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„Optimizing management performance with intelligent nudges: Reducing the knowing-doing gap by implementing a personalized digital coach"

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STATUTORY DECLARATION

I hereby declare to have written this master's thesis entitled "Optimizing management performance with intelligent nudges: Reducing the knowing-doing gap by implementing a personalized digital coach" on my own, without having used other references and resources than the ones quoted. Thoughts from other resources having been integrated directly or indirectly into this thesis have been indicated as such.

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ABSTRACT ENGLISH

This master thesis aims to analyse the potential of behavioural economics, specifically of the nudge theory, combined with artificial intelligence (AI) to optimize management strategies and reduce the knowing-doing gap. In many cases, management cannot implement their strategies as desired due to factors like stress, lack of time, laziness, forgetfulness, or other factors that affect the existing knowing-doing gap. The main motivation of the research study is to overcome this gap, by evaluating the implementation of the so-called intelligent nudges, which send certain reminders and personalized signals through a digital environment. Moreover, intelligent nudges present the potential to influence management towards a better performance reducing the critical knowing-doing gap. The experiment consists of an intervention study where the implementation of a personalized digital coach supported by AI and nudging techniques was examined. The results identify that certain features of the personalized digital coach decrease the knowing-doing gap, leading organizational management towards implementation. However, the digital coach might not be suitable for a user without a willingness to implement this type of technology.

ABSTRACT DEUTSCH

Diese Masterarbeit zielt darauf ab, das Potenzial der Verhaltensökonomie, insbesondere der Nudge-Theorie, in Verbindung mit künstlicher Intelligenz (KI) zu analysieren, um Managementstrategien zu optimieren und die *Knowing-Doing Gap* (Kluft zwischen Wissen und Handeln) zu verringern. In vielen Fällen können Führungskräfte ihre Strategien aufgrund von Faktoren wie Stress, Zeitmangel, Faulheit, Vergessenheit oder andere Faktoren, die die *Knowing-Doing Gap* beeinflussen, nicht wie gewünscht umsetzen. Die Hauptmotivation der Forschungsstudie ist die Überwindung dieser Lücke. Um die Lücke zu füllen, können Manager von *intelligent Nudges* (intelligente Denkanstöße) gebrauch machen, die über eine digitale Umgebung bestimmte Erinnerungen oder personalisierte Signale an die Manager senden. *Intelligent Nudging* hat somit das Potenzial, die Leistungen des Managements zu steigern und die kritische *Knowing-Doing Gap* zu verringern. Das Experiment besteht aus einer Interventionsstudie, in der die Implementierung eines personalisierten digitalen Coaches analysiert wird, der durch KI und Nudging-Techniken unterstützt wird. Die Ergebnisse zeigen, dass bestimmte Aspekte des personalisierten digitalen Coaches die *Knowing-Doing Gap* verringerten und die Umsetzung der Managementmaßnahmen fördern können. Nichtsdestotrotz ist der digitale Coach möglicherweise nicht für Benutzer geeignet, die nicht die Bereitschaft aufweisen, diese Art von Technologie zu implementieren.

KEY WORDS

Key Words: Behavioural economics, organizational performance, nudge management, intelligent nudging, digital nudging, leadership development, knowing-doing gap, Artificial Intelligence, Machine Learning, decision-making strategies, choice architecture, personalization.

Schlüsselwörter: Verhaltensökonomie, Organisationsleistung, Denkanstöße, intelligente Denkanstöße, digitale Denkanstöße, Führungsentwicklung, Wissenslücke, Umsetzungslücke, künstliche Intelligenz, Maschinelles Lernen, Entscheidungsstrategien, Entscheidungsarchitektur, Personalisierung.

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1. Introduction

Leadership and management are key components of an organization. Therefore, it is essential to embrace management to provide its best outcome. An unsolved gap in organizational management costing companies' great amount of money is the so-called knowing-doing gap or implementation gap, which can be defined as the gap in between knowing what has to be done and putting it into action, or in other words, for an organization, can be the difference between planning the strategy and transforming it into operational action.

Organizations are constantly changing and developing their structures and strategies to adapt to new technologies and generations. Since behavioural economics has become a relevant topic for academics and practitioners, theories like "nudging" started being implemented by the government and military followed by private institutions. Companies started implementing nudges aiming to influence individuals' choices, in the desired direction to embrace organizational performance.

Behavioural economics combined with Artificial intelligence is becoming a new trend implemented by some companies in the USA, UK, Australia and India and other countries. This new concept has the potential of driving organizational change and improving profitability, employee retention, happiness and successful management amongst other factors. The combination of technologies such as Artificial Intelligence (AI) or machine learning (ML) with behavioural sciences (BS) can mean the next big step for organizations to manage their strategies and reach their ultimate goals.

The so-called knowing-doing gap affects many individuals and nevertheless managers, especially in situations where they are under stress or lack of time. It might be that managers are too busy, too stressed or lack time to put into action their goals and strategies. Here is when intelligent nudging comes into place acting as a personal coach for managers, guiding them with personalized solutions to make optimal decisions according to their personality and business' goals, and by motivating them through incentives.

Some companies have already put into practice theories from behavioural science to influence irrational behaviour from buyers, pricing strategies or decisions by choice architecture. Companies that started to implement these technologies, seem to have improved companies' outcomes. However, as nudges get smarter, they will become more intrusive and this should be taken into account, as personal information won't be private anymore.

In the theoretical part of the proposed Master Thesis, the author exposes firstly some literature about the knowing-doing gap, the reason trainings are mostly ineffective and some possible ways of bridging the gap. Moreover, the author will continue exposing insights and examples of how the nudge theory can effectively influence individuals' choices for a better outcome. Furthermore, this previous point will merge with the power offered by artificial intelligence, especially regarding the field of online personalization. The previous chapters will form the equation that leads to the concept of digital nudges. The author explains and analyses the concept in detail, especially in the business field.

