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JONATAN PACHECO LUIZ

ASSESSMENT OF STRATEGIC PLANNING FOR THE ADOPTION OF THE BLOCKCHAIN TECHNOLOGY

SÃO PAULO

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Thesis presented to Escola de Administração de Empresas de São Paulo of Fundação Getulio Vargas, as a requirement to obtain the title of Master in International Management (MPGI).

Knowledge Field: Internacionalização de Empresas

Advisor: Prof. Dr. Ligia Maura Costa

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ABSTRACT

This thesis explores ways to infer if companies are diligently planning strategies to support the decision to adopt the blockchain technology. To that purpose, concepts already introduced in the strategic management literature are presented through a 9-steps framework. Then, information regarding attitudes on blockchain, gathered from secondary sources, is assessed *vis-à-vis* the framework. With this structured analysis of key variables and their context, it is possible to identify patterns, areas, processes or activities that are most likely to present problems. Considering factors like the FOMO (fear of missing out) effect, it is fundamental to ensure rational and accurate decision making in companies. Among the main findings are two warnings to managers: a possible overconfidence related to levels of knowledge and the lack of objective criteria to measure performance against competitors.

KEY WORDS: Blockchain, Competitive Advantage, Strategic Planning

RESUMO

Essa tese explora maneiras de inferir se empresas estão diligentemente planejando estratégias para apoiar a decisão de adotar a tecnologia *blockchain*. Para tanto, conceitos já introduzidos na literatura de gestão estratégica são apresentados através de um modelo teórico de 9 passos. Então, informações pertinentes a atitudes relacionadas a *blockchain*, levantadas de fontes secundárias, são avaliadas *vis-à-vis* o modelo teórico. Com essa análise estruturada das principais variáveis e seu contexto, é possível identificar padrões, áreas, processos ou atividades que eventualmente apresentariam problemas. Considerando fatores como o efeito *FOMO*, é fundamental garantir tomada de decisão racional e precisa nas empresas. Entre os principais resultados estão dois avisos aos gestores: um possível excesso de confiança relacionado aos níveis de conhecimento e a falta de critérios objetivos para mensurar performance em relação aos competidores.

PALAVRAS CHAVE: *Blockchain*, Vantagem Competitiva, Planejamento Estratégico

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I. Introduction

Arising from the inception of Bitcoin and other cryptocurrencies in 2008, the blockchain technology has the potential to be almost as disruptive as the internet was. By making intermediaries in two parties' transactions redundant it is a fast and cost-efficient and alternative. Due to its automation and cryptographic structure, it contributes both to transparency and stronger compliance, as information validation and access are more efficient and secure. It is important to note that its potential is not limited to financial transactions, any kind of digital information shared between two or more parties can benefit from blockchain. Additionally, with the advents of other technologies like the Internet of Things, it will be possible to increase the range of physical assets that can be recognized and tracked inside a blockchain network.

However, as an emerging, new technology, there are also many pitfalls in its adoption. For instance, at their inceptions and many years after, computers and the web could only be used by the tech savvy. Currently, only programming experts can properly create dispositions and applications inside a blockchain network, which envisions a lot of investment in human capital to create and maintain the needed knowledge. This decision might not be the most appropriate one to all companies at the moment. But, as with any recent technological trend, the risk of being influenced by the FOMO ("fear of missing out") effect is considerable. A duly strategic planning is needed to mitigate this risk.

For that matter, the author presents a strategy framework and guides the reader through some of its steps, complementing them with data regarding the current context of blockchain on a global scale. More specifically, by using information from secondary researches, the author searches for evidence and hypothesizes if companies are following proper strategic processes. This assessment is made with proxies that relate the information available and the steps of the framework.

This thesis is divided in 5 parts. First, a brief summary is presented in the Introduction. Then, in the second part, theoretical foundations about the blockchain technology and strategic management are built. Among others, the author discusses:

(i) What are blocks and their basic structure;
(ii) The cryptographic processing that ensures and confirms the consistency and legitimacy of all transactions inside a block through a proof of work method;
(iii) How a block is recorded in the public repository after its confirmation, usually called mining;
(iv) How this decentralized processing done by many nodes in the network eliminates the need of a central authority;
(v) Why is a blockchain network resistant to tampering and why is it unfeasible to add fraudulent transactions to the former;

(vi) Types of blockchain networks and governance regarding decision making inside them;
(vii) What is the FOMO effect and how it influences decision making;
(viii) How performance indicators are a catalyst to strategic planning and help to prioritize projects;
(ix) Why a clear communication is imperative since the beginning of a proposal of change;
(x) How the market environment and internal resources and capabilities should be considered in strategic planning;
(xi) Why a vision is important to identify market gaps and to support change efforts;
(xii) The dynamics between a corporation's headquarters and its business units to create competitive advantage.

After that, in the third part, the author adds further detail to the Methodology. In this part, the author explains the approaches, challenges and considerations of the research.

In the fourth part, the author presents the research findings, relating the variables of the datasets with the strategic planning framework. Finally, the fifth part is a conclusion with closing remarks, contributions to the academia and to the industry and the limitations of this thesis.

II. Literature Review

1. Blockchain

a. Introduction

Bitcoin and the blockchain construct were officially presented by Satoshi Nakamoto in a white paper, published in November 2008. Nakamoto claimed that, in order to be trustable intermediary guarantors, the traditional financial institutions incur in many transaction costs. Thus, the main proposal is to shift the base of electronic payment systems from trust in third parties to peer-to-peer cryptographic proof (Nakamoto, 2008).

The backbone of this change is the blockchain, a decentralized network that allows any user (i.e. node) to interact with another user without relying on (financial) intermediaries but still through a safe system. The most common example is the transfer of funds from user A to user B in the form of digital tokens (e.g. bitcoins). For the sake of explanation and for the moment, the author will stick with this transfer example, but there are many other possibilities.

All the transactions between any two nodes are recorded sequentially in a public digital ledger, whereas the bundling of many transactions results in a block of the blockchain network. Each block contains three main data strings called hashes. The first one associates the current block to the previous block; the second hash uniquely identify the specific block in the blockchain; and the last hash contains a summary of the transactions that are stored in the block.

This summary is created through an encryption algorithm and stored in a data structure called *Merkle tree* (Nakamoto, 2008). A technical description of said structure is out of the scope of this thesis, but to put it briefly, its protocol turns transactions details into cryptographic hashes and bundles them in pairs until there is only one left, the root hash or *Merkle root*. The figure below provides an example with four transactions.

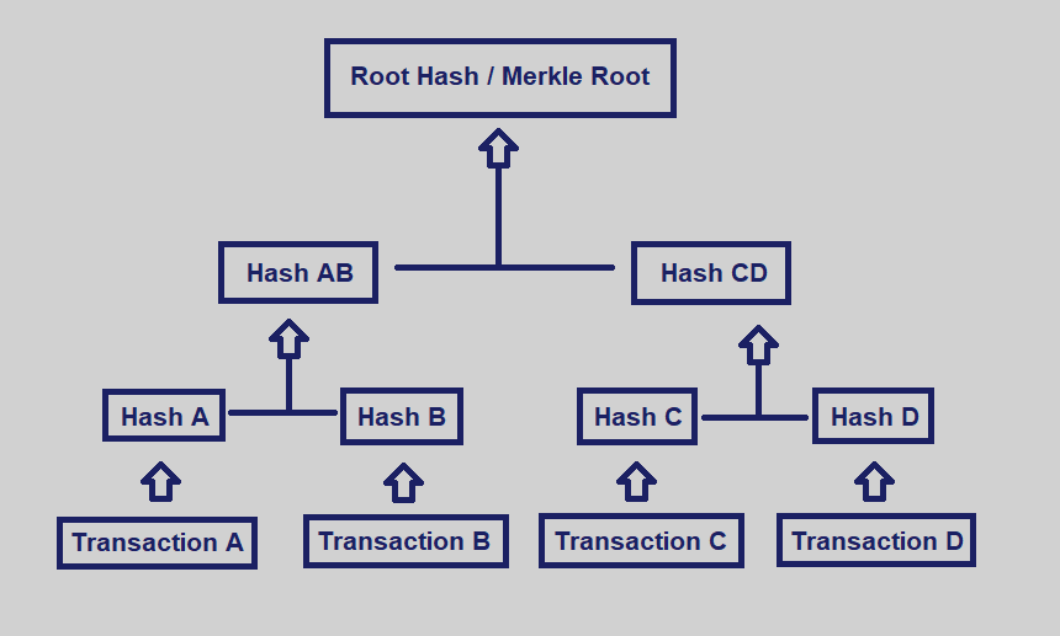


Figure II-1 Example of Merkle Tree
(Ray, 2017)

The cryptographic key that identifies each user and is recorded in the block when the summary hash is created is not necessarily related to the personal data of the users (Perugini & Dal Checco, 2015), maintaining a level of anonymity and privacy. A given block is only chained to the public repository after the validation and verification over the network. Furthermore, once it is recorded, it can no longer be deleted (Wright & Di Filippi, 2015). Finally, all nodes in the network store a copy of the blockchain and they synchronize periodically to ensure they carry the same database (Wright & Di Filippi, 2015).

b. Block Confirmation

In the transfer example, after node “A” makes a transaction to node “B”, this transaction is queued in a pool of unconfirmed transactions and must be verified multiple times by other nodes in the network to ensure the legitimacy and consistency. This is done mainly by checking if “A” had enough funds and if the funds were not expended in another transaction. If a transaction is considered invalid, it is discarded.

When a number of transactions is batched in a block, a mathematical question is broadcasted to the network. This question considers when the transactions happened, their timestamps, and the hash of the previous block. A volunteer node “C” can try to solve the question by trial and error, which demands a lot of processing power from the computer. Once “C” finds a solution, it generates the hash that identifies the block and suggests chaining the latter to the network’s repository. “C” calculated the summary hash of all the previous branches of the Merkle tree.

The chaining effectively happens only when the other nodes reach a consensus regarding the legitimacy of the block and the transactions inside it. “C” is then awarded a given number of bitcoins or another cryptocurrency within that blockchain network. Whereas it took “C” a relatively long time to solve the mathematical question, the solution (summary hash) is easily checked by the other nodes when they are validating the block. The whole mechanism is usually referred to as *proof-of-work* and node “C” was a *miner* in the example.

What makes it unfeasible for an attacker to create a parallel, fraudulent block, with unverified transactions, is that the nodes only reach a consensus when verifying the longest possible path for the blockchain and ignore shorter paths. A path is the number of blocks between a specific block and the first block created, called the *genesis block*. To effectively cheat the system, the attacker would need more processing power than half of the combined network. In this unlikely scenario, it would be possible to generate and verify blocks faster than the rest of the network. The other nodes would consider the new longest path as legit and would continue building the blockchain upon the fraudulent block.

c. Governance

This newborn technology must be implemented diligently to pave its way on financial transactions and other applications. Currently, there is an intrinsic paradox in blockchain public networks that brings up a social concern (Atzori, 2015).

While the construct originated as means of decentralization, promoting independence from third parties and, to an extent, equality, it encompasses strong asymmetries of information and power between developers and users (Atzori, 2015). For example, even though any user can contribute to the code through global cooperation forums, any changes to Bitcoin’s governance structure must be approved by a small group of core developers (Gasser, Budish & West, 2015).

Another model is that of Ethereum, in which governance decisions are based on ownership and a vertically structured hierarchy (Atzori, 2015). All this centralized decision power fosters the emergence of a technocrat elite which has the opportunity to control or exert influence over profitable businesses, like mining (Gervais, Karame, Capkun & Capkun, 2013).

Atzori (2015) warns that the integration of blockchain to everyday life requires an interdisciplinary effort and special attention, mainly from social sciences, to ensure social cohesion and the improvement, or at least maintenance, of individuals’ rights.

Most known cryptocurrencies operate under public networks and bring, to some extent, the governance concerns aforementioned. However, private blockchain networks are also possible, and that’s where lies the potential for companies planning to implement it internally or along their supply chains.

d. Types of Network

The most widely known model is that of Public Networks, which, as mentioned above, is used by most cryptocurrencies. It is an open network that allows any person to join and participate on core activities, including writing, viewing, validating and auditing transactions (Seth, 2018). It is indicated to permanently record a transaction, as once the block is validated it cannot be changed. A practical use for a company would be making a proof of certification along its supply chain available to individuals that don't wish to submit a specific registration to a network to check said certification (e.g. a potential customer browsing the environmental compliance of a given retail product).

On the other hand, Private Networks are closed and only allow selected participants, verified by a central operator (Seth, 2018). It is naturally indicated for transactions containing sensitive information (e.g. purchasing orders from a given supplier or customer personal identification), which can eventually be changed. They function mostly like private databases that can be efficiently shared between corporate partners.

A third kind, Permissioned Networks, are a mix of the previous two. As the name suggests, they are more permissive after an identity verification. There are varying degrees of permission inside the network and specific known nodes (institutions) validate and permanently record the transactions. A practical example would be cases of cross-border purchasing/selling orders (Seth, 2018). For customs clearance, a regulatory agent needs access to some bits of sensitive information, but not to all of it.

A last kind are Consortia, when companies jointly develop applications in any kind of network with different partners or even competitors. They are a mean for accelerated learning and cost savings but might involve sharing sensitive information. As a note, the previous categories consider an in-house development of applications inside the networks.

e. Applications

Blockchain was conceived with cryptocurrencies and is intrinsically connected with them, but its network validation can be extended to other uses in other areas. It is a decentralized database and a permanent, tamper-proof repository that can register information and instructions about documents, contracts, properties and assets (Atzori, 2015). As such, one of the main applications are Smart Contracts, automatized protocols that self-execute actions in agreements between two or multiple parties (Szabo, 1997b).

The concept itself dates back to 1997, when the researcher Nick Szabo published papers theorizing about the evolution of data encryption (Perugini & Dal Checco, 2015). Szabo introduces the topic by making a comparison with vending machines, a "primitive ancestor of smart contracts" (Szabo, 1997b). They are a simple smart

contract that uses conditional coding language to create a decision tree path, given external stimuli. If a specific condition is met, certain outcome will happen. If the aforementioned condition is not met, the logical sequence changes paths and will try to validate another condition. In the vending machine example, if the amount of cash inserted is exactly the amount needed for product, then it dispenses said product. If the amount is higher, it will calculate the change and dispense both the product the change. Finally, if the amount is lower and a time threshold has elapsed, the machine will return all the amount as change and dispense no product.

