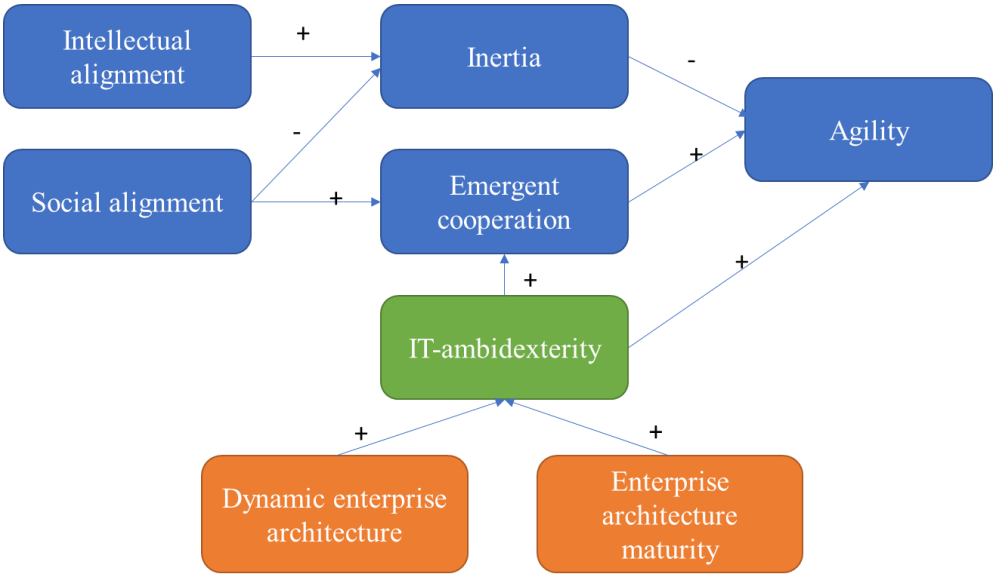
Highly complex environments such as healthcare lead to complex organizational structures and strategies (Helmig et al., 2014; Jöhnk et al., 2022; Sabherwal et al., 2019). Despite prospective hospitals being proven to outperform other strategies, the complexity of organizations might make it more difficult to act prospectively (Zacharia et al., 2009). Healthcare

organizations in most western countries are highly regulated, which makes it important to take stakeholders such as investors and government into account (Helmig et al., 2014). Innovative strategies may be too risky for stakeholders, which makes balancing strategies the more preferred choice. This way stability does not come at the expense of flexibility.

4.2 Alignment-agility link

Figure 4

Expanded theoretical model of agility



Note: based on research of Liang et al. (2017) and expanded with research by Van de Wetering et al. (2022), Van de Wetering (2021) and Bradley et al. (2012) displayed as blue, green and orange respectively.

To provide more structure, figure 3 is repeated above as figure 4. In figure 4, a conceptual model based on several research papers combined was formed. This combined model shows the link between alignment and agility and several factors which influence this link. This model proposes that intellectual alignment leads to higher levels of inertia which has a negative impact on organizational agility. On the other hand, social alignment has a negative impact on inertia but a positive effect on emergent cooperation, which eventually leads to more organizational agility. IT-ambidexterity moderates the relationship between agility and emergent cooperation. Besides being a moderating variable to emergent cooperation, IT-ambidexterity also has a direct positive effect on agility. Furthermore, IT-ambidexterity can increase when

influencing factors dynamic enterprise architecture and enterprise architecture maturity increase as well. This model is based on general firms, with no sector specifically in mind.

Literature generally shows that higher amounts of IT-ambidexterity lead to higher levels of organizational agility, also for hospitals (Van de Wetering et al., 2022; Walraven et al., 2022). However, this effect works differently from the originally proposed model in Figure 3. In the original model, intellectual alignment has a negative impact on agility through inertia. But, this same effect cannot be found for hospitals as they require intellectual alignment in order to achieve agility (Plomp & Batenburg, 2009; Helmig et al., 2014). The reason for this is that stability is needed in order to guarantee operational excellence for stakeholders. Stability in this case only impedes agility when hospitals are more stable than they are flexible. When flexibility is surpassing or matching stability, agility can still be achieved within hospitals (Zhang & Wang, 2022). This indicates that the model from figure 3 only partly applies to hospitals. The factors which are involved can be adopted, but the effects might work differently.

4.3 Controlling factors

There are several other factors to consider when studying ways for hospitals to reach strategic alignment in order to reach organizational benefits. One of these factors is market share or firm size. As mentioned earlier, innovation-based strategies are less likely adopted by healthcare organizations, because of risk averse behavior of management and stakeholders (Helmig et al., 2014; Tallon, 2007; Zacharia et al., 2009). However, this risk averse behavior is less prevalent in larger hospitals, because they can diversify risks better than smaller hospitals (Helmig et al., 2014). This means that achieving organizational agility is easier for larger firms.