For the experimental part of the thesis, the author wants to prove that intelligent nudges can reduce the knowing-doing gap in management by conducting an intervention study were a group of managers implements "Coach Amanda", a personalized digital coach from an American company called LeadX. Firstly, insights about LeadX and Coach Amanda will be presented, followed by the experiment that aims to evaluate the hypotheses: "Implementing intelligent nudging through a personalized digital coach decreases the knowing-doing gap in management". The research methodology is based on an intervention study conducted to managers that are divided into two different groups. The managers from the intervention group will implement the personalized digital coach, whose results will be compared with the ones from the managers of the control group who received no treatment. Moreover, the intervention study will be evaluated through pre- and post-assessment interviews and supported by additional material coming from the American company that developed the digital coach. Furthermore, the findings will be presented based on the Mayring method, followed by the conclusion, limitations and further research on the topic.

2. The knowing-doing gap in management

Management is one of the core departments in charge of the organizational success of a corporation, responsible for the business operations and the performance of their team. Managers are the leaders who run the business and therefore one of the most important components that form it. There is a great number of books written on management techniques and methods, and still a great number of corporations and businesses fail to succeed, in many cases because the managers are not doing their job properly. Certain gaps in business management affect organizations and their effectiveness all over the world. One of the persistent gaps existing for many years that affects organizations as well as individuals is the "knowing-doing gap", which refers to the fact that people and organizations know what to do but for some reason, they do not put it into action. (Snook, Nohria and Khurana, 2012) This part of the paper aims to analyse and

explain in detail the knowing-doing gap as one of the main causes for management training to fail at performing and achieving results.

2.1. The role of managers and why management training fail

According to Peter Drucker, known as the father of modern management and as a leading thinker on business and management in the 20th century, what individuals understand by management mainly comprises making it hard for other individuals to achieve their professional tasks. (Drucker, 2006; Lu and Betts, 2011)

The main reason CEOs and human resources invest in management training is to increase efficiency for their leaders and organizations, however, results have not been as expected. In 2011, three-quarters of 1,500 senior managers working at 50 different organizations claimed not to be satisfied with the learning and development function of their organization. Decades' worth of studies show why this matter is not working as expected (Drucker, 1954; Westcott and Krivokuca, 2006; Hersey, Blanchard and Johnson, 2017) but, sorrowfully, that understanding has, as of today, not made its way into most firms. (Pfeffer and Sutton, 1999; Lu and Betts, 2011)

Peter Drucker integrated organizations as an important part of society paying special attention to proper governance. Drucker's research has been useful to help leaders and managers to execute effective managerial and leadership methods. The author emphasizes that the manager is the main pillar of an organization and the one who embraces dynamism and defines the organization's mission, the one responsible for team growth, and responsible for setting goals and accomplishing them. Moreover, managers' actions are the ones that drive the organization and are key to influencing decision-making in the business they are leading. (Drucker, 1954; 2006)

Drucker developed the Management by Objectives (MBO) concept and made it very popular for developing the strategy in an organization. The MBO concept consists in defining key objectives, allocating resources efficiently, and the use of effective and timely feedback and communication. This system is known to help managers empower their teams and measure performance. (Drucker, 1954; 2006) One of the main aspects of this method is the fact that the manager and employee agree and build a goal together, making it easier for the employee to take part on the process of reaching the goal and at the same time empowering him/ her for reaching one common organizational goal with open feedback performance. Involving the employee in the process of establishing goals, will result in more awareness and sense of responsibility (Hersey, Blanchard and Johnson, 2017). Furthermore, the MBO goals are known to be smart goals; specific, measurable, achievable, realistic and time-bound; which facilitates the measurement of performance. It must be highlighted that rarely any management training is based on the MBO

concept, as trainings normally are just directed to managers without taking into account their team and without engaging other employees.

Leaders from organizations aim at staying competitive by constantly learning. However, biases cause people to focus too much on being successful and taking action rapidly instead of doing it properly. Attribution bias embrace this behaviour, where leaders tend to attribute success to their actions and to attribute failure to bad luck or other events but their actions. (Ali, 2019) Therefore, it is key to embrace a "growth mindset" were managers become more aware of opportunities, embrace change and are bias towards action. When managers are faced with a problem, they usually take action, or at least they try to spend more hours and stay busier on the matter, start setting goals and building on a strategy and aiming at implementing it. (Gollwitzer, 1993)

The productivity of knowledge workers has become one of the major managerial challenges (Ebert and Freibichler, 2017). The main reason for organizations to invest in training is to make their leaders more effective, however, the results are disappointing. In 2015, corporations spend around 356 billion dollars globally in employee training and education, still not getting a proper return on investment. This has led to training institutions taking advantage of businesses and charging a great amount of money for training that will most likely not change employees' and leader's performance. Surveys from the Harvard business review expose cases where training programs that did seem to affect employees contrasted by pre and post surveys, did not affect the employees some years later. (Gino and Staats, 2015; Ebert and Freibichler, 2017; Lu and Betts, 2011) However, simple changes like few activities properly timed can enhance the learning transfer and provide a profitable impact for the company as well as for the effectiveness of leaning (Leimbach, 2010).

Bandura’s framework highlights motivation and self-efficacy as key factors for learning theory, understanding that it has a strong connection with social factors that interact in the process of training. Banduras aims to fill in the gaps of other theories in analyzing human action, stating that it is necessary to take into account environment and external factors that influence human behavior. (Bandura, 1986)

For leadership development trainings in particular, it is important to fit a specific methodology according to the organization’s culture. Moreover, it is also important to track the progress or do some follow-up on the skills transferred. (Burke and Collins, 2005) Fishbein and Ajzen (1977) insist on the necessity of distinguishing between four classes of variables: beliefs, attitudes, intentions, and behavior, assuming that human beings determine decisions according to the information available to them. Moreover, Gollwitzer, Heckhausen and Steller (1990) agree that

individuals go through different action phases that shape their behaviors and actions through the information received as input.