The inception of and advances in blockchain technology brought Szabo's theory closer to reality. Bitcoin was a forerunner of this technology, but it is on the Ethereum network that most development of smart contracts is currently happening. The protocol was presented by Vitalik Buterin in January 2014 and differs from the Bitcoin blockchain paradigm mainly due to the focus of the decentralized database as means of distributed consensus (Buterin, 2014). It is an open source platform that allows the programming of generic applications and assets inside the network (Atzori, 2015). Whereas it offers numerous resources that can be written with different kinds of operating code, the platform also enables the interaction of these through a message framework (Wood, 2014).

f. Internet of Things and Increased Coverage

Caria (2016) and Perugini & Dal Checco (2015) argue that not all operations can be fully executed digitally. Such is the case of products or services that are purchased online, but will be delivered to a physical, real world address. Caria (2016) states that there is a dichotomy between the real and virtual worlds. The transaction of the payment can be processed normally through the blockchain, but how could the network ascertain the transference of the rights? Perugini & Dal Checco (2015) point out that the platform cannot process any operation that includes a material consistence or will be performed in the real world.

However, while this is currently true, the boundaries that characterize this dichotomy will weaken with the advances of the *Internet of Things* (IoT). IoT encompasses the development of smart solutions for everyday household appliances and even machinery, increasing their communication capacity via cloud computing. In other words, it is a way to connect "things" to the internet. Adding the use of sensors, data can be collected and analyzed to provide efficient interactions and outputs. Integrating IoT demands a diligent execution aiming to improve infrastructure and mainly security. As we get more reliability on it, the potential coverage of smart contracts will be broader. Arguably, its common and broad acceptance will happen in gradual steps, in the same fashion that we started using the web on PCs and mobiles.

Furthermore, tokens that can identify assets and proprieties already exist in the blockchain networks. *Colored coins*, for example, can be used to indicate the

ownership of a specific asset and also its transference through the network because they can store personal data and specific information about an asset or even digital rights. These digital coins are “colored” because they are qualified in a special way to avoid its expending as virtual currency (Perugini & Dal Checco, 2015). Nonetheless, to be tied to the coin, said asset must be able to send a private key and receive a hash code. As IoT creates the potential of connecting any appliances or machines to the internet, Ethereum could be able to process the propriety of those in its network (Assunção & Gonçalves, 2016).

g. FOMO Effect

The FOMO (“Fear Of Missing Out”) effect is an apprehension or anxiety that others might be having rewarding experiences by taking a specific action that the individual is not taking (Przybylski, 2013). While FOMO is usually discussed under a psychological perspective of the individual, it can also be observed in corporate decisions.

In March 2018 the IT consulting company Gartner conducted a webinar with professionals to discuss the adoption of blockchain. 321 participants agreed to answer their poll questions at the end. An interesting insight from that seminar is shown below.

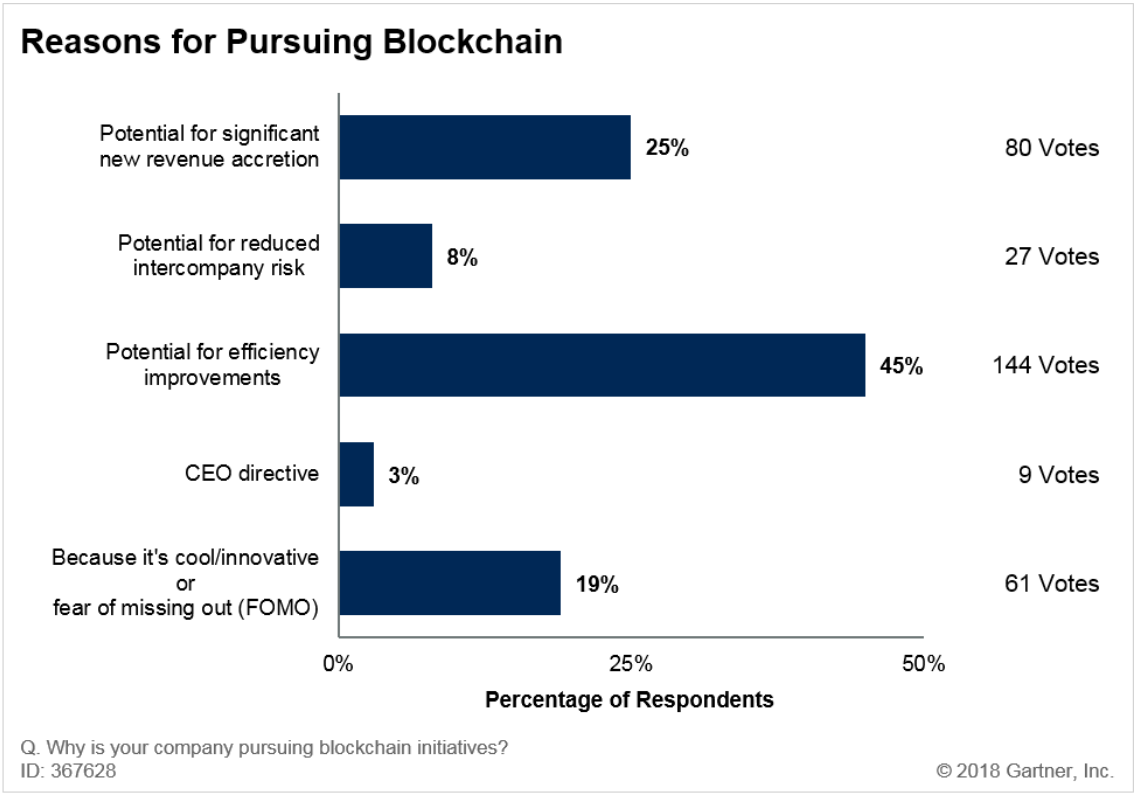


Figure II-2 Reasons for Pursuing Blockchain
(Gartner 2018b)

As can be seen, the majority points out the potential for efficiency improvements as a reason. However, almost 20% of the respondents declared that their company is pursuing blockchain due to the FOMO effect; a number that is, arguably, too high.

Furthermore, Pournader et al. (2019), while citing Pawczuk et al. (2018) and Carther and Koh (2018), defend that the adoption of blockchain is more likely to happen in supply chain, logistics and transport activities. This indicates that decisions pertaining to those areas might be influenced by the FOMO effect.

It is then interesting to assess if companies are being diligent on their decision to eventually adopt blockchain, especially considering the aforementioned activities.

2. Strategic Planning

a. Introduction

Given that blockchain is a trendy new technology with arguably a lot of potential, it might tempt decision makers to overlook important factors. Its planning and implementation represent a complex change that definitely is not the best choice for all cases. Companies must be aware of pitfalls like the infamous *FOMO* effect, as mentioned above, and avoid investing without proper planning.

To the extent of building ways to verify if managers are being rational and accurate on their decisions, an organized analysis is imperative. In that manner, it is possible to identify areas, processes or activities that are most likely to present problems.

As such, the following topics will discuss the author's proposed approach through the 9-step theoretical framework elaborated by Venzin, Rasner & Mahnke (2018). Called a Strategy Map, it builds on many concepts of the current strategy literature and each step is associated with relevant management tools. However, the focus is how everything is integrated into the whole strategic management process. Finally, they point out that a strategic decision: (i) has long-term effects; (ii) is difficult to reverse; (iii) requires resource commitment; (iv) is conditioned to uncertainty; and (v) is based on analysis.

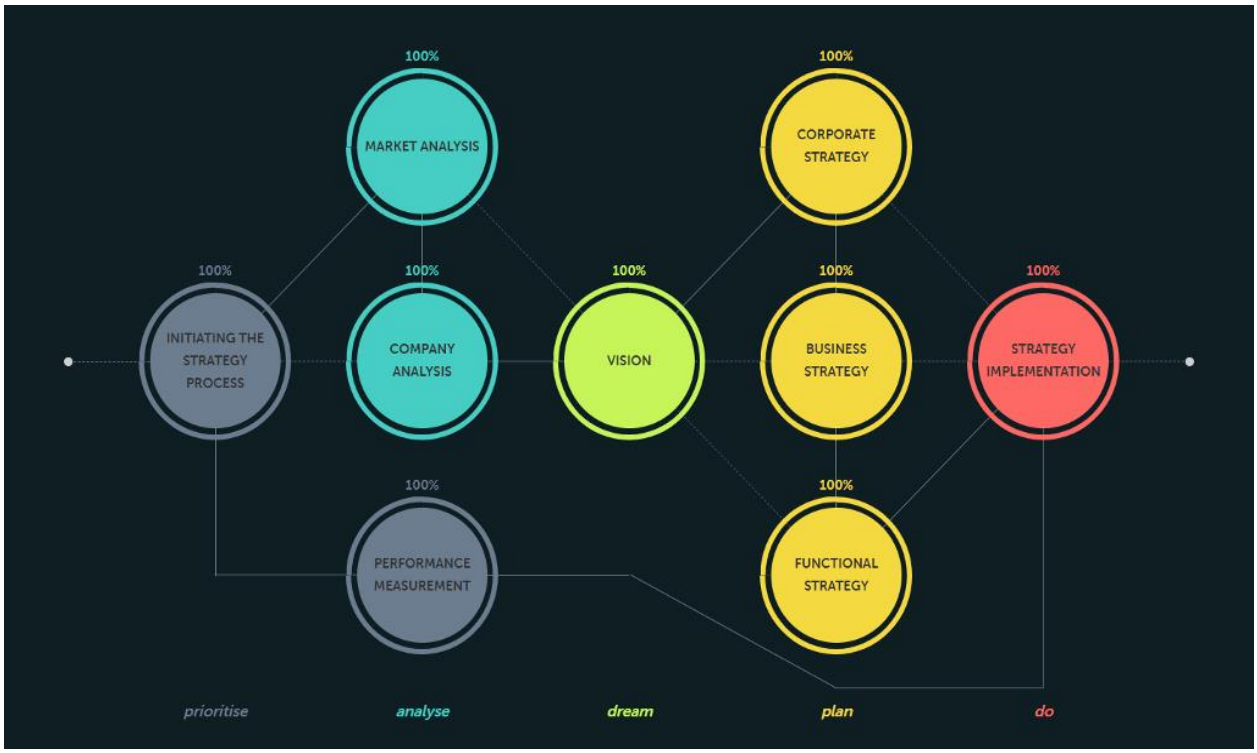


Figure II-3 Strategy Map
(Venzin et al., 2018)

b. Performance Measurement

As can be seen on the Strategy Map above, the whole framework is a flow with many instances of iterations. In practical terms, the need for changes is usually noted after a prior reading of performance indicators. The strategic process moves forward with this catalyst as it supports the creation of a sense of urgency.

Besides this use as an early warning mechanism, it also serves as a monitoring tool for effectiveness and implementation. This step enables a comparison of what *should be* and what *is*, so management can introduce corrective measures to reach targets (Venzin et al., 2018). For that matter, Venzin et al. (2018) cite Balanced Scorecards as an example. It is a mean to periodically measure performance and link it to long-term goals. The focus on a limited number of representative figures allows for a proper analysis of the organization's current context and eventual adjustments on the long-term objectives.

c. Initiating the Strategy Process

The strategic process is approached by many managers with apprehension, frustration and ignorance (Venzin et al., 2018). Arguably, the strategic process is often misunderstood as not related to the core business, having few touch points with day-to-day activities. Furthermore, managers' performance is usually assessed considering short/medium term results, whereas the effects of strategies might take several years

to become evident (Venzin et al., 2018). Unwillingness can actually come from any position since that, considering the long-time horizon, roles tend to change and so do the teams responsible for implementing the strategy process.

Given this context, and as will also be described in the “Vision” and “Implementation” topics, it is paramount to have a clear communication with milestones and incentives to gather internal approval. In fact, planning and taking actions that will raise the likelihood of success is one of the main concerns for this step (Venzin et al., 2018).

First and foremost, past strategy processes must be studied to assess which approaches would be accepted and to gather best practice examples. Then, strategic models should be adapted accordingly to suit the company’s context, mitigating change resistance. A company with a more conservative profile might prefer a throughout analysis with scenario simulations of the effects of a given project on key performance indicators. On the other hand, for a company with a more innovative profile, a brainstorming session bringing new ideas and some key data numbers could be enough.

It is naturally easier to convey a proposal with clearly defined concepts and guidelines. As such, it is important to ascertain if everyone involved has a common understanding. For example, by previously compiling commonly used terms in the company and individually asking each person their definition for these; and later comparing them in meetings. Venzin et al. (2018) argue that this experiment equalizes the knowledge. Furthermore, a framework that determines roles, responsibilities, timing, reporting and other work conditions should be established. These efforts improve the quality and speed of strategic decisions.

Venzin et al. (2018) point out that efficiency is the focus during a later stage, implementation; whereas effectiveness is the focus of strategy planning. Thus, it is important to properly define priorities to raise effectiveness. This can be achieved with the use of a *Project Portfolio Matrix* considering urgency and influence on company success. As shown below, by plotting different projects, it is possible to create a simple yet powerful tool regarding decision making.