Another factor to be considered is market volatility. We know that alignment influences performance of firms through agility Mikalef et al., 2020; Sabherwal et al., 2019; Tallon & Pinsonneault, 2011; Zhou et al., 2017). While agility has a positive effect on firm performance, this effect is greater in volatile markets (Tallon & Pinsonneault, 2011). Research of the effect of strategic alignment on firm performance of Sabherwal et al. (2019) also shows that a more volatile market increases this effect, but the effect also decreases when an environment gets more stable. This implies that the healthcare sector, which is considered a volatile market, will especially benefit from achieving alignment. Important to note is that as markets become more dynamic, organizations are likely to act more rigidly. Intellectual alignment increases and will

lead to organizational agility only when it is complemented with social alignment (Zhou et al., 2017).

5. Discussion

5.1 Discussion

The goal of this study was to research if alignment models are generally applicable to hospitals and its information systems, or if a different approach should be used. Three sub questions were formed to better understand alignment and strategy for hospitals. The research question was ultimately answered using 17 articles.

The first sub question concerned how strategic alignment is achieved for HIS. Research on strategic alignment for companies in general, presented in the theoretical framework, suggests that there are a few steps organizations take after alignment, both social and intellectual, to achieve organizational benefits: a focus on social alignment rather than intellectual alignment, emergent cooperation, IT ambidexterity and agility. Generally, intellectual alignment and inertia have an opposite effect and do not lead to better performance of firms. A focus on flexibility instead of stability would therefore lead to better firm performance. The results show that this effect, however, works differently for hospitals. Intellectual alignment does not impede agility as long as social alignment is matching or surpassing the level of stability. This answers SQ1 which concerns the way strategic alignment is achieved for HIS.

The second sub question, ‘does alignment within the healthcare companies mostly occur at process or business level?’, could be answered by first looking at the controlling factors. Market volatility is a crucial factor when comparing hospitals to other types of firms. When organizations find themselves in a volatile market, intellectual alignment automatically increases to remain stable in a dynamic market. While this would be a downside to regular firms, for hospitals it does not need to be a downside literature shows that intellectual alignment only impedes agility if it remains higher than social alignment. This concerns process level alignment specifically, which answers SQ2.

Another difference between hospitals and regular firms is the impact of agility on firm performance. Firms in volatile markets, such as hospitals, are shown to benefit more from agility than other firms. This means that the potential impact is larger for hospitals, which also answers SQ1.

Lastly, SQ3 concerns the strategy archetypes of hospitals. While hospitals tend to adopt defending strategies, while presented with hybrid strategies hospitals self-report as defending analyzers. These organizations are on the lookout for innovation, but are waiting for proof of succession in other organizations. This is likely, due to the risks that are involved while innovating in the health sector where errors could be fatal. So, hospitals mainly identify as defenders, but also adopt some analyzer characteristics.

With the answers to these sub questions and the results, the research question can be discussed. Results showed that alignment models from other sectors can also be used in the healthcare sector as long as some factors are kept in mind. Market volatility and risk aversion are the main concerns when applying alignment models, and should be addressed when trying to align business and IT in hospitals. Stability should be the base for a strategy to attain alignment, but a solution to be more flexible on top of that stability will make strategic alignment possible for hospitals. Lastly, not the entire organization should be changed in order to attain alignment, because process level alignment for risk averse and performance based organizations seems to increase organizational benefits more.

5.2 Theoretic and practical implications

Recommendations for future research consist of more qualitative data, including only healthcare organizations in the sample and focusing on a homogeneous sample with the same healthcare systems. This study also points out the heterogeneity in terminology within alignment literature which creates a challenge in finding literature. Furthermore, this study criticizes the strategy archetypes of Miles and Snow as it turns out that four archetypes are not enough to accurately display all types of organizations and that hybrid strategies might create a more representative view of organizations.

As for practical implications, we have seen that organizations in dynamic markets especially benefit from agility. But we have also seen that the healthcare sector is more traditional when it comes to alignment with IT strategy following business strategy due to risk aversion. A recommendation could be to play into the hybrid strategy of defending analyzers which are more conservative but are on the lookout for innovation that is proven to be successful elsewhere. Hospitals could have a look at what other organizations with similar dynamic markets and risk aversion are currently improving in their information systems in and take an example

from that. Other organizations could be hospitals in a more competitive landscape such as private hospitals or cosmetic clinics or as seen in this study even the Chinese shipbuilding companies.