Training could actually enhance performance, but most trainings are not designed properly and do not aim at enhancing employees and managers skills or teaching them new ones that will be valuable for their specific job and that align with the company's objectives. The reason for this might be because trainings are costly even more if you specialize them (Elnaga and Imran, 2013). Management trainings do not support a strategy of implementation, they lack ongoing feedback, and cultural commitment from managers (Lu and Betts, 2011). About 95% of a company's employees are not aware of or do not understand their company's strategy. Moreover, organizations fail to implement trainings in a short-term ongoing or continuous basis and do not understand the difference between education and training. (Spitzer, 1984; Crittenden and Crittenden, 2008)

Organizational research has focused on strategy formulation rather on strategy implementation, with 70-90% of strategies failing (Mistry, 2014). Organizations are in need of a new way of approaching the matter and a new form of developing the leaders and influencing their strategy. For organizations to change, the system itself has to adjust enabling and embracing change. One of the main common barriers for overcoming change in an organization and increasing its performance relies on unclear direction on strategy and values. Senior executives who don't work as a team or have a laissez-faire leadership style[1], prevent honest conversations, show inadequate leadership and don't give enough time and attention to talent issues. Moreover, should focus on their intention of transferring knowledge, for this knowledge to be successfully transferred and implemented; otherwise it will remain unimplemented. (Ebert and Freibichler, 2017; Hersey, Blanchard and Johnson, 2017; Al-Eisa, Furayyan and Alhemoud, 2009; Chiaburu and Tekleab, 2005)

The fear of breaking organizational culture is one of the greatest inhibitors to transfer knowledge in an organization, and one important factor is that the community, or other managers also received the training. Some forms of support like motivation, were linked with positive opinions about the training but not with actual implementation. The factors that were linked with implementation of the new learned tasks are coaching and the fact of having a boss take the same training. (Gilpin-Jackson and Bushe, 2007) According to Luo and Lee (2013), knowledge management implementation is enhanced by ethics, trust, commitment and satisfaction, which are factors to be taken into account when transferring knowledge. Moreover, Zaher (2014) states that two main factors that influence knowledge-management practices in organizations are

[1] The Laissez-faire leader makes few decisions and allows their team to choose appropriate workplace solutions. This leadership style is the direct opposite of autocratic leadership.

leadership and organizational culture; and that implementing a servant leadership style[2] can support business goal achievement.

It could be assumed that organizational behaviour problems are related to individual performance. However, these problems could also arise from an ineffectively management system with lack of structure. Moreover, it is commonly thought that the firm's effectiveness and performance will improve by improving employee's knowledge and skillset, when studies show that it is more effective to change the system in a way that supports new tactics to enable the learning and implementation of this new behaviour. In most corporations, lack of training is not the problem, but the lack of leadership establishing a clear strategy that matches corporate values. There is an unimaginable amount of training, books, podcasts, online courses, workshops, webinars, management systems, devices and all types of management tools available for business and individuals published or launched every year. Companies spend a great amount of money, around at least 10.000 dollars a year per leader and more than $60 billion a year on management training, and some other billion in consulting, which in most of the cases are inefficient. Moreover, there are over 80,000 MBA graduates a year in business schools just in the United States, meaning there are potential leaders and students who know the theory for improving businesses and the way they work; still this is not yet happening. A focus could rely on skill transfer, which is a function of both individual (goal orientation, training self-efficacy) and contextual factors (supervisor and peer support). (Chiaburu and Tekleab, 2005; Gollwitzer, 1993; Burke and Collins, 2005)

Chiaburu and Marinova (2005) evaluate the relationship between continuous-learning culture and training motivation as factors influencing on the implementation and training transfer. Moreover, certain factors contribute to transfer specifically soft-skills in a leadership training, for example, the actual utilization of newly learned skills shows that the training was useful (Gilpin-Jackson and Bushe, 2007). Leaders need to be able to develop a strategy, but also to implement it. Many of the concepts proposed as new can be found in equivalent books from earlier decades, however, these books are still being bought because the ideas, even though often known, remain unimplemented. MBAs attend many theoretical courses about strategy but not about actual implementation of that strategy, moreover authors like Nicolaidis and Michalopoulos (2004) state that MBA grade are mainly inflated with no student failing the program. This shows that management education fails at translating managerial knowledge into organizational action. (Pfeffer and Sutton,1999; 2000; Snook, Nohria and Khurana, 2012; Speculand, 2014)

[2] Style in which the manager builds relationships with employees to promote organizational culture for the achievement of the business goals

The milestone of training leaders and employees seems to be perfectly accomplished, the greatest challenge is to achieve putting that knowledge into action and focusing on the execution part of the business. As stated by Ebert and Freibichler (2017), one of the major obstacles in international organizations relies on the lack of strategic renewal and poor execution, which has been labeled by Psychologists as the phenomenon of "planning fallacy".

Despite the amount of money and time spent on management training, corporations and organizations all over the world still fail to comply with business goals. Even though managers are well trained, know exactly which strategies to put into practice and have acquired the necessary knowledge to run a successful business, they still fail at doing so because they are not able to transform that knowledge into action. Managers know what has to be done and implemented but they do not apply it or put it into action, this is what we call the knowing-doing gap; where management fails to implement knowledge.

2.2. The Knowing-doing gap in management

> "Moving from concept to organizational action may be the most difficult step in the strategic decision process" (Floyd and Wooldridge, 1992, p.38)

The implementation gap also known as knowing-doing gap refers to transforming existing knowledge into action, or in other words implementing what individuals are aware that has to be done. There is a difference between entrepreneurial activity and strategic management. In the case of managers, the activity refers to implementing strategy for their organizations instead of just "defining" it (Floyd and Wooldridge, 1992; Pfeffer and Sutton, 2000; Bird, 1988; Knight et al., 2007). As stated by J. Maxwell (as cited in Li and van der Wees, 2015) the greatest gap in the world is the gap between knowing and doing, which applies to individuals as well as companies and is one of the gaps which remains unsolved in business management. Moreover, Johann von Goethe (as cited in Li and van der Wees, 2015) stated that "Knowing is not enough. We must apply. Willing is not enough. We must do." Therefore, one has to know by doing.