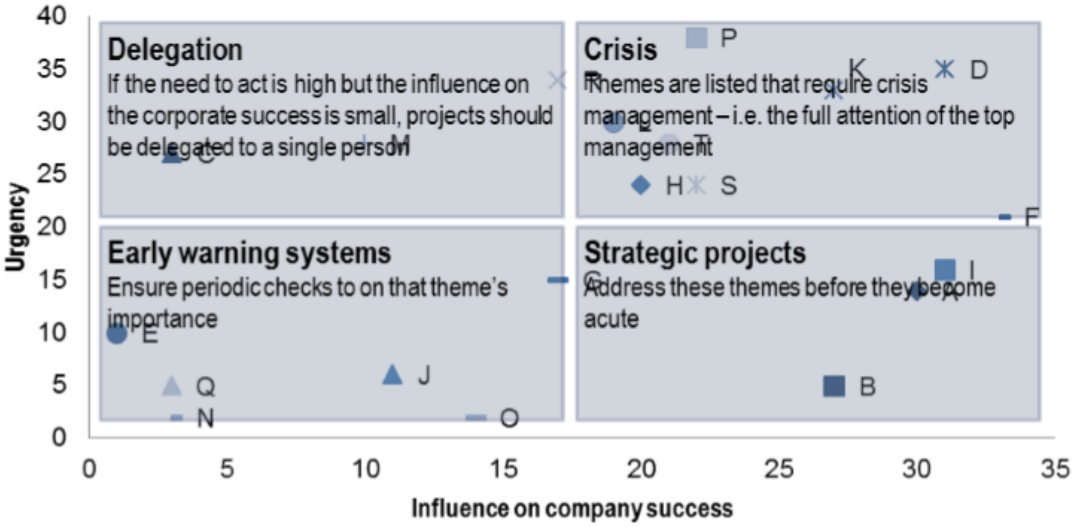


Figure II-4 Project Portfolio Matrix
(Venzin et al., 2018)

d. Market Analysis

A duly made market analysis helps to identify attractive markets and increase awareness of a given industry. By reducing complexity, one can find rough patterns and trends besides preventing errors (Venzin et al., 2018). Grasping the structure of an industry allows for changing and exploiting opportunities.

A market analysis process should begin with its segmentation. Broad generalizations often yield false results and, consequently, to effectively reduce the complexity of an assessment, it is important to adjust the range covered. The many ways to create segments is out of the scope of this paper.

Given the proper segmentation, the market environment should be considered and, regarding this, Venzin et al. (2018) recommend the *PEST analysis* – Political (government stability, current & new laws etc.); Economic (inflation, interest rates, economic cycles etc.); Social (demographics, consumer behavior etc.); and Technological (innovation rates, degrees of modernization etc.) factors. Prioritizing the factors in order of importance helps brainstorming and forecasting how trends will affect customers, suppliers and competitors (Venzin et al., 2018).

After the market environment, we can move to the description of the industry structure, and, for that matter, one of the best tools is *Porter's 5 forces*: industry competition, threat of new entrants, threat of substitutes, bargaining power of customers and bargaining power of suppliers (Porter, 1979). It is a relatively simple model that reduces complexity and helps to identify the industry's supply and demand structure; negotiation power struggles between the participants; and profit opportunities.

The conclusion of the market analysis is the definition of key success factors, equal for all competitors in the market. Focusing on strategic concerns and involving decision-

makers in the data collection and analysis early allows for an understanding of how a company can stand out from the competition, yielding the ability to flexibly exploit changes in the industry structure. Finally, this market-based approach to strategic management is only recommended for stable markets (Venzin et al., 2018). Dynamic markets might make some of the data collection and analysis redundant.

e. Company Analysis

On the other hand, a resource-based approach to strategic management is more adequate for dynamic markets with fast-paced changes (Venzin et al., 2018). Uncertainty in the market environment might make in-house resources and capabilities more relevant to create and sustain profitability.

The first stage of the company analysis is to search and list the available and useful resources and capabilities in the company. After evaluating and comparing the influence of the resources and capabilities on creating competitive advantages (i.e. their strategic value), a strategy that fosters these should be chosen. Finally, it is needed to determine which resources and which capabilities should be protected, developed or acquired.

Venzin et al. (2018) define two classifications for resources: *physical*, the tangible assets (machinery, vehicles etc.); and *virtual*, the intangible assets (reputation, qualified staff etc.). By themselves, though, they have little value. It is the company's ability to combine and use resources into processes that creates competitive advantage. As such, the many *functional* process capabilities (research & development, marketing, finance, logistics etc.) should be considered. Finally, since a practical division of labor usually takes place in companies, an *integrative* capability of these functional processes is also important.

There are four main characteristics considered to determine the strategic value of individual resources or capabilities: *value* (generation of high value for the customer), *rarity* (how scarce it is), *imitation* (how hard it is to be replicated) and *substitution* (if it cannot be substituted). Even though an individual resource or capability might be easy to copy, the combination of many of these can create a value-chain that is hard to replicate. When an individual or a group of resource/capability is unique, hard to replicate and to substitute in the medium/long-term and also generates value for the customer, it is a sustainable source of competitive advantage (Venzin et al., 2018). Possessing such allows the company to actively shape the market.

Besides planning changes in its competitive advantage, a company can also create and sustain profitability by acting on industry attractiveness using its organizational capabilities to influence individual competitive forces. In this context, Porter's 5 forces might be useful.

f. Vision

A vision provides a directive for a desirable future and is the starting point for change (Venzin et al., 2018). To properly address expectations and coordinate different stakeholders, it should set challenging yet achievable objectives. Furthermore, it should be easy to communicate and clearly present the elements to be changed. For that matter, Venzin et al. (2018) recommend the *SWOT analysis*. It is a model that shows gaps between a specific market segment requirements and the current company situation.

The company's Strengths and Weaknesses, arising from its resources and capabilities, should be compared against the competitors'. On the other hand, Opportunities and Threats are based on the market analysis. This summary of the internal and external situation should then be used to further analyses and also to create a storytelling about the gaps and what strategic decisions the company is making (or will make) to overcome them. Thus, the company is forming efforts to build conditions that stimulate performance and support change.

g. Corporate Strategy

In the Corporate Strategy step, Venzin et al. (2018) point out how company Headquarters ("HQ") contribute to the strategic process. Their role is to create parenting advantage by coordinating and creating synergies along the value chain and the different Business Units ("BU's").

Linking activities in the value chain fosters economies of scope and economies of scale. By respectively increasing the variety of goods (scope) or the volume of goods (scale), the average cost per good is decreased. Sharing some stages of the value chain might be advantageous, making processes more efficient. Naturally, there is certain elasticity and limitations for the synergies, and it is a HQ competence to assess how much BU's can be linked horizontally.

Important to note is also the sharing of knowledge. By integrating and complementing the capabilities and resources of different BU's, the HQ can improve strategic planning and increase the competitiveness of various units (Venzin et al., 2018). For example, the implementation of a new technology can be pilot tested on a more permissive BU. After gathering initial insights, best practices and successful case studies, the planning for and extension to other BU's would be facilitated.

h. Business Strategy

In contrast, during the Business Strategy step, Venzin et al. (2018) discuss how individual Business Units play on the strategic process. Their role is to develop competitive advantages, either by *cost leadership* or by *differentiation*.

The cost leadership approach builds on and directly supports the HQ role of creating synergies and economies of scale/scope. As the name indicates, it focuses on controlling costs while still maintaining a comparable quality, usually producing a large number of items. Furthermore, since price is the selling point for the target customer, it is paramount to be among the best players in the segment. With a strategic cost analysis of its value chain, the BU can identify and optimize cost drivers by forming strategic partnerships with suppliers, outsourcing and standardizing processes.

On the other hand, the differentiation approach aims to offer products or services with additional utility. The focus is on performance and how to ascertain which special features or characteristics differentiate the company from the competitors. For that matter, the company needs to understand what of its own resources/capabilities are valuable, rare, hard to replicate and hard to substitute. By identifying these differentiation drivers, the BU can develop a unique selling proposition that explains the added value to the target customer (Venzin et al., 2018).

i. Functional Strategy

The Functional Strategy step is a bridge to the actual Implementation, with clear indications of the competitive advantages. It shifts the focus from effectiveness to efficiency and serves as a guideline to raise the productivity of available resources (Venzin et al., 2018). Depending on the strategies defined during the previous steps, different activities and goals are assigned to each functional area.

j. Implementation

Naturally, implementation of a strategy implies change, which is often a controversial topic in organizations. A strong resistance to change is usually a consequence of (i) a sense of urgency that is not acknowledged, (ii) a vision that is not shared, (iii) a strategy that is not understood and/or (iv) incentives that are not enough (Venzin et al., 2018). This is especially true for the middle management, referred to as organizational clay by Venzin et al. (2018), as they act as an intermediary between Headquarters and Business Units. Their task is to promote an effective flow of information to mitigate misinterpretations, but they could choose to hamper changes. As such, it is imperative to have them aligned with the initiatives, providing a fair addressing of expectations and promoting a clear communication of goals behind the strategies.

k. Expected Variables

In conclusion, the theoretical framework is a structured way to plan, analyze, implement and measure strategy initiatives. All the steps are linked as a flow and also present intended overlaps to cover as many perspectives as possible. It is by no means a strict, compulsory list of activities, but rather a guide. However, it does cover tested and proved concepts, theories, processes and tools. While not necessarily and specifically framing the steps, an effective and efficient strategic planning should have touch points with the framework. That is why the author has chosen this framework for the assessment in this thesis.

Blockchain planning and implementation scenarios are naturally more dynamic. This most likely makes analyses of the market environment redundant, as the information would already be obsolete by the time it is ready for serving as input for decision making. Even so, the author will still try to consider the related step, “Market Analysis”, as it influences the “Vision” step. The latter, in turn, arguably helps with clear coordination and communication, which are needed when dealing with a disruptive change such as blockchain.

While proper implementation is as arduous – if not more – as proper planning, solving problems in implementation would be pointless if problems in planning remain. Arguably, the latter most likely cause the former. As such, this thesis will not cover analyses under the “Functional Strategy” and “Implementation” steps. Likewise, the monitoring of the “Performance Measurement” step would not contribute to this thesis.

Before moving to the Methodology, the author presents a brainstorming exercise to draft variables expected to be found with research and that could help to assess diligent strategic planning for the adoption of blockchain:

Initiating the Strategy Process: (i) priority of blockchain in a portfolio of potential projects, (ii) efforts of companies to communicate new initiatives, (iii) comparison of blockchain adoption with past change initiatives, (iv) views on time horizon of the effects of strategical changes, (v) if the need for changes usually flows top down or bottom up, (vi) common/leveraged knowledge regarding blockchain, (vii) views on blockchain being a strategy initiative or just a solution for the tech savvy.

Market Analysis: (i) views on potential changes in bargaining struggles in the industry structure with the adoption of blockchain, (ii) what market environment factors could influence the technology, (iii) insights regarding metrics of success, (iv) if any studies are being carried out/commissioned to understand the current market context, (v) how involved are decision makers in that assessment.

Company Analysis: (i) what actions, if any, are being taken to identify internal resources and capabilities that have the potential to foster and lever blockchain technology, (ii) what resources and capabilities companies are currently lacking that

are identified as relevant to blockchain, (iii) what actions, if any, are being taken to develop relevant resources and capabilities, (iv) views on the dilemma of gaining and maintaining competitive advantage vs. the reduced costs and less risks in development with collaborations.

Vision: (i) how stakeholders are being coordinated/included in the decisions and if it is being effective, (ii) (more) reasons to pursue blockchain, (iii) current market gaps, threads and opportunities, (iv) assessment of current strengths and weaknesses, (v) insights on how to support change, (vi) how to balance long term effects with short/medium term compensation, (vii) how objectives and milestones are being set, (viii) comparison against competitors.

Corporate Strategy: (i) benefits of blockchain for organizations as a whole, (ii) how can blockchain contribute to the creation of parenting advantage, (iii) main activities of the value chain that can be improved with blockchain, (iv) if contributions would be more relevant to the variety of goods/services or to the volume of goods/services offered, (v) views on the sharing of knowledge across BU's and between BU's and HQ, (vi) what activities of the value chain – if any – would face a limits that blockchain can't improve on, (vii) expected magnitude of cost savings, (viii) expected magnitude of CAPEX and OPEX to implement and maintain blockchain, (ix) how HQ is considering to implement and roll changes to BU's.

Business Strategy: (i) what cost drivers could be optimized with blockchain, (ii) how can blockchain foster strategic partnerships, (iii) what are the main envisioned use cases, (iv) can blockchain help the BU deliver additional utilities or benefits to the customer, (v) can blockchain help to identify special features and characteristics that differentiate the BU, (vi) can blockchain help to better communicate the BU's selling propositions.

III. Methodology

1. Research Approach

The objective of this thesis is the assessment of strategic planning regarding the blockchain technology. More specifically, to answer the question “What strategic processes - if any - are being properly planned regarding the decision to adopt blockchain technology?”. To that extent, the author builds on some steps of a theoretical framework to present to the reader strategy concepts in an organized manner.

During the Literature Review potential variables on each relevant step of this framework were brainstormed to serve as proxies to assess compliance (or not) with strategic planning. Not exhaustively, this drafting of variables is a starting point to observe and classify blockchain adoption under a strategic view with the framework. Regarding that, it is important to emphasize that blockchain is a newborn technology that still is under development. The potential and opportunities are widely unclear and can change drastically depending of the target use case or the implementation model. Also, many misconceptions exist and will likely persist during the next years. That said, the author’s motivation is to gain a more accurate profile of events, situations and phenomena (Saunders et al., 2012) involved with the adoption of blockchain. As such, a descriptive research design is the most adequate.

After that consideration, information to feed the framework with is needed. To that extent, the author reminds that (i) this thesis is looking for evidence of duly strategic planning and that (ii) blockchain is not an isolated occurrence, it is being developed and tested simultaneously on many fronts. To actually try to capture the global context and infer something meaningful of whole industries, broad coverage of experts on the technology frontier is needed. Regarding that, as Bulmer et al. (2009) point out, a new analysis of data can expand the original interpretations, bringing forth additional or different knowledge and conclusions. In effect, both raw data and published summaries can be considered. Additionally, according to Saunders et al. (2012), secondary data probably are the most adequate sources to meet the objectives of research projects that demand national or international level readings.

Saunders et al. (2012) also expanded on the classification structures for secondary data sources elaborated by other researchers (especially Bryman, 1989; Dale et al., 1988; Hakim 1982, 2000) with three main umbrella categories: Documentary, Multiple Sources Compiled and Survey-based. Naturally, the data carry characteristics from the original sources. Furthermore, in the survey-based category, it is interesting to emphasize the popularity of questionnaires, a structured and standardized information collection method that allows for comparisons and identification of general patterns in the sample (Saunders et al., 2012). As such, it is reasonable to argue that a secondary study still allows for the same outputs from the original source.