Another practical implication is to look into the locus of alignment which turns out to especially benefit organizations with defender strategies. By evaluating where in the business process hospitals have room for innovation to stimulate agility, a small change can be made with low risks. An example of this could be as small as a dialing menu for visitors or patients who want to call the hospital. This could ease the workload for receptionists by having callers already sent to the right phoneline for the correct department.

5.3 Recommendations for future work

This study is a good start for follow-up research on alignment in the healthcare sector. A recommendation for further research is to include more qualitative research. The articles included in this thesis are mostly survey studies which are quantitative. Another recommendation is to only include research based on hospitals instead of the mix that was used in this study. Furthermore, there is a lack of homogeneity in the definitions of certain phenomena within alignment research. While collecting articles, I found multiple different terms for the same phenomenon which might indicate that some research has not been found as these terms were not included in the searching strategy.

Also, research based only on hospitals in western countries was included in this literature study. Reason for this was to have a comparable starting point in technological innovations. However, in the healthcare sector, there are some differences within western countries. The main issues are based around healthcare organizations in the United States of America where there is no universal healthcare. This might influence the strategies that these organizations employ and create differences between American and European or Asian healthcare organizations. Therefore, follow-up research could showcase differences between markets in different continents and their respective strategies. In addition, the United States of America could be treated as a special case in the future.

Last suggestion for further research would be firstly to use different methods to explore the found effect for healthcare so the exact size can be found and possibly be compared to other sectors. Another recommendation would be to reevaluate the strategy archetypes for hospitals. In self-reporting literature, the four strategies made by Miles and Snow are too rigid and hybrid

strategies have shown to be a better fit for some organizations including hospitals. Perhaps these categories can be included in future work.

5.4 Conclusion

This literature study questioned if alignment models are generally applicable to health information systems or if another approach would be more effective. To find this out, the road from alignment to organizational benefits through agility. Then business strategies for different types of organizations were introduced. With this theory, healthcare organizations were placed into context as risk averse defender organizations. Based on this, literature for the study was collected. The results suggest that alignment models are generally applicable to hospitals, but need to consider controlling factors like market volatility and risk aversion. As discussed, hospitals tend to take on defending strategies which avoid risk. Even when we consider the hybrid strategy defending analyzer, the level of risk aversion is still high. Furthermore, the role of intellectual alignment can be disregarded as long as social alignment matches or surpasses the level of intellectual alignment which means focus within process level alignment is crucial. We could also say that alignment within hospitals is more old-fashioned where IT follows business strategy instead of challenging it.

Results of this study are a good basis for follow up research on alignment for the healthcare sector and even a good critique for the lack of homogeneity in terminology or outdated literature such as Miles and Snow. Practical implications consist of small changes based on the locus of alignment that turned out to be beneficial for defending strategies and embracing a hybrid strategy of defending analyzer for hospitals.

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7. Appendices

Appendix A

Literature not placed in context of hospitals entirely

Author	Year	Topic	Research type	N	Context
Jöhnk et al.	2022	IT ambidexterity	Interview	30	German firms
Liang et al.	2017	Process from alignment to agility	Survey	429	Chinese shipbuilding companies
Lu & Ramamurthy	2011	IT capability and agility	Survey	128	Medium sized American firms
Mikalef et al.	2020	Dynamic capabilities	Survey	322	International firms
Sabherwal et al.	2019	Alignment and performance	Data-panel analysis	657	American firms
Tallon	2007	Process-based strategic alignment	Survey	241	Publicly traded American firms
Tallon & Pinsonneault	2011	Alignment and agility	Survey	241	Publicly traded American firms
Van de Wetering	2021	Dynamic capabilities	Survey	299	Dutch IT managers
Zhang & Wang	2022	Social alignment, intellectual alignment and agility	Polynomial regression	245	Chinese shipbuilding companies

Appendix B

Literature based on research in hospitals

Author	Year	Topic	Research type	N	Context
Bradley et al.	2012	Enterprise architecture maturity, alignment and agility	Survey	167	US hospitals
Helmig et al.	2014	Miles & Snow strategy choice extension	Survey	409	German hospitals
Paré et al.	2020	IT function and organizational performance	Survey	72	Canadian hospitals
Plomp & Batenburg	2009	Enterprise architecture maturity, alignment and agility	Case study	3	Dutch hospitals
Sha et al.	2020	Dynamic alignment	Case study	1	Singaporean hospital
Van de Wetering et al.	2022	IT-ambidexterity	Survey and fuzzy set qualitative comparative analysis	90	Dutch hospitals
Walraven et al.	2022	Dynamic capabilities and performance	Survey	85	Dutch hospitals
Zacharia et al.	2009	Alignment and strategies in healthcare organizations	Empirical analysis	178	American hospitals