The original theory of reasoned action shows the individual's motivation, which is used as a measurement to determine the individual behavior or willingness to achieve a certain goal (Fishbein, 1979). However, this theory does not take into account other influential variables, for example, managers are willing to implement certain behaviors in a company, yet in many cases they still fail in doing so, therefore it can be said that the motivational factor is not the only one influencing the act of implementation. The theory of planned behavior from Ajzen (1991), arises due to the necessity of studying non-controllable behaviors. This theory exposes interesting behavioral insights to take into account as the cognitive self-regulation making an emphasis in

unresolved issues like implementation. To approach failure in predicting achievement-related behavior based on personality traits, the aggregation of specific behaviors is taken into account, as this aggregate considers situation and other external factors and represents an increased value in measurement of behavior. (Ajzen, 1991)

The theory of planned behavior analyses behavioral attitude, subjective norms and perceived behavioral control to determine the likelihood of implementation of a behavior. The behavioral attitude is the effect or contribution made to the individual. The subjective norms refer to the surroundings of the individual, his social network, group beliefs, etc., in other words, the support given to the individual from his community. And lastly, perceived behavior control refers to the ability of the person to perform the certain behavior. In case of management, the favorability of these factors will also influence on the likeability of a manager to accomplish a certain behavior that leads to change, in this case towards taking action and reducing the implementation gap. (Ajzen, 1991)

According to the theory of planned behavior, in order to predict or measure behavioral achievement, the focus should rely on the factors of intention (motivation) and also the ability or (perceived) behavioral control. Seems that managers are in general motivated and willing to drive success in their firms, however, sometimes they might not be able to control their behavior towards implementation. This can make reference to the so-called self-efficacy believe, where individuals behavior is greatly influenced by their confidence in their performance ability. (Ajzen, 1991)

The model of self-efficacy represents a manager's capabilities to drive implementation and change and its powered mainly by managers motivation to drive this implementation and the factors influencing the level of motivation. Self-efficacy as well as self-generated influences, motivation and follow-up are key for managers to reach a successful implementation. Some of the characteristics refer to the managers personality traits, for example, a high level of commitment to overcome obstacles and transform them into action; and features of the workplace that influence managers self-efficacy. A surprising fact is that leaders coaching is significantly correlated with managers attempts of leadership. Managers who had superiors that engaged in change and implementation influenced them in adopting a similar behavior to their superiors being more likely to act upon and engage more towards implementation. (Paglis and Green, 2002; Bandura, 1986) Moreover, according to Jørgensen, Boer and Gertsen (2003), self-efficacy is a great driver of continuous improvement implementation.

The implementation problem has also been a discussed matter in other fields. Cline (2000) provides a model comparison of Goggin et al communication model (CM) of intergovernmental policy implementation and the implementation regime framework (IRF). The CM model

conceives the implementation problem as a problem of organizational management and makes an emphasis on the need to focus implementation analysis overtime. Furthermore, the IRF model conceives the implementation problem as a problem of achieving cooperation. Both models provide some contribution to the topic of the knowing-doing gap, as it seems that cooperation as well as organizational management play a role in the implementation problem. (Cline, 2000)

Floyd and Wooldridge (1992) evaluate the lack of implementation with a focus on the middle management, which seems to be the problematic factor in some cases due to the non-alignment of goals and strategic decision between top leaders and middle management. Proving once more that the stages of strategy and planning apparently work for most firms, however, the implementation stage fails. To activate the implementation phase, implementation intentions are needed, they create a mental replication of an actual situation and transform it into real action through goal achievement and erasing the gap (Gollwitzer, 1993).

Some examples illustrate the frequent gap between knowing the importance of something and getting to do something about it. For instance, the Association of Executive Search Consultants conducted a survey in which 75% of the responding CEOs stated that companies should use `fast track' programs, however, less than half of the participant companies have one. According to a Fortune article commenting on this survey, it could be executive directors, either do not mean what they say, or they struggle implementing it. Research indicates that the main problem relies on implementation. The knowledge across firms slightly varies, the only remarkable difference in successful firms is the ability to implement and turn plans into operational action. (Pfeffer and Sutton,1999; 2000; Snook, Nohria and Khurana, 2012; Bird, 1988; Gollwitzer, 1993)

The main causes of the knowing-doing gap are due to various reasons: Excessive talk that replaces action (discussion does not lead to execution), dependence on organizational memory (excessively trusting and following the organizations culture, doing thinks how we were taught or saw they were traditionally done), fear (employees afraid to express their ideas and to act on the acquired knowledge), absence of measurement (with the absence of measure, process problems will be masked, and management will lack directions to act towards improvement, which is an obstacle for new ideas), internal competition (when part of the organization implements favourable ideas, others within the firm may reject these ideas if organizational competitiveness is too high). (Pfeffer and Sutton, 2000; Ajzen, 1991)

> “Digital suave generations have a tendency to treat virtual reality as reality, talking as doing and information as knowledge”. (Zeleny, 2008, p.67)

Thinking that talking about something equals doing it, is an increasing trend, especially amongst new generations of managers, the ones already familiar with technologies, behave as if talking as if what is to be done were as valid as actually getting it done. Nowadays managers pay more attention to polish their presentations and do the talking than actually working on it. The authors also state that MBA education in its traditional way also encourages students to focus on talking and looking smart more than doing. This mainly happens because the "talking" can be measured and assessed immediately, and on the contrary, implementing action and getting things done requires a greater timeframe and organization. The main issue when addressing the gap is that nowadays the aim is to sound smart and give a good impression to others. It is about "marketing" but not about real work. Another barrier for putting things into action is the corporate DNA, which stays in the firm and tells employees to act and do things the way they have been always done. As well as internal competition. (Zeleny, 2008; Pfeffer and Sutton, 2000)

Engert and Baumgartner (2016) agree that little attention is dedicated to implementation due to the gap between formulation and actual implementation. A relevant challenge for individuals not to put knowledge into action is the exhaustion challenge, meaning that exhausted employees are too tired to learn new things and to apply them. A research study conducted by Hengchen Dai, Katherine Milkman, and David Hofmann discovered that employees in hospitals lower the rate of hand-washing compliance when they have busy schedules. However, compliance increased when the shifts were shorter and less busy. (Gollwitzer, 1993) Another great challenge influencing the knowing-doing gap is lack of reflection and internal competition. Being always "on the move" and active, does not offer individuals or managers the opportunity to reflect on what they did and what they did correctly and what they did not do properly. A research study conducted in India by a global IT consulting firm confirmed that employees who spend some minutes reflecting and writing on their new knowledge from the training performed way better than the ones who did not. Other studies with the same aim, claimed similar results. Moreover, according to Kruse (2019a) leadership is based on behaviors, and even the most highly motivated manager can go back to traditional habits, becoming task-focused under stress. Information bias, which can be defined as the tendency to seek more information even though it will not affect action, might be another great contributor to the knowing-doing gap, keeping managers busy in meetings to collect information and not acting upon it (Ebert and Freibichler, 2017).