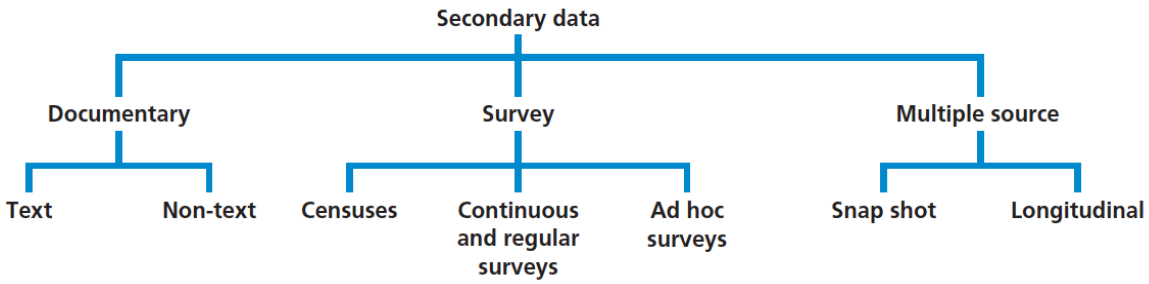


Figure III-1 Types of Secondary Data
(Saunders et al., 2012)

Additionally, under Survey-based lies a subcategory, Ad Hoc Surveys, which refer to punctual surveys conducted by organizations with specific goals and no pre-defined plan for repetition. Considering the novelty of blockchain, as presented during the Literature Review, the author considered that censuses or continuous/regular surveys would not sufficiently cover the topic yet. In effect, as Saunders et al. (2012) mention, finding relevant secondary data required some detective work.

The starting point were online databases which the author had knowledge of due to professors' recommendations. The most promising one was Statista, a portal that indexes statistics and survey results collected by market and opinion research institutes. It has actually served as tertiary source of information in the sense that a compilation of statistics it has published in 2019, the Statista Blockchain Dossier (Statista, 2019), pointed the author to other studies with datasets about blockchain. Thus, it was possible to ascertain that relevant secondary data are likely to exist and the next step is an evaluation process of these potential datasets (Saunders et al., 2012). This evaluation process as well as some advantages and disadvantages of secondary data will be discussed shortly after the next topic.

2. Data Collection Procedure of the Original Researches

As a preface to the evaluation process discussion, the author first is going to present the reports that provided the data to assess strategic planning through the 9-steps theoretical framework. These reports are the official publications of two surveys conducted by the consulting company Deloitte Touche Tohmatsu Limited. As mentioned above, the reasoning behind the choice will be explained shortly afterwards.

In *Breaking Blockchain Open: Deloitte's 2018 Global Blockchain Survey* Deloitte surveyed 1053 companies across seven countries: Canada, China, France, Germany, Mexico, United Kingdom and United States. Conducted online from March 26th to April 5th, 2018, in a multiple-choice format, the survey had the goal of gathering more insights regarding the overall attitudes and investments in blockchain. The sought-after respondents were senior executives that had, at least, a broad understanding of

blockchain and that were able to comment on their organization's investments regarding blockchain (Pawczuk et al., 2018). The annual revenue threshold to select a company was US$500 million or more for US companies and US$100 million or more for companies of other countries. Finally, the report was published in September 2018.

In *Deloitte's 2019 Global Blockchain Survey: Blockchain Gets Down to Business* Deloitte expanded on the previous year study and surveyed 1386 companies from twelve countries: Brazil, Canada, China, Germany, Hong Kong, Israel, Luxembourg, Singapore, Switzerland, United Arab Emirates, United Kingdom and United States. The surveys were conducted from February 8th to March 4th, 2019, with the same format, goal, target respondent and revenue thresholds as past year's. It was published in May 2019.

Deloitte's reputation arguably has influenced the sampling size or, in other words, the number of willing respondents. The number of non-respondents or discarded answers, if any, were not disclosed though. Additionally, both surveys were commissioned internally in the Deloitte group. Finally, the information publicly shared in both studies are summaries of the data collected. Even without all the details, they still are insightful for the objectives of this thesis.

As a clarification, the report that describes the study conducted in 2018 will be hereafter mentioned as "Deloitte 2018". Likewise, the report about the study conducted in 2019, "Deloitte 2019".

3. Evaluation of Secondary Data Sources

a. Advantages & Disadvantages

Starting the evaluation discussion, first and foremost, it is interesting to point out that the main advantage of secondary data are the cost savings, specially the researcher's time and money (Ghauri and Grønhaug, 2010). As such, it becomes possible to study data that covers a way broader population. Also, as Smith (2006) defends, datasets collected by governments or organizations are likely to yield higher quality than that collected by an independent researcher. Finally, as Denscombe (2007) describes, secondary data usually provide sources that are permanent and relatively easy to check, which makes research findings based on the datasets more open to critical examination.

On the other hand, the natural main disadvantage is that the data were collected for a specific purpose that does not necessarily match all the objectives of the researcher that is reanalyzing the datasets (Denscombe, 2007). Additionally, as the author has experienced during the elaboration of this thesis and as Saunders et al. (2012) argue, most secondary data is likely to be in published reports. Thus, data may have been compilated and aggregated in some way. Finally, Saunders et al. (2012) also warn that

the initial purpose of a report may influence how data are presented at least to some extent.

In line with addressing the aforementioned disadvantages, it is important to ensure the research question will be answered by the secondary data sources. Thus, a careful evaluation is imperative. Saunders et al. (2012) suggest a three-stage process to first, assess the overall suitability; second, evaluate precise suitability and; third, ponder costs and benefits.

b. Overall suitability

Regarding the overall suitability, Saunders et al. (2012) mention the necessity to ensure that the secondary data contain data variables that cover the whole population of interest and enable the answering of the research question. To do so, according to Hakim (2000), there are two considerations to be done: if unwanted data can be excluded and if sufficient data remains for analyses after said exclusion(s).

The Deloitte studies had a purpose of raising insights about attitudes on and investment in blockchain, but not all the results are necessarily relevant for this thesis. For example, the past expenditure on blockchain per industry variable presented on Deloitte 2018. While there might be strategic reasoning behind it, investments already incurred are part of implementation, not planning. This could be matched with another step of the theoretical framework, but not to the ones chosen considering this thesis objectives. Nonetheless, even after excluding this specific variable from the analyses, it is still possible to search for evidences of strategic planning by considering the other variables presented.

Likewise, some variables that the author expected to find in secondary sources were absent from the Deloitte studies. Saunders et al. (2012) define these as unmeasured variables and argue that, however, this might not be particularly problematic for descriptive research. In effect, during the Literature Review, the author had brainstormed about variables that could be used to assess compliance to strategic planning. But, during the first rounds of analyses of the Deloitte reports, the author has realized that other variables, presented on the latter, could also be used as proxies.

After reviewing, two groups of criteria were defined: variables from the 2018 study and variables from the 2019 study. After building the inventory of available and relevant information, the author proceeded to hypothesize how to study the relation between the variables and the relevant steps of the theoretical framework. The result of that exercise is summarized below:

Strategic Planning	Variable/Proxy	Source
Initiating the Strategy Process	Declared Level of Understanding	2018 study
	Perception of Blockchain Solely as Tool for Financial Services	2018 study
	Relevance within Organization	2018 study
	Department Responsible for Decision Making	2018 study
Market Analysis	Metrics of Success	2019 study
Company Analysis	Attitudes on Blockchain Adoption	2019 study
	Programs to Develop In-house Competences Regarding Blockchain	2019 study
	Blockchain Related Hiring Decision	2019 study
Vision	Organizational Barriers to Greater Investment in Blockchain	2018 study
	Company Current Adoption Compared to Competitors	2018 study
	Engagement of External Stakeholders	2018 study
Corporate Strategy & Business Strategy	Blockchain Models (Type of Network)	2018 study
	Blockchain Use Cases	2018 study
	Advantages over Existing Systems	2018 study

Figure III-2 Variables for Strategic Planning
(Self-provided)

As mentioned during the Literature Review, the theoretical framework serves as a guideline for effective and efficient strategy processes. To that extent, there are a plethora of variables that can be considered on an assessment. The absence of some variables does not invalidate a step as long as other variables are identifiable. In turn, the presence of some variables might provide evidence of diligence and compliance, even if weak. Regarding that, the Deloitte studies present data that foster the study of processes being undertaken by the surveyed companies. By analyzing the variables and understanding their context, a researcher can build ways to infer if managers are being rational and accurate on their decisions.

c. Precise Suitability

When it comes to the assessment of precise suitability, Saunders et al. (2012) start by pointing out that the reliability and the validity of secondary data are dependent on the method of data collection and the source. Saunders et al. (2012) also argue that survey data from large and distinguished organizations are likely to be reliable because their continued existence depends on the credibility of their data and, as such, their procedures should be strict and structured.

Pournader et al. (2019), on their systematic review of literature regarding applications of blockchain in supply chain and correlated areas, establish that there are still too few academic papers on the topic. On the other hand, they cite recent publications that provide a holistic view on blockchain technology and argue that these are evidence that this situation will change drastically with an increasing interest in the near future.

Pournader et al. (2019), mentioning some publications, also attest that industrial research conducted by reputable consulting companies like McKinsey, Deloitte and Ernst & Young are crucial in this view of the future for academics and professionals

alike. Finally, referring to Du et al. (2018) and Beck et al. (2017), Pournader et al. (2019) point that the literature on actual implementation, implications and limitations of blockchain is not sufficient. There is a lack of discussion on the reasons behind success or failure of blockchain projects. Furthermore, according to Browne (2017), only 8% of 26,000 blockchain projects in 2016 were successful, showing that a pragmatic analysis of potential causes is imperative.

In turn, Cai (2019), citing Karajovic et al. (2019), states that the "Big Four" in accounting (PwC, Deloitte, KPMG and E&Y) are the largest players in the industry and move much faster than the academia. Cai (2019) also comments that these firms are deeply engaged in the research and development of blockchain, implementing changes across different areas. Karajovic et al. (2019) assert that an overview of recent blockchain developments done by the "Big Four" indicates the disruptive nature of the technology.

Also according to Karajovic et al. (2019), Deloitte has been a rather aggressive player in the development and started working on its own blockchain in 2014. The most prominent platform, Rubix, simplifies the auditing process of blockchain transactions (Karajovic et al., 2019). Deloitte also has over 800 employees in 20 countries working on blockchain development (Faile, 2017). These facts point that the company understands the advantages of integrating blockchain technology in its portfolio (Karajovic et al., 2019). Furthermore, the former also indicate that Deloitte's researches and analyses regarding blockchain are not limited to advising its clients, but also serve as a mean to improve its own activities.

Zamberlan (2008), citing Aaker et al. (2001), states that the ethical perspective of market researches and surveys encompasses three groups of participants: (i) the client or sponsor of the project, (ii) the service provider, that plans and executes the project and (iii) the respondents, that provide information. Regarding the first group, Zamberlan (2008) defends that the conduction of an ethical survey is a right of the client or sponsor. In that sense, Zamberlan (2008) mentions that an organization that works with researches must conduct studies with quality, avoiding, among others, the violation of the confidentiality of the respondents and the deliberated change or creation of (false) information in order to promote a specific goal or agenda. Considering more than 150 years have passed since its foundation in 1845, an ethical behavior is something that certainly can be expected from Deloitte.

On that note, the author remembers that the goal of a commercial business ultimately is profit. While it is unfeasible to dismiss any and all trace of bias when it comes to the objective of attracting customers, it can be argued that no properly managed company would risk damaging its reputation by proposedly and openly providing inaccurate data to potentially close new deals. Reputation is a valuable and non-transferable intangible asset (Mahon, 2002). This is especially true for service providers like consulting companies. In the case of the blockchain surveys conducted by Deloitte, they were publicly published by the company as an institution (not just as a business unit), with

an even higher reputation risk at stake. Most likely they were reviewed and revised several times by different people with previous experience to ensure it is accurate.

Adding to reliability and validity discussion, Dochartaigh (2007) mentions the assessment of the authority of the source. In the context of secondary data obtained via the Internet, Dochartaigh (2007) suggests that the researcher look for copyright statements, as it is an indication of who is responsible for the data. Furthermore, Saunders et al. (2012) argue that online sources usually inform an email address that allows the reader to contact the author for additional information. Analyzing the reports published by Deloitte it is possible to find copyright statements paired with brief disclaimers as expected. Also, the names, email addresses and positions of all authors and contributors were disclosed.

The assessment of the method used to collect the data is a consideration also defended by Dale et al. (1988). This examination is important to try to ascertain the context of and the precision needed by the original research, which indicates potential errors or biases (Saunders et al., 2012).

The methodology statements of the Deloitte reports make clear that their researchers had objective criteria, making use of thresholds to purposefully sample respondents. While purposive sampling logically increases selection bias, this was intrinsically needed considering Deloitte's goal. Bernard (2002) defends that the strength of this method actually lies in its intentional bias, being more efficient in practical field circumstances. According to Tremblay (1957), this is due to the fact that a random member of society does not know necessarily as much of a given topic as an expert. As such, in Deloitte's studies, reaching out to specific individuals and companies was more realistic than trying to randomly choose respondents.

Bernard (2002) argues that with the continued use of the method, researchers develop an expertise on how to efficiently and wisely choose respondents and level of analysis needed to answer a question. Tongco (2007) builds on that and points that expertise is achieved by constant practice and integration of experiences, which, as mentioned before, are reasonable to be expected from Deloitte.

Hones (1990) points out that, regardless of how respondents are chosen, a method must be reproducible to yield results that contribute to the understanding of theories and phenomena. To that extent, Tongco (2007) suggests the use of systematic and detailed ways to choose respondents in purposive sampling. While reputation arguably plays a factor in respondents' willingness to participate, theoretically other researchers could conduct a similar study with similar results as Deloitte by following the latter's criteria.

Finally, even though the sampling criteria were explained in the Deloitte reports and the results cover relevant samples with more than 1,000 observations each, the number of non-respondents is not disclosed, so it is not possible to ascertain the response rates. In hindsight and as Saunders et al. (2012) argue, this might be the

case because Deloitte sees further details of their research methodology as important to their competitive advantage.

Thus far, the author has presented the views of many authors and shared some of his own to exhaustively discuss the reliability and validity of studies conducted by Deloitte on blockchain technology. Given all the considerations explained and as a conclusion to this section, the author emphasizes that, to his best knowledge, the Deloitte studies are the most complete and updated datasets that are publicly available and that can provide insightful information towards this thesis objectives.

d. Costs and Benefits

As Kervin (1999) defends, the final step for evaluating secondary data is an analysis of the costs (both time and financial resources) and benefits involved. In that sense, Saunders et al. (2012) point that the benefits are a function of the extent that they enable the researcher to address the research objectives, which can be assessed from the dataset's overall and precise suitability.

Adding to this analysis, the author highlights the concerns with availability of alternative sources of information and also the eventual losses in explanation power due to interpretations. Ideally, in the case of the latter, a researcher could triangulate findings with other sources. But that is not possible when alternative sources are also scarce. Furthermore, not many authors had similar problems with blockchain, so there is no tested solution for it.

Nonetheless, as expatiated in the Literature Review, supply chain managers are prone to the Fear Of Missing Out (FOMO) effect and this risk is specially observable with the blockchain technology. Adding to that, during a previous section of Methodology, a low success rate of blockchain projects linked with a lack of insights behind the reasons was pointed out. As such, the author had planned to build ways to start verifying diligence in strategic processes specifically concerning supply chain. This would serve as a warning if no evidences could be found regarding a given step of the theoretical framework.

Unfortunately, even though they raise many insights for the area, the Deloitte studies do not have a "Supply Chain" category. Arguably, supply chain is a functional area present in many industries, not an industry itself. Depending on the company, it can also be broken down to different areas, like purchasing, procurement, transporting, warehousing among others. Furthermore, due to data aggregation, not all variables in the Deloitte reports were presented in terms of industries. Some of them are shown as percentage of the total respondents.

As such, the author had to choose between two paths. The first option would be to generalize and widen the coverage of the research question. The main objective,

assessing strategic planning in the adoption of blockchain technology, would be kept, but the findings would not be applicable only to supply chain.

The second option would be to assume an even (uniform) distribution of the variables that are consolidated and consider that the result still is representative of each industry. An example with simplified numbers is as follows: The whole survey had 1,000 respondents from different companies, and it is informed that 26% of these are executives from 260 different companies of industry X. Then, one of the variables show that 50% of all the respondents of the whole survey agree to a given statement. The consideration would be that 50% * 26% = 13% of the 1,000 respondents are from industry X and agreed with the statement. On these arithmetic operations, numbers would always be rounded up.

While simple, this assumption is not absurd and would enable the author to meet the research objectives. According to Saunders et al. (2012), as long as they aid the researcher to answer the research question, datasets not completely reliable or with some biases are still better than no data at all. However, this choice might lack enough academic rigor. So, this thesis will present findings according to the first option mentioned, with occasional supply chain detailing when possible. Furthermore, brief references to other sources are also made to develop some discussions.

Another consideration is a potential divergence between the studies. Both Deloitte 2018 and Deloitte 2019 have similar variables that can be compared. However, there were changes in the countries that compose the samples, and a yearly comparison could be problematic. To mitigate this effect, each step was limited to variables of only one year. That means that, for example, if step X was assessed by one variable of Deloitte 2019, all the other variables of step X also must be selected from Deloitte 2019. In turn, step Y could still be analyzed considering variables of Deloitte 2018, as long as only variables of this same study were selected. As each study on its own still is representative of the target population, the conclusions regarding the strength of the evidence(s) about each step are still valid.

Finally, an article called *Many Paths Lead to Blockchain Adoption, and no Two are Alike* was published in Deloitte's website and provides further clarifications regarding the consolidated data of the 2019 survey. Thus, when feasible, adjustments were made to consider the more accurate data. In such cases, the use of the article is specifically stated.

IV. Findings and Analysis through the Strategic Planning Framework using Deloitte's datasets

1. Introduction

As explained so far, blockchain is a new technology with a lot of potential but many pitfalls. Additionally, there currently is a lack of literature that studies the reasons behind successes or failures of blockchain projects. One possibility would be to assess the compliance to strategic planning processes under a structured framework, as this thesis proposes.

To that extent, two studies from the Deloitte consulting company were the main sources of information, as mentioned during the Methodology session. The first one, *Breaking Blockchain Open: Deloitte's 2018 Global Blockchain Survey* ("Deloitte 2018"), compiles answers from 1053 companies, as follows.

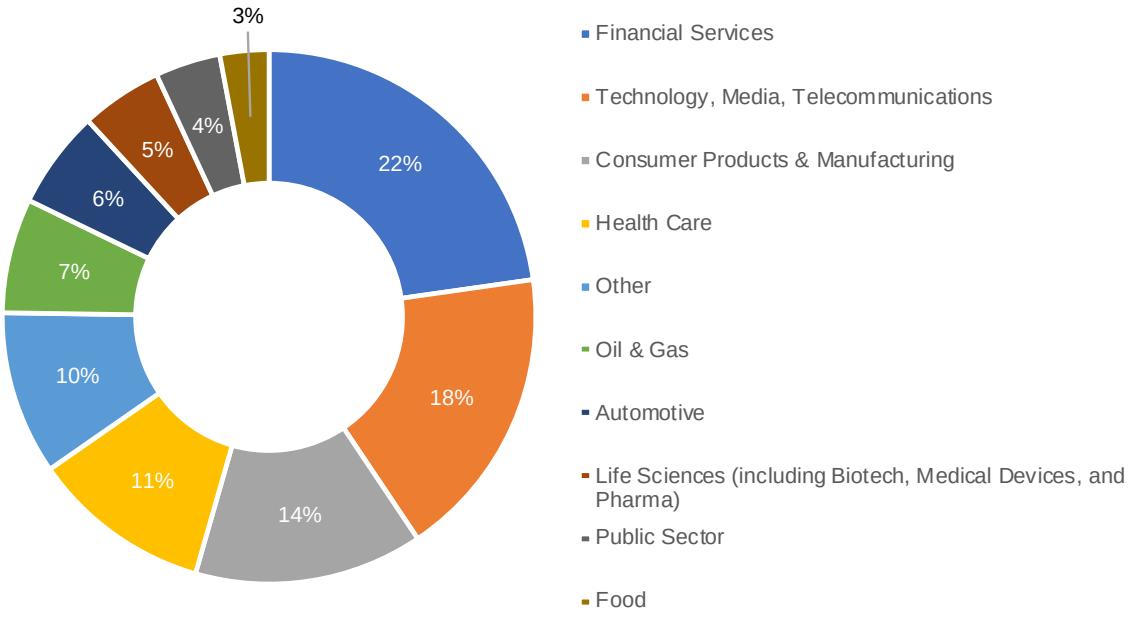


Figure IV-1 Industries of Companies Surveyed 2018
(Pawczuk et al., 2018 - adapted)

The planned spending on blockchain technology by each industry is shown below.

	US$ Million	2018 ranking		US$ Million	2018 ranking
Automotive	6,02	1st	Food	3,78	6th
Oil & Gas	4,77	2nd	Consumer Products & Manufacturing	3,64	7th
Technology, Media, Telecommunications	4,45	3rd	Health Care	3,28	8th
Life Sciences (including Biotech, Medical Devices, and Pharma)	4,44	4th	Other	2,91	9th
Financial Services	3,97	5th	Public Sector	1,78	10th

Figure IV-2 Weighted Average Spending by Industry
(Pawczuk et al., 2018 - adapted)

The second study, *Deloitte's 2019 Global Blockchain Survey: Blockchain Gets Down to Business* ("Deloitte 2019"), compiles answers from 1386 companies, as follows. The planned spending on blockchain technology per industry was not disclosed in the 2019 study.

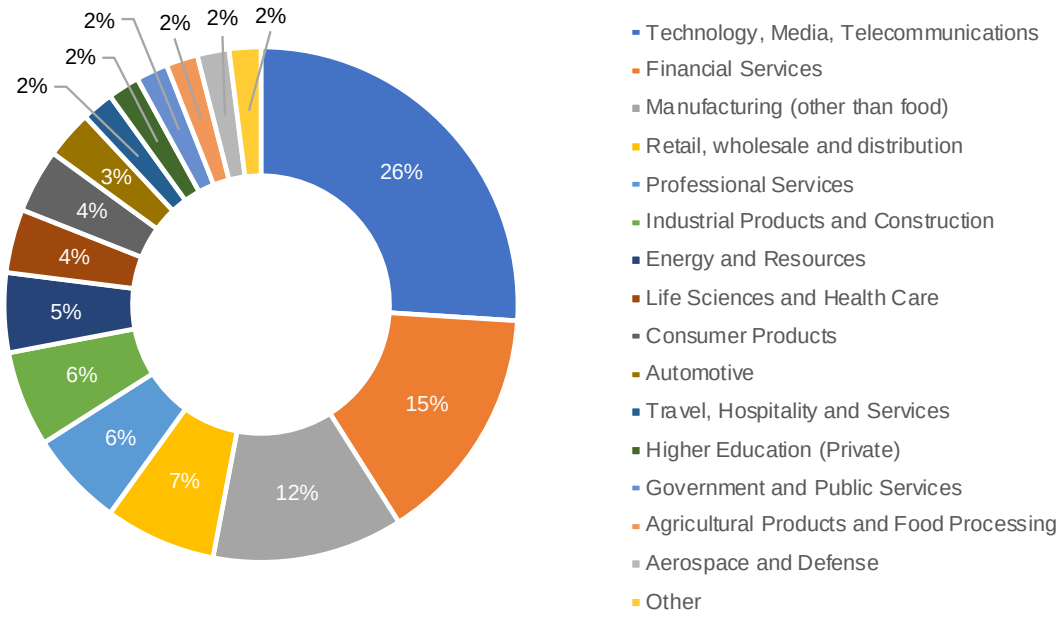


Figure IV-3 Industries of Companies Surveyed 2019
(Pawczuk et al., 2019 - adapted)

2. Initiating the Strategic Process

As mentioned during the Literature Review, a company should assess its past strategical efforts to determine what course of action would raise effectiveness. In

effect, setting priorities is important in order to align decision making processes. In that sense, Deloitte 2018 provides a variable that serves as a direct proxy, as shown below.

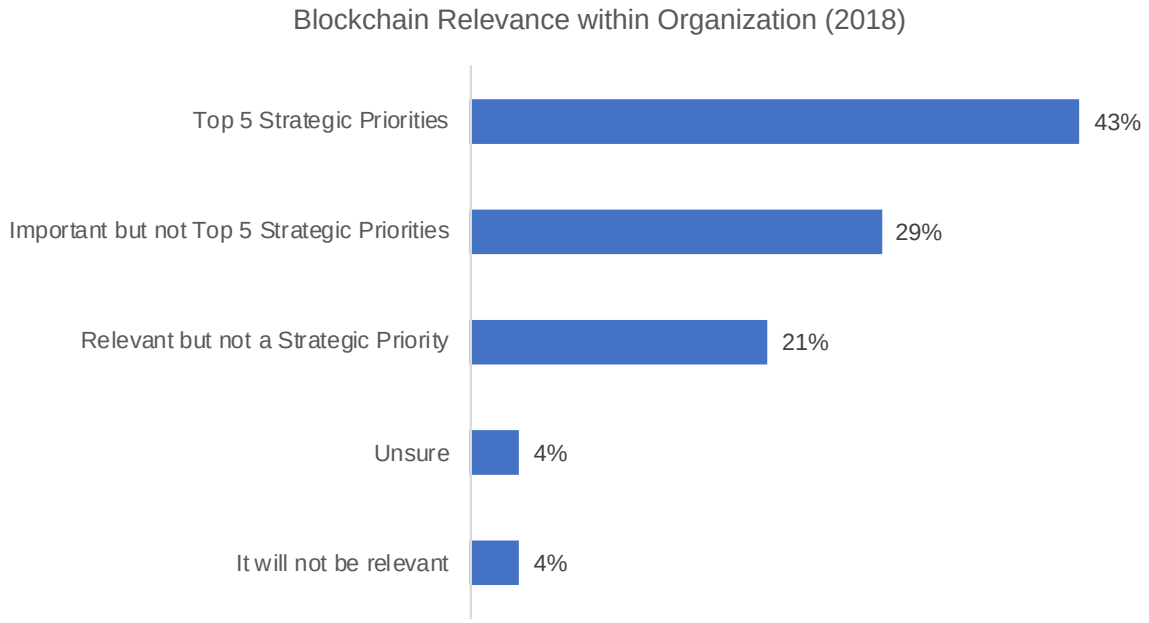
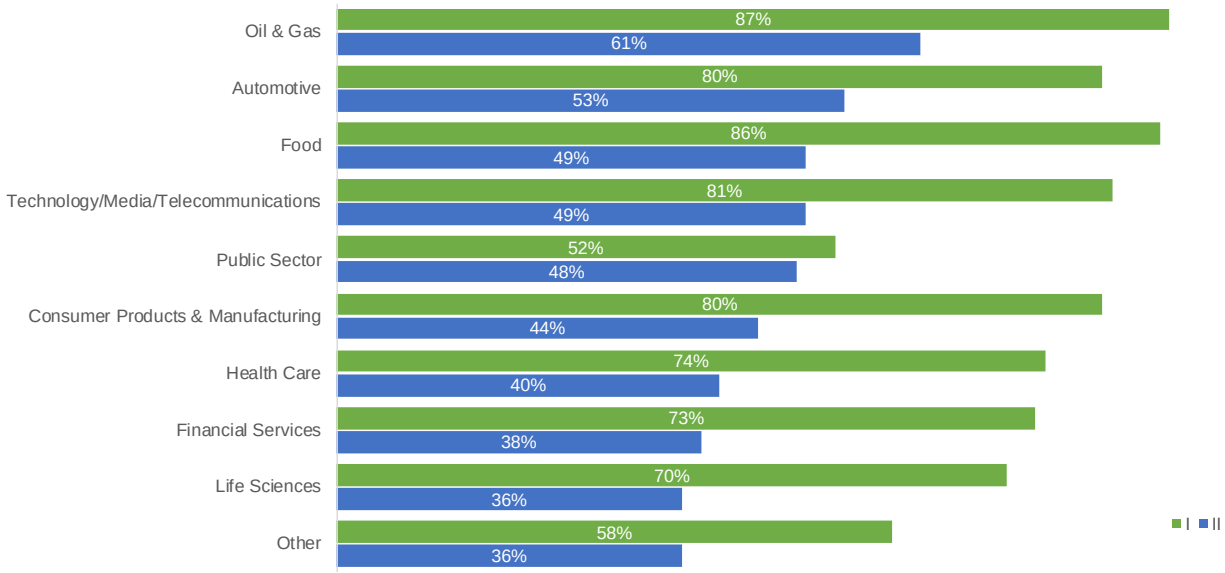


Figure IV-4 Blockchain Relevance
(Pawczuk et al., 2018)

The importance given to blockchain is evident: over 70% of the surveyed companies view blockchain as a strategic priority and the vast majority consider it at least relevant. While this initial reading seems simple and logical, it is imperative to ensure that the topic is being discerned in a portfolio of potential projects to start the strategic process of blockchain adoption.