To achieve organizational success, it is not just important for managers to know how to manage knowledge, but even more important is to transform the knowledge into business action. In other words, implementation is critical for organizational success and for building a capable firm (Crittenden and Crittenden, 2008). The main challenge for managers is to make knowing and doing the same thing in order to perform efficiently and embrace the culture of action (Ebert and Freibichler, 2017).

The fact that "we can't get anything done" despite all the training and information received is a mystery worthy of a business-school case study and has much to do with a change in behaviour. Therefore, the effort to analyse the possible ways to overcome the knowing-doing gap in management will be presented in the following chapters.

2.3. Analyzing possibilities to overcome the knowing-doing gap in management

> "Effective management is the key to solving the implementation problem" (Cline, 2000, p.2)

To overcome the challenges and the knowing-doing gap itself, managers should take various aspects and recommendations into consideration. Changing the way people think and act when it comes to sharing their knowledge, is not easy and involves considering psychological factors, personal attitudes and competencies as well as the history and the dynamics of the social, emotional and organizational context in which people operate. (Angehrn, 2005; Lin and Tseng, 2005) To achieve implementation, managers should implement communication, allocation and monitoring skills, as well as establish a strategy according to the firm's culture (Crittenden and Crittenden, 2008).

According to Bourne et al. (2003) there is plenty taught about strategy but little about the operational part of implementing this strategy. The steps that must be taken in order to avoid or reduce the gap refer to improving understanding of the strategy, situation and influencing factors and enhancing commitment towards implementation (Floyd and Wooldridge, 1992). According to Mistry (2014), top management plays a great role for implementation strategy and they should be the responsible of establishing goal implementation, tracking, monitoring the process and external factors and adapting the goals depending on the change of situation. (Bourne et al., 2003; Mistry, 2014; Engert and Baumgartner, 2016)

Gestalt-Field psychologists believe that behavior is not just driven by external factors but also depends on how the person interprets these external incentives, therefore when willing to implement or change a behavior, it is important to change the perception of the situation. In behavioral science, the Dunphy and Stace typology drives the managers through exercises to help them diagnose their own situation and change their personalized plan of action, this approach is transformational, as the continuous measurement can be translated into continuous change. (Bourne et al., 2003)

There are certain guidelines to reduce the knowing-doing gap and for managers to build a culture of action based on goal-directed responses that become automated. It is important to understand the reason for committing an action, to have the will to accomplish it and invest in learning. Leaders are key for turning knowledge into action by engaging with actionable principles and explaining not just why things are done but how, developing a strategy that engages with organizational action and measuring behaviours as well as organizational culture in order to implement the organizational strategy based on action principles. (Burke and Collins, 2005; Speculand, 2014; Zaher, 2014; Gollwitzer and Schaal, 1998)

Some authors believe that the steps for achieving a successful implementation are the following: Leaders should dedicate at least as much time for implementing the strategy as for fabricating it, staying committed by constant flow of information and communication with employees, leaders should readapt the strategy depending on the situation, and ensure the right conditions regarding organizational culture are given for supporting a successful implementation; lastly, leaders should follow-up on the results of implementation to objectively evaluate their implementation performance. (Speculand, 2014)

Other authors opt to rely on the model of knowledge conversion proposed by Nonaka and Takeuchi (1995), that supports academics and practitioners to bridge the knowing-doing gap. This model is based on four pillars: the socialization mode, where theoretical models are shared; the externalization mode, that encourages creative thinking between practitioners and academics; and the combination mode, where systematic and operational knowledge emerge and drive implementation.

According to HBR studies, a possible solution to prevent or avoid the challenges mentioned in the last subpoint, of exhaustion and lack of reflection is to insert some breaks into the schedule and allow the employees, or managers in our case, to reflect and rest for small periods. However, for many management positions, there are no mandatory breaks, they have to choose themselves when to take one. A survey conducted by Staples to more than 200 office employees found out that most of them just take a lunch break mainly because they feel guilty if they would take more breaks. However, also most of them (90%) encouraged taking small breaks from work and suggested that in these cases their productivity increases. (Gino and Staats, 2015; Bandura, 1986)

Engert and Baumgartner (2016) agree that little attention is dedicated to implementation due to the gap between formulation and actual implementation; and that factor that could support to decrease the gap are employee motivation and communication. Managers are strongly encouraged to block some time in their calendar to plan the agenda and evaluate how did the day went, the same way they would block time in their calendar for a meeting. Another study conducted by the

HBR in the UK showed that workers who were encouraged to plan their forthcoming days during their journeys were happier, less stressed and more productive than the control group. Therefore, time management and saving some time to reflect on the work done becomes extremely important, especially for leaders, who might influence the structure of employees' weekly calendar. Strategies like the after-action reviews in the US Army might also be useful for managers to keep track of their strategy and make sure that action is being implemented. Therefore, reducing the knowing-doing gap by having an objective picture of what the reality looks like and how much it differs from the targeted picture. (Gino and Staats, 2015; Engert and Baumgartner, 2016)

The whole point of reducing the implementation gap is by implementing intentions into operational action. By aiming to implementing intentions, the mind creates a representation of a specific situation, which through goal setting and intending behavior, will reach goal achievement and implementation of action. Situational factors and personality are the main moderators that influence the relationship attitude-implementation, or in other words, the likelihood of implementation. Gollwitzer (1993) claims that intentions get implemented through automatic processes, which are driven by intention or intended behaviors. Traditionally, intentions, known as the best predictors of behavior, were viewed as either an act of willingness or necessity. Moreover, intentions can also be seen as commitment. However, it must be differentiated that the commitment can refer to either goal intentions, known as the commitment to realize a wish or desire, or as implementation intentions, actually aiming at the real action. If goal intentions are followed by implementation intentions, the chances of reaching actual action increase as intentions help prioritizing and favor action initiation. Automatic processes embraced by implementation intentions result on a change in behavior toward actionable principles that help reduce the knowing-doing gap. (Gollwitzer, 1993; Gollwitzer and Schaal, 1998)

According to Locke, Shaw, Saari and Latham (1981), goal setting when intending to perform a task or action leads to higher performance and acts as a motivational factor. Specifically, the factor that help overcome the gap are: specifying goals, having the ability to approach them, feedback and rewards in some occasions. Moreover, Chiaburu and Marinova (2005) agree that performance goal orientation can act as an enabler of implementation. However, as Gollwitzer, Heckhausen and Steller (1990) state, goal setting must not be confused with goal striving; as the first one belongs to the planification stage, while the second is part of the actionable stage of implementation. The best way to understand the separation of these is by ordering action levels from low to high; high corresponding to the strategy level where planning takes place; medium referring to the operative level where goal-directed behaviors are established, and the low level referring to tactics and actual execution, or in other words, implementation (Gollwitzer and Schaal, 1998).

Necessary variables for performance are knowledge and information. However, nowadays the efficiency in which knowledge is transferred is increasing tremendously. Best practices are shared worldwide, and there is little difference in the information firms can access, however, not in how they implement and turn this information into action. According to Pfeffer and Sutton (1999) in many businesses, the gap between what they know and what they do remains unsolved. This gap can be understood as a performance paradox where "Managers know what to do to improve performance, but actually ignore or act in contradiction to either their strongest instincts or to the data available to them."(Pfeffer and Sutton 1999, p. 40). According to Al-Eisa, Furayyan and Alhemoud (2009) transfer of knowledge strongly relies on the intention of transferring the knowledge, which itself relies on self-efficacy, motivation to learn and support, normally not taken into account in nowadays trainings. Nicolaidis and Michalopoulos (2004) agree that self-efficacy and reflecting are key factors for bridging the knowing-doing gap.

Managers' calendars are full of meetings in which most of the time the topic to be discussed is what has occurred, instead of taking action. One of the main problems is that organizations tend to measure outcomes instead of processes, and this can be a handicap in many occasions. The main task for managers is to assist in building systems of practice that create a more reliable transformation of knowledge into action. Leaders should create environments that promote the action culture where actions count more than words. An exemplary firm is IDEO, which embraces management practices that value an "attitude of action" and learning by doing. (Pfeffer and Sutton, 1999; Floyd and Wooldridge, 1992) Virtaula is another example of an initiative from a Spanish bank that applies the learning by doing approach using components like interaction and practices. Instead of asking managers to read theoretical content, they do some exercises and case studies related to their field. The platform acts as a coach asking managers to write a couple of lines about their professional field and making them more involved in the process of learning by applying the concepts to their daily business operations. (Bronfman, 2007; Virtaula.eu, 2019)

> “The action research we have done on the uses and results of Virtaula showed that this framework and model for instructional design is of great help in bridging the knowing-doing gap.” (Bronfman 2007, p.9)

Some other powerful tools are known to be networking and mentoring, as well as exposure to others. The most accessible strategy has been recognized to be experimental learning, or in other words "learn by doing”. However, since decades authors like Porter already presented research relevant for companies to focus on action and implementation. Porter developed the activity maps in 1996 to find out what the companies' activities are. According to Porter, a strategy is what the company does, a strategy must equal the company's activities. Such a method was developed a

long time ago and still up to today is not being implemented by most managers. (MacLennan, 2011) Other authors like Zeleny (2008) present a methodology for overcoming the implementation gap in the area of strategic management, were vision and mission are a mere description of intentions but no actual strategy or action. Managers should interpret corporate strategy as an active portfolio and not just as planning, because there are psychological and emotional differences between making plans and implementing.

As proposed previously, researches evaluate many alternatives for overcoming the knowing-doing gap and embracing implementation, there is a need of re-evaluation and further research on the topic. The remedy to the knowing-doing gap is logically doing something, acting upon a cause, implementing a strategy. The key to success its simply to make knowing and doing the same thing, sounds easy, however, it is still one of the main challenges for business managers, which have to find a great strategy to help them lead implementation. For successful companies there is no existing knowing-doing gap; as there is no difference between how they think and what they do.

Furthermore, to better comprehend the absence of implementation, or in other words, the existence of the knowing-doing gap, this research paper will further analyse behavioural economic insights and how these can help to change a certain behaviour, in this case, towards implementation.

3. Behavioral Economics

As Richard Thaler (2015) states, traditional economics simply doesn't account for human behaviour. Neoclassical economics assumes a model of human decision-making where individuals are perfectly rational, which is not the case as individuals make irrational decisions when it comes to economics choices. Conventional economics does not take into account the irrationality of human behaviour and decision-making, which is constantly influenced by biases, heuristics[3] and emotions. (Sunstein and Thaler, 2009; Thaler, 2015)

“Behavioral Economics can be defined as the study of natural limits on computation, willpower and self-interest, and the implication of those limits for economic analysis” (Camerer, 2018; p.2). In order words, behavioral economics (BE) considers the variables that are likely to affect economic choices.

Behavioural economics is born due to the gap between real humans and the "Homo Economicus", as this last one does not present the limitations that characterize the way real humans make

[3] Decision-making shortcuts

decisions, many times irrationally (Sunstein and Thaler, 2009). This new type of economics can be seen as a criticism of some aspects like the rational choice theory presented by traditional economics and targets a more suitable and realistic way of understanding human behaviour. Behavioural economics is based on a dual-process theory of mind, composed of two 2 systems. System 1 is more automated, fast and intuitive, and system 2, is characterized to be reflective, logical and slower. (Ebert and Freibichler, 2017; Kahneman 2011)

It can be said that traditional economics does not target human behaviour, which makes it more difficult to target gaps such as the implementation gap, which has to do much with self-control and other biases influencing human behaviour. The increasing influence and application of behavioural economics could mean a step foreword to target and reduce the knowing-doing gap. In other words, behavioural economics aims at making economics more robust, realistic and human-centred, "…behavioural economics enriches the conventional economics toolbox by incorporating insights from psychology, neuroscience, sociology, politics, and the law." Behavioural science combines economics and psychology to understand irrational decision-making. Therefore, humans are not treated as machines but as emotional decision makers. (Altman, 2012; Kahneman 2011)