After setting priorities, to convey a proposal of change, it is important to have defined concepts and guidelines. Consequently, the people involved should have common knowledge of the topics. When compared, two variables of Deloitte 2018 show an interesting, perhaps problematic contrast in this matter. Close to half of the respondents among all industries (44%) believe that blockchain is an application limited to financial services and money transactions (blue bars below). This is a very common misconception because, as has been presented in this thesis, there are many other use cases and applications.

Among this same sample of industries executives, the vast majority (75%) claim to possess excellent or expert level knowledge of the technology (green bars below). This disparity indicates that these managers probably are unaware of many other implications and challenges that come with blockchain, which is an attention point that should be raised. To ensure diligent and accurate processes, the people involved with the change initiatives must be properly trained and share knowledge.



I	“Excellent” or “Expert” Knowledge Level Regarding
II	Is Blockchain an Application Limited to Financial Services and Transactions?

Figure IV-5 Blockchain Knowledge Assessment
(Pawczuk et al., 2018 - adapted)

Another insightful variable from the Deloitte 2018 is which department is making the decisions regarding blockchain. Albeit information technology departments still are responsible for promoting the change in 40% of the cases, the whole businesses are involved in another 40%. From that it is possible to infer that the eventual adoption of blockchain is being interpreted as beneficial to all areas and not being limited to IT experts. Furthermore, this may also point that employees and managers alike would be willing to learn more about the technology as it would improve their daily activities.

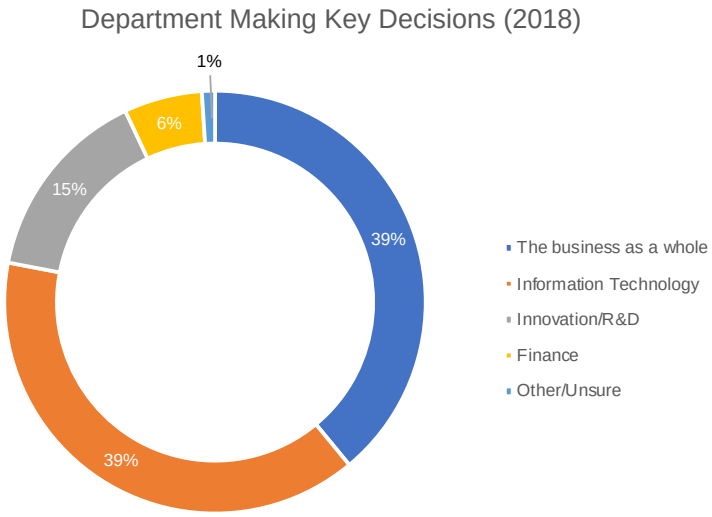


Figure IV-6 Which Department is Making Key Decisions about Blockchain
(Pawczuk et al., 2018)

3. Market Analysis and Company Analysis

Deloitte 2019 presented some metrics that can be considered as broad guidelines by all players in the markets to measure the impact of blockchain adoption, as shown below. Understandably, they lack segmentation considerations and specific political, economic, social, technological and legal assessments. In other words, this variable lacks readings on market environments. As such, according to the theoretical framework, it cannot be considered a proxy for key success factors on a market-based approach.

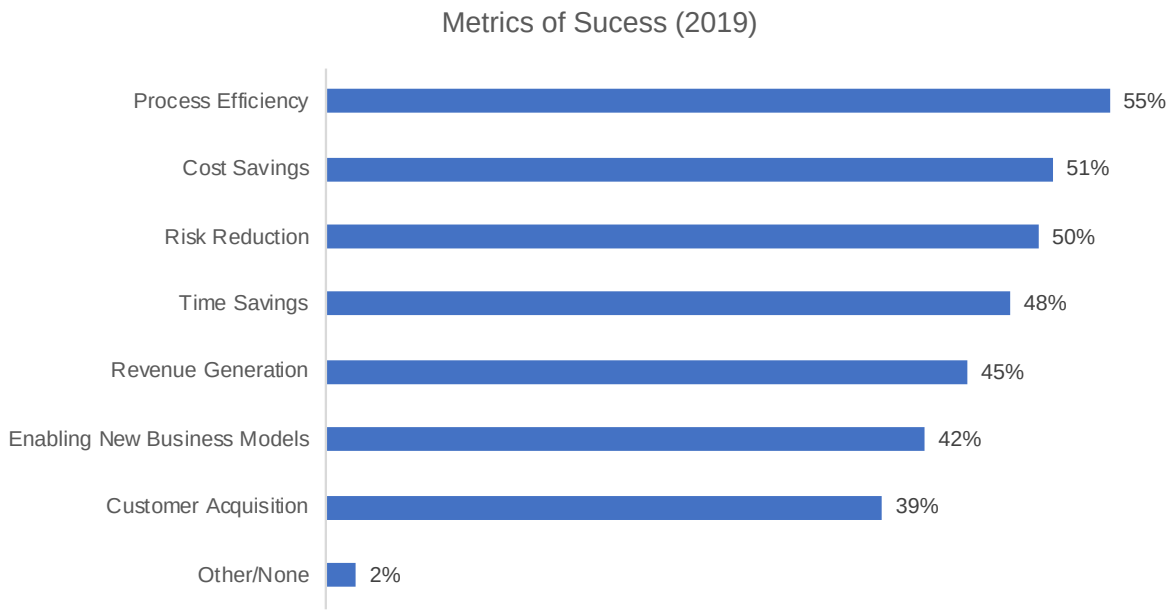
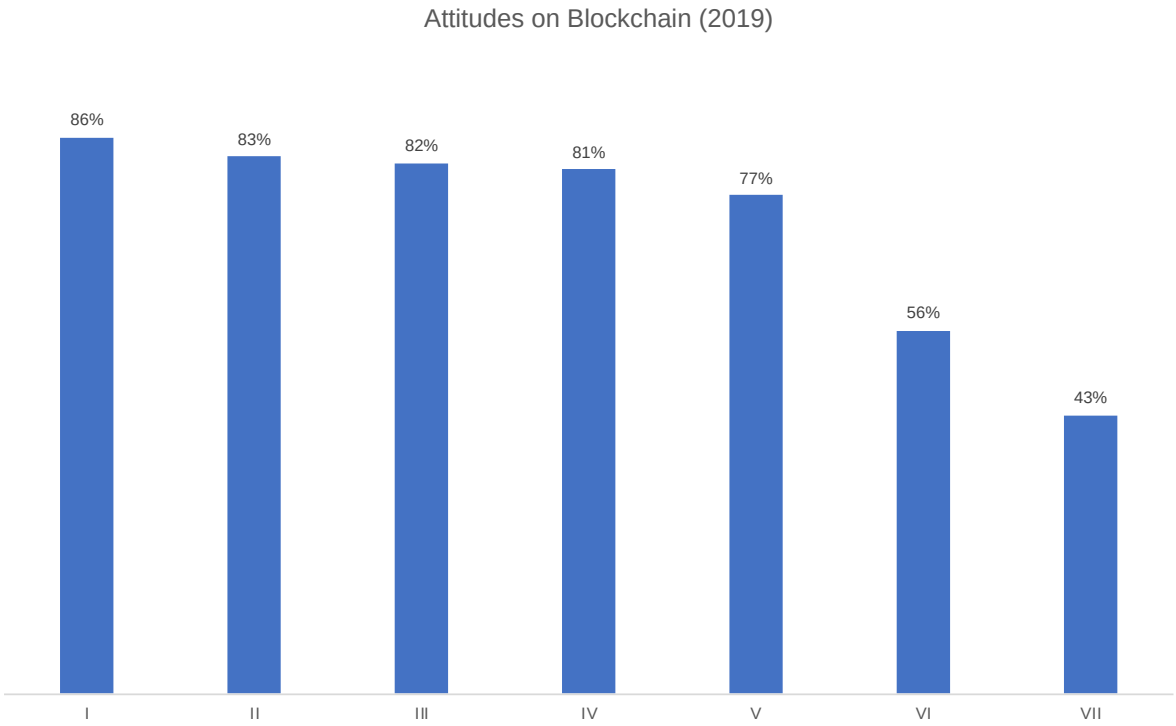


Figure IV-7 Metrics Used to Measure Success
(Pawczuk et al., 2019)

Furthermore, changes pertaining to blockchain happen on a fast-paced basis, making it difficult to have a long-term reading of the market environment. As mentioned before, by the time the information would be ready to contribute to decision making, it would already be obsolete and could lead to mistakes. Thus, for companies considering investing in the technology, a resource-based approach is more adequate for strategic planning.

As mentioned in the Literature Review, if a resource or a capability is rare, hard to replicate, hard to substitute and adds value, it is a sustainable source of competitive advantage. Objectively protecting, acquiring, developing and using these allows for a company to stand out from its competitors. A new, disruptive technology has the potential to challenge the *status quo* and, arguably, the steps for its implementation can become sources of competitive advantage.

Regarding attitudes on the adoption of blockchain, Deloitte 2019 indicates that a vast majority of the surveyed executives are favorable. Interesting to note is the reading that blockchain will replace current systems, as illustrated by IV below.



I	Blockchain technology is broadly scalable and will eventually achieve mainstream adoption
II	The executive team believes there is a compelling business case for blockchain
III	Our suppliers, customers, and/or competitors are discussing or working on blockchain solutions to current challenges in the value chain that serves my organization
IV	We are planning to replace current systems of record
V	We will lose a competitive advantage if we don't adopt blockchain technology
VI	Blockchain will disrupt our industry
VII	Blockchain is overhyped

Figure IV-8 Attitudes regarding blockchain adoption
(Pawczuk et al., 2019 - adapted)

As could be expected and even if not framed specifically according to the theoretical framework, the technical improvements of blockchain are pointed out as an important resource. This will be further detailed in the Corporate Strategy and Business Strategy steps.

For now, it is relevant to remember that a resource has little value if not accompanied by the proper knowledge (capability) to be developed, used and maintained. Deloitte 2019 suggests that some companies are aware of that and have programs in place to develop blockchain skills. As shown below, in-house training is the most prominent choice, closely followed by recruiting.

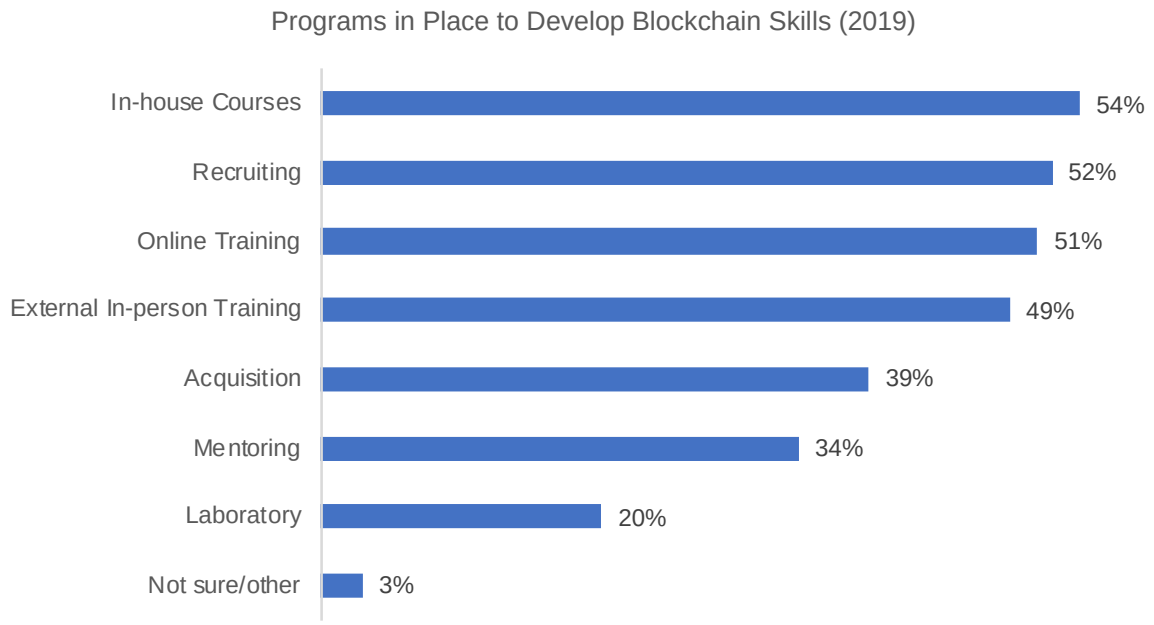


Figure IV-9 Programs in Place to Develop Blockchain Skills
(Pawczuk et al., 2019)

Focusing on the hiring aspect, an article published on Deloitte's website provided further detailing of a variable presented in Deloitte 2019. In effect, the reading of blockchain related hiring decision serves as a proxy to assess efforts of the companies to further improve an important capability that influences their competitive advantage.