Emotions affect people's decisions, and this should be taken into account when applying or studying economics. As the human brain is not a calculating machine and gets influenced by many factors when making decisions, “Some behavioral economists recommend that governments intervene to nudge people into making choices that the experts perceive to be in people’s best interest” (Altman 2012, p.165)

There are some existing limitations such as the bounded rationality, that makes individuals fail in deciding which choice will benefit them the most. For example, the lack of self-control when deciding to stop smoking. Therefore, it could be helpful to guide people on their choices. A great influencing factor when people have to make a decision is the choice architecture, meaning how people's choices are framed or presented to them, which can determine a lot about their decision. Moreover, framing peoples' choices can easily be done by manipulating default options or with nudges, which are known to be gentle incentives that motivate individuals towards making a certain decision and without influencing their freedom of choice. (Sunstein and Thaler 2009) Behavioural economists agree on the fact that people's decisions tend to be biased because decisions are based on heuristics. In the following chapter, the author will analyse different techniques that influence decision-making, with a special focus on nudging theory.

3.1. Nudges for influencing behavior

Since the 1950s, behavioural scientists have been studying human irrationality and the ways peoples' choices could improve. The word "nudge" might sound new, however, this phenomenon has been around for a long time. Nudges were introduced by Thaler and Sunstein in their book "Nudge: improving decisions about health, wealth and happiness", where the aim is to influence people's decision for a better lifestyle without limiting their choices. These, nudges that target public health, are the most accepted ones by the population (Sunstein and Thaler, 2009; Tikotsky, Pe'er and Feldman, 2019)

Nudge has driven a great academic interest, with around 5,000 citations from various disciplines like psychology, economics, public health, marketing, sociology, political science, etc. Nudges are subtle interventions that guide choices without limitations, these interventions in the environment are being implemented to influence people's behaviour without limiting their choices. A nudge can be defined as an effortless reminder that aims to help individuals make choices that are favourable for themselves without limitations. The nudge theory is based on ethical behavior and influences individual's free choices embracing their well-being (Sunstein and Thaler, 2009; Hall-Ellis, 2015)

Nudges are everywhere, some easy examples are the flies in the men's bathroom in Amsterdam's airport, writing next to the meal the number of calories to influence healthier choices, the letter from the energy company telling you that you use more energy than your neighbours. Nudges have proven to be so powerful that large entities such as the military, governments, businesses and even countries have been implementing them for their benefit. (Kruse, 2019b)

Behavioural economics, and particularly nudging has been pioneered by policymakers to aid national priorities as well as to reshape brand perception, consumers' behaviour, and therefore increase sales. An example can be president of the US Obama, who implemented behavioural economics to support national priorities; such as finding better jobs or influencing citizens to have a healthier life. This field is of increasing interest within organizations and business leaders who are willing to take decision-making to the next level. (Tikotsky, Pe'er and Feldman, 2019)

> "It is true that some nudges are properly described as a form of "soft paternalism"[4] because they steer people in a certain direction. But even when this is so, nudges are specifically designed to preserve full freedom of choice." (Sunstein, 2019, p.2).

[4] Limiting or influencing an individuals' liberty or autonomy to promote their own good when the action to be committed is involuntary or the individual is not completely aware.

The 10 most important nudges are (Sunstein and Thaler, 2009):

1. Default rules (Automatic enrollment programs)
2. Simplification
3. Use of social norms (emphasizing what most people do)
4. Increase ease and convenience (make healthy food more visible)
5. Disclosure (show awareness of economic or environmental cost)
6. Warnings (graphics in cigarettes)
7. Pre-commitment strategies (act according to your goal)
8. Reminders (due to the fact that people hold a lot of information in their heads)
9. Elicit implementation intentions (do you plan to vote?)
10. Informing people of the nature and consequences of their own past choices ("smart disclosure")

There is still much to be found about how identity, consumer preferences, and ethics affect the power of nudge. However, these small incentives demonstrate how small behavioural changes can shift averages. One of the most basic and effective nudges is the reminder; something where behavioural science can expand its research, for example, targeting the types of reminder that affect different types of individuals with different personalities, meaning that every individual could implement and personalize nudges with own characteristics. Other powerful nudges apart from reminders are the ones that generally provide information and promote self-regulation. (Tikotsky, Pe'er and Feldman, 2019)

Richard Thaler, considered the father of behavioral economics, criticizes conventional economics and refers to the Homo Economicus as if it "can think like Albert Einstein, store as much memory as IBM's Big Blue, and exercise the willpower of Mahatma Gandhi", (Thaler, 2011) in other words as an intelligent machine more than a real human being with complicated emotions, limitations and bounded rationality. According to conventional economics, it is believed that people are free to make their choices. However, Behavioural Economics has proven that the choices we make are always influenced by certain factors, nudges are not new, meaning that it is just a new type of nudges being applied on top of pre-existing nudges. (Altman, 2012)

The concept of self-control has been discussed by many economists such as Adam Smith. Moreover, behavioural economist George Loewenstein has documented stressed importance in concepts such as "willpower". However, problems such as self-control or time inconsistency as well as will power are issues to which economists did not address or pay enough attention yet. Humans have to be considered when economics are applied, and the field of behavioural economics, as well as nudging, is still developing to reach this goal. We are in the process of

reaching a more developed version of economics, where humans and human behaviour stand in the centre. "adopting behaviourally realistic approaches" (Thaler, 2015; Bandura, 1986)

Human beings determine and shape their behaviors and actions based on the information available to them. Therefore, nudges can be very easily implemented and generate significant payoffs. Unnoticeable aspects of our environment can have a significant impact on our behaviour. Even if nudges are simple and subtle, they are proven to be powerful influencers of people's behaviour. They do not affect an individual's economic incentives; they are human-centred and designed to understand people's needs and influence choice for their benefit. Moreover, nudges are voluntary, as they safeguard freedom of choice. For this last reason, nudges must be transparent. (Fishbein and Ajzen, 1977; Gollwitzer, Heckhausen and Steller, 1990)

The nudge approach proves that aspects of organizational design influence their employee's behaviour and that implementing nudges is proven to be a better practice than rewards systems, competency models or performance management to support a behavioural change initiative. The next step might be to get managers to implement this type of technique for better performance.