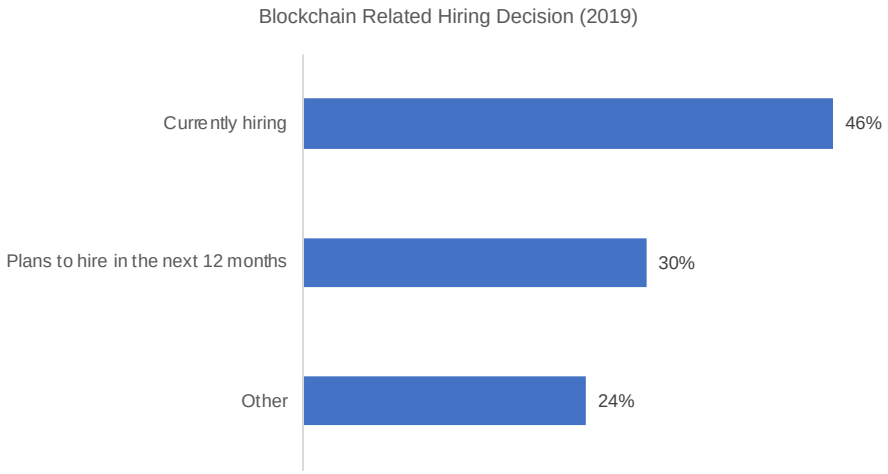


Figure IV-10 Blockchain Related Hiring Decision
(Holdowsky et al., 2019 - Adapted)

With an expressive 76%, it is possible to verify that many of the surveyed companies understand this capability as important and are actively pursuing it. Naturally, this is only one possible approach to infer to what extent relevant resources and capabilities are being identified and developed.

4. Vision

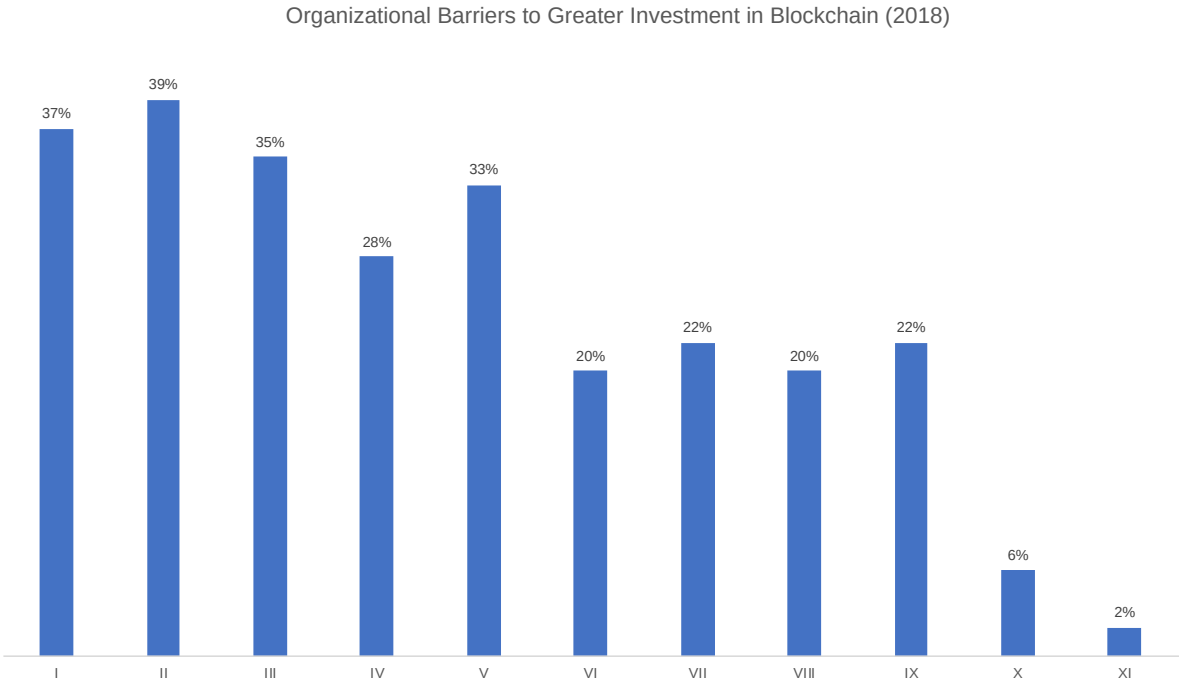
In its strategic planning, a company should define directives for the future. Besides that, engaging relevant stakeholders since the beginning is important for a clear communication and a coordination of expectations. To that extent, the company must be aware of its internal and external situation. The barriers to greater investment in blockchain variable presented in Deloitte 2018 provides many insights for the matter and some of them will be discussed next.

According to Karajovic et al. (2019), regulatory and security concerns (II and III below) often arise from two streams: the lack of regulatory standards for interoperability and that regulators might not consider the technology secure for widespread use. Adding to that, Karajovic et al. (2019) cite Del Castillo (2017) and explain that global companies across many industries formed an alliance, the Enterprise Ethereum Alliance, exactly to promote standardization of practices, security, scalability and interoperability. By integrating governance and accountability models in the same platform, it is possible to simplify the creation of policies and the assessment of compliance, besides improving transactions speed and volume (Karajovic et al., 2019). Finally, Karajovic et al. (2019) point that other blockchain alliances and associations can further facilitate this process.

Thus, it is realistic for the companies surveyed to consider regulatory and security issues as threats. The still-in-development nature also raises some concerns about the future (V, VII and VIII below). However, it is important to be aware that the context is gradually changing towards a more optimistic trend.

Among the main concerns we also have the lack of in-house capabilities (IV below), in line with the discussion in the Company Analysis step. Given the complexity of blockchain presented thus far, it is reasonable to assess the presence or lack of this knowledge respectively as a strength or a weakness.

While implementation *per se* is not the focus of this thesis, choosing between replacing or adapting existing systems (I below) demands heavy planning and analysis. Since the surveyed companies consider it a concern, it is reasonable to assume this proxy shows some evidence of diligent strategic processes, as is the case for the other proxies discussed above.



I	Implementation (Replacing or Adapting Existing Legacy Systems)
II	Regulatory Issues
III	Potential Security Threads
IV	Lack of In-house Capabilities (Skills and Understanding)
V	Uncertain ROI
VI	Concerns over Sensitivity of Competitive Information
VII	Lack of a Compelling Application of the Technology
VIII	This Technology is Unproven
IX	Not Currently Identified as a Business Priority
X	We don't see any barrier
XI	Not sure/Other

Figure IV-11 Organizational Barriers to Investment in Blockchain
(Pawczuk et al., 2018 - Adapted)

When it comes to a comparison with competitors, Deloitte 2018 indicates that the surveyed companies are, on average, really confident on their own adoption of blockchain. The reading that 65% consider themselves as leaders or one of the leaders on the respective markets seems questionable though. In fact, by practical means it is not possible for more than half of the players to be a segment leader.

As discussed in the Market Analysis step, there are some broad success metrics considered across the industries. However, perhaps due to the dynamics that make a Market Analysis not so accurate, the benchmarking against competitors to assess performance might be too subjective. The answers to the question most likely reflect how much the companies believe they have advanced through the phases leading to

implementation. Nonetheless, with this finding, the risk of being influenced by adversities like the FOMO effect is still plausible, reassuring the need of a diligent strategic planning.

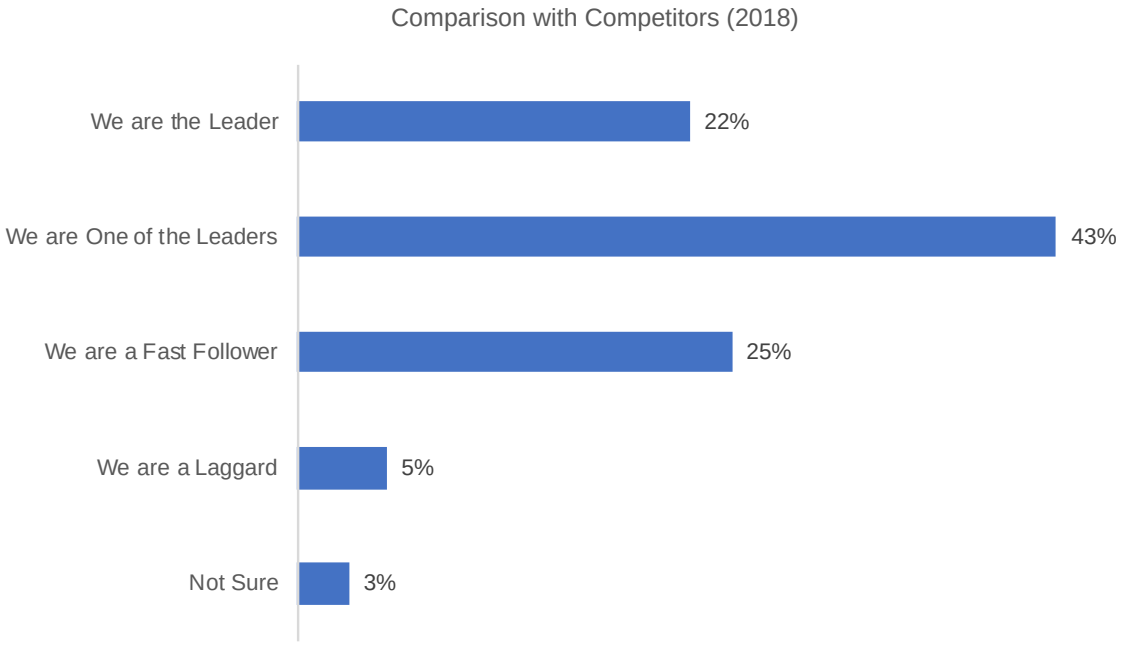


Figure IV-12 Current Adoption of Blockchain Compared to Competitors (Pawczuk et al., 2018 - Adapted)

Lastly, from the results below, it is observable that companies are involving external stakeholders in its blockchain strategic planning, at least to some degree. This is naturally an effort to support the adoption of the new technology. The companies surveyed are likely using organizational capabilities to influence other individual competitive forces and increase industry profitability.

Unfortunately, only this overview is not enough evidence to ascertain if the expectations of said stakeholders are being properly addressed. Questions approaching their perspective would be needed to gauge how efficiently the communication is flowing between the nodes.

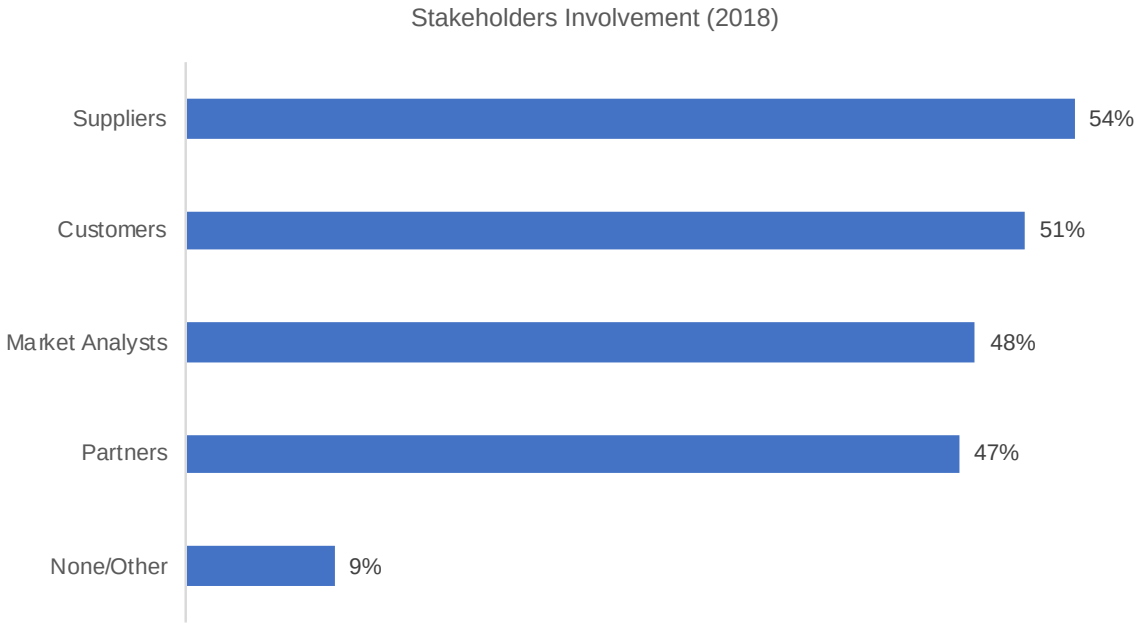


Figure IV-13 External Stakeholders Engaged in Blockchain Strategy
(Pawczuk et al., 2018)

As such, some aspects under the Vision step could not be properly verified. During the conclusion, the author will resume this discussion, highlighting the potential for future researches.

5. Corporate Strategy and Business Strategy

As mentioned in the Literature Review, the Corporate Strategy and Business Strategy steps focus on the dynamics between Headquarters (“HQ”) and Business Units (“BU’s”) to create competitive advantage.

The executives surveyed by Deloitte most likely work in the HQ of the companies, but this distinction is not made during the studies. However, in the purposive sampling, only respondents that had knowledge about blockchain initiatives on all levels of the

respective companies were selected. Furthermore, the proxies proposed to assess adherence of the companies to the framework make more sense when discussed together.

The first interesting result comes from the question about which blockchain models are being the focus of development, as found in Deloitte 2018. This is arguably a decision made on the HQ level with inputs from the BU's as it directly influences the cost leadership or differentiation strategies with the synergies it creates or the processes it enhances.