3.2. Nudging Managers for better performance

Nudging has been used by governments and policymakers to influence nations' behaviour, but its potential is still to be proven in the business world. However, if governments can influence people's decisions by creating a better choice architecture, companies can as well do it. (Sunstein and Thaler, 2009) As the nudging theory is based on research in behavioural economics and the way individuals make decisions, to influence people to make better decisions by presenting the options or choices in different ways, it can be deduced that behavioural research could influence and motivate employees or mangers on their decision-making.

Individuals make decisions fast when they are under pressure, based mainly on intuition, limited information and unconsciously guided biases and psychological fallacies. If individuals face so many difficulties when making decisions, the main point for behavioural economics is to make it more likely for them to choose the better option for them and their organization. The key to achieve this is to responsibly implement nudges. Human irrationality has been a topic for researchers and academics for about a decade, mainly regarding consumer behaviour and the effect on employees' motivation. Even highly motivated leaders fall back on traditional habits and become task focused in stressful situations. As managers mostly cannot rely their own abilities when implementing action, this implementation must be driven by the formation of implementation intentions. Effective practices can simply be based on giving effective feedback, showing appreciation, or being mindful of other communication styles. Companies should start

using nudge management techniques to implement existing knowledge and intentions towards actionable principles. Results depend on how goal-content is framed. Therefore, nudges can act a valuable ally to influence intentions and self-regulating the implementation of automatic action control. (Kruse, 2019a; Thaler, 2015; Gollwitzer and Schaal, 1998)

Research conducted by Tawse, Patrick and Vera (2018) is based on the relation between management literature (strategy implementation and change management) and psychology literature (self-regulation and nudges) and proposes six different nudges divided in two different groups. On the one hand, nudges to enhance will-power and on the other hand desire-reducing nudges, with both groups aiming at empowering action. The six nudges and the group where they belong can be seen in the following table:

Table 1: Six nudges that improve implementation and reduce desirability to plan

#	Name	Nudge	Impact
NUDGES THAT IMPROVE WILLPOWER TO IMPLEMENT			
1	Remove the distraction to plan	Arrange implementation meetings that exclude any discussion of strategy formulation.	Improves willpower by removing the temptation to plan.
2	Develop implementation intentions	Perform if/then scenario exercises.	Improve willpower by preparing the mind to resist future distractions from implementation.
3	Use verbal framing	Say "we do" instead of "we can do."	Strengthen willpower by creating an implementation mindset.
NUDGES THAT REDUCE DESIRABILITY TO PLAN			
4	Highlight the end game	Inspire through motivational vision and mission statements.	Increase the desire to implement through the intrinsic reward of achievement.
5	Leverage a crisis	Nudge individuals into a state of negative affect.	Decrease the desire to plan by creating a sense of urgency, where immediate action is required.
6	Celebrate small wins	Extrinsic goals motivate task initiation.	Tight deadlines and frequent rewards motivate individuals to initiate task-relevant action.

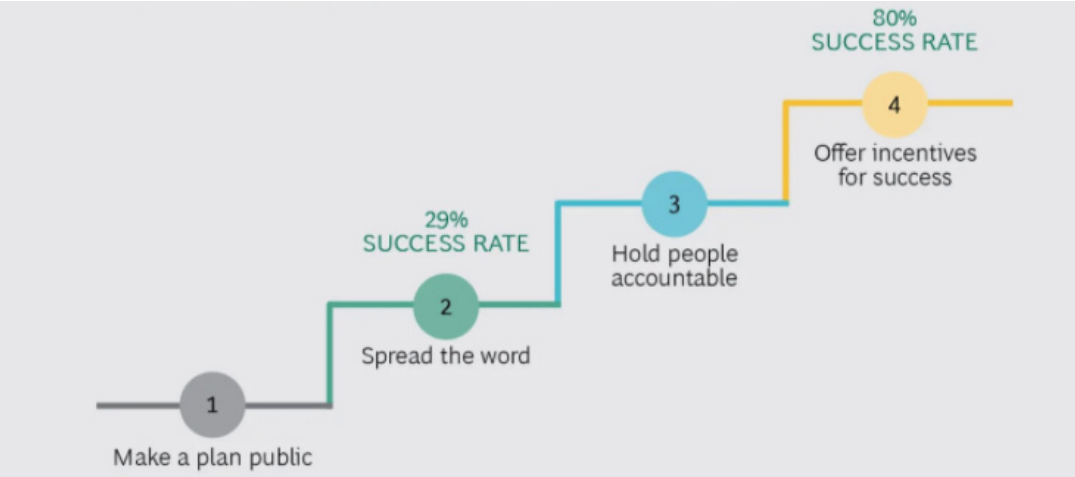
Source: Tawse, Patrick and Vera (2018)

Managers tend to have a planning tendency as it is more pleasurable than taking action. Evidence suggests the previous exposed nudges improve the chances of strategy implementation engagement, and therefore, can be considered as an integral component for implementation success changing a planning mindset for an actionable one beating the self-control dilemma or battle between the desire to continue to plan and the willpower needed o transition into action. (Tawse, Patrick and Vera, 2018)

The nudge theory offers a strategy to modify group behavior. Specially, in the field of business, techniques like nudging can result very useful to influence the leader's behaviour and guide them towards certain outcomes or change initiatives. Meaning, nudges have great potential for

businesses, and in particular, for increasing the likelihood of transformation programs being successful using a properly designed coaching strategy for new and existing managers positively influencing their choices on topics like decision-making, implementation and other organizational skills (Hall-Ellis, 2015; Kruse, 2019b). The following exhibit shows the steps for a change program, and the phases ("spread the word" and "offer incentives for success") in which nudges reinforce the positive response of employees in a change program:

Figure 1: Nudge steps for change management



Source: Dhar et al. (2017)

Leaders agree that many times they act irrationally when making decisions for the company. According to CEO