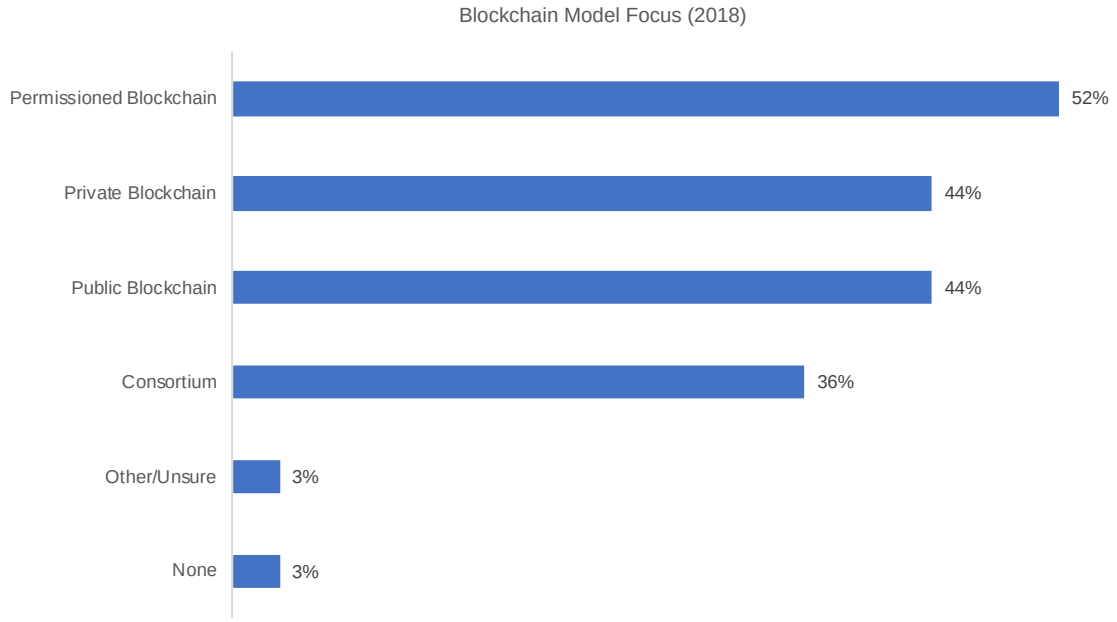


Figure IV-14 Blockchain Model Focus
(Pawczuk et al., 2018)

From the graph above, it is possible to see that permissioned networks have a slight preference; but the other two main categories, public and private networks, don't lag behind by much. Even the experimentation through consortia, despite the trade-off, still is considered by many companies. As such, there is no strong predominant model – but the fact that the companies could choose more than one option for this question does influence this reading.

The second proxy are the use cases, as shown in the results below from Deloitte 2018. While Digital Currency and Payments are prominent categories, they are arguably more related to cryptocurrencies than other applications inside a blockchain. As such, the focus will be four main categories: Supply Chain, Internet of Things, Digital Identity and Digital Records.

Supply Chain improvements come as the most important needed use case. It encompasses the optimization of cost drivers with more efficient data validation, access and sharing. This facilitates the identification of bottlenecks, the standardization

of similar processes and the negotiation with partners. The digital tracing of physical products is also relevant in this matter, which leads to the importance of the second category, Internet of Things. The “tokenization” of assets, liabilities, equities and others is imperative for an automated tracking from end to end. Both of these categories happen mostly on private networks of close corporate partners, but also have a place on permissioned networks when the validation of external entities is needed.

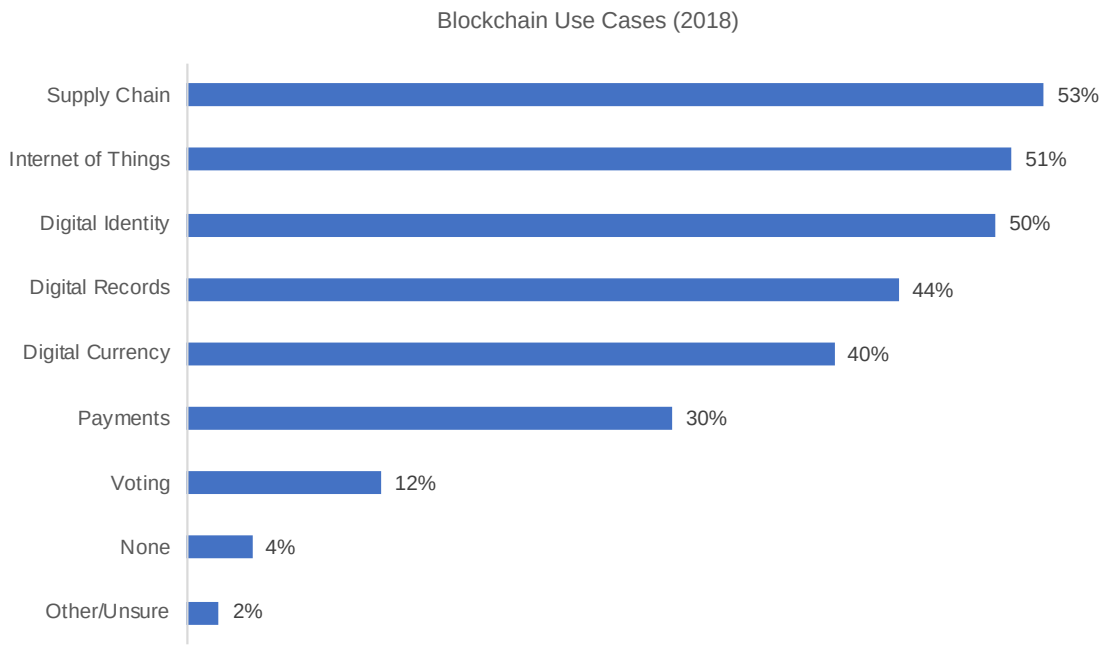


Figure IV-15 Blockchain Use Cases
(Pawczuk et al., 2018)

When it comes to the Digital Identity and Digital Records categories, the former is a certificate of the veracity of the information about an entity, which include organizations, people or even devices. The latter, in turn, serves to permanently save and disclose any kind of information. In that context, the example of making a proof of certification along the supply chain available to individuals (as mentioned in the Literature Review) is a mean of differentiation. Another related use is the promotion of transparency for example by publishing financial reports that can be freely audited by anyone interested. To be effective, these must happen on public networks.

The third and last proxy are the advantages of blockchain over existing systems, as presented in Deloitte 2018. These technical advantages were mentioned during the Company Analysis step and are a resource that potentially contributes to competitive advantage when combined with the proper knowledge (capability).

Classifying the categories below as per the Literature Review, greater speed, lower risks and lower costs are expected in a cost leadership strategy, which links them with the supply chain and internet of things use cases presented above.

On the other hand, new business models stream from potential differentiation strategies. Greater speed and security arguably result from differentiation as well. Thus, they can be linked with the digital identity and digital records use cases.

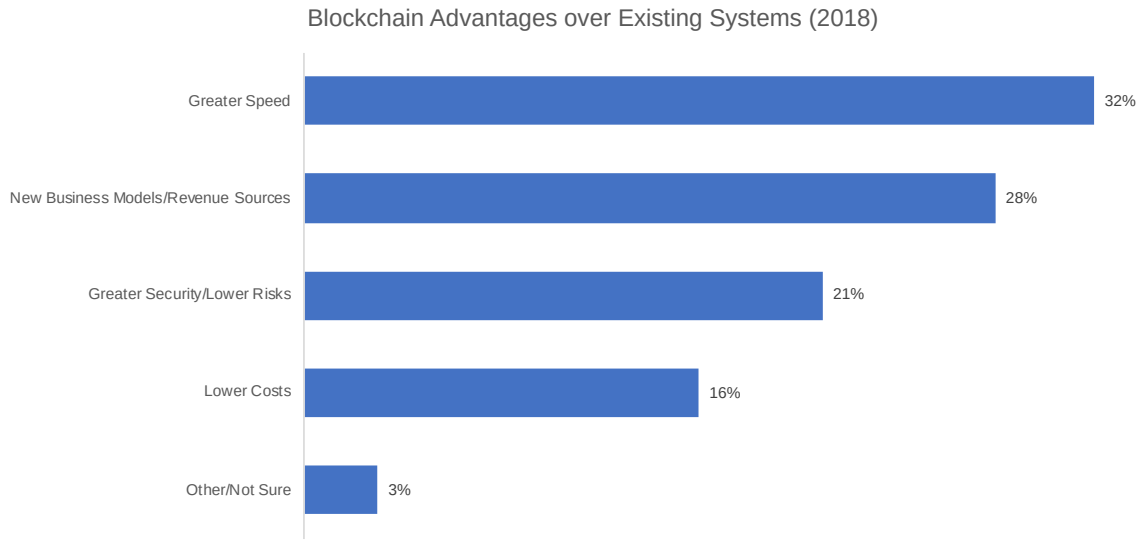


Figure IV-16 Blockchain Advantages over Existing Systems
(Pawczuk et al., 2018)

As such, the chosen blockchain models in the HQ level are sufficient and related to the use cases desired on the BU level, fostering the hypothesis of proper collaboration between the two. Additionally, the perceived advantages of blockchain over existing systems are in line with the benefits arising from the desired use cases. These relations, in turn, are evidence of some extent of strategic planning. However, especially because companies could choose more than one category in the first two proxies, some interpretation noises are possible. A brief discussion regarding potential research topics that this brings will be held in the conclusions.

V. Conclusion

As it is a new, emerging technology, the processes for the adoption and development of blockchain are still widely experimental and unknown. Considering factors like the FOMO (fear of missing out) effect, it is very important for companies to have a proper strategic planning as a way to ascertain what changes should be done in the organization, if any at all.

As this thesis defends, a researcher can assess strategic planning diligence with analyses organized after a theoretical framework. By studying key variables and their context, it is also possible to identify areas, processes or activities that are most likely to present problems.

Furthermore, as pointed out by Pournader et al. (2019), the literature currently lacks enough publications regarding the reasons for failures or successes of blockchain projects. Additionally, according to Bulmer et al. (2009), a new analysis of data can expand the original interpretations, bringing forth additional or different knowledge and conclusions

Thus, when it comes to the assessment conducted in this thesis considering the Deloitte datasets, the table below summarizes the evidence strength of the relevant variables in strategic planning:

Strategic Planning	Variable/Proxy	Evidence
Initiating the Strategy Process	Declared Level of Understanding	Attention
	Perception of Blockchain Solely as Tool for Financial Services	
	Relevance within Organization	Good
	Department Responsible for Decision Making	Good
Market Analysis	Metrics of Success	Weak
Company Analysis	Attitudes on Blockchain Adoption	Good
	Programs to Develop In-house Competences Regarding Blockchain	Good
	Blockchain Related Hiring Decision	Good
Vision	Organizational Barriers to Greater Investment in Blockchain	Good
	Company Current Adoption Compared to Competitors	Attention
	Engagement of External Stakeholders	Weak
Corporate Strategy & Business Strategy	Blockchain Models (Type of Network)	Weak
	Blockchain Use Cases	
	Advantages over Existing Systems	

Figure V-1 Evidence of Strategic Planning
(Self-provided)

The proxies shown as providing “good” evidence could sufficiently help the author to build ways to infer proper strategic planning processes. They do not encompass an absolute and complete reading about the step though as this would most likely require a very specific approach on a per company basis. Additionally, different variables can provide different readings about a step, as can be seen with “Vision”.

The evidence on the “Metrics of Success” variable is considered “weak” due to theoretical implications and the coverage of the dataset. It does suggest ways to measure impact of blockchain adoption, but in a broad manner. According to Venzin et al. (2018), the accuracy can only be attested with specific market environment readings.

In the case of “Engagement of External Stakeholders” the analysis only through this variable would be incomplete. As mentioned during the Findings, it is not possible to infer if the stakeholders’ expectations are actually being addressed, albeit stakeholders themselves are being involved.

As for the “Corporate Strategy & Business Strategy” variables, relations between the Headquarters and the Business Units can be hypothesized. Furthermore, the advantages of blockchain over existing systems are aligned with the benefits arising from the main use cases. However, since respondents could choose more than one category for some of the questions in the Deloitte study, interpretation noises are possible and should be noted.

Regarding the “attention” reading in “Initiating the Strategy Process”, the concern is that the disparity between the variables show that, while the executives claim to possess an excellent knowledge regarding the technology, they also hold a very basic misconception as true. Furthermore, this indicates that they might be unaware of other implications and nuances pertaining to the technology. As such, companies must ensure proper training and campaigns to diffuse knowledge, specially targeting people involved in change initiatives.

Finally, about “Company Current Adoption Compared to Competitors”, the issue was identified when the study showed that 65% of the companies consider themselves as leaders of the respective markets, which is impossible in practical terms. This suggests a highly subjective assessment of performance, which leads to risks like influence by the FOMO effect. If establishing objective measures of performance is challenging due to the dynamism around blockchain, companies should at least take actions to ensure diligent planning in other activities.

Regarding the limitations of this thesis, naturally the main one is that it uses diverse secondary sources of research that have not been especially elaborated for its research objectives. Linked to that, data aggregation/compilation in the only viable sources of information has actually made the author reconsider some of the original research objectives to maintain academic rigor, as described in the Methodology.

This thesis has also suffered with a general lack of other publications or datasets approaching the topic, which made triangulation and cross checking unfeasible. Alternative ways to address such were explored in the Methodology.

Finally, due to theoretical implications, some steps of the framework can’t be assessed in broad terms and require detailed information on a per company basis. As such, some

established proxies were not sufficient to provide evidence of strategic planning, as discussed above.

Considering the analyses of the strategic steps with the chosen variables, this thesis offers the readers additional insights regarding blockchain strategic planning under the theoretical framework. It is useful for managers because it identified patterns and, most importantly, potential attention areas for their planning, as discussed above.

On the other hand, this thesis is useful for researchers as it provides a broad view on the current blockchain context. It also brings industry research closer to the academic grounds on the topic and proposes some suggestions for further research:

First, (i) surveys to gather and then analyze/compile what blockchain concepts are currently more problematic to be understood in industries. Linked to that, (ii) an assessment of preferred (or most efficient) ways of learning about blockchain. Third, (iii) specific study to determine blockchain success factors in an industry. As long as the managers don't take it at face value but rather as a parameter, even potentially obsolete insights can enhance decision making. Fourth, (iv) building of more ways to infer how companies are identifying and developing relevant resources and capabilities for competitive advantage. This thesis has explored the perceived advantage and knowledge path, but certainly there are more. Fifth, (v) how to properly compare blockchain adoption in an industry, if possible, at all. Sixth, (vi) complete assessment of communication with and coordination of stakeholders, including the addressing of their expectations. Seventh, (vii) extensive study on the current use needs of companies and the pertinent type of network on which the former should be developed. And finally, (viii) analysis of more relations between benefits arising from current use needs and perceived advantages over existing systems.

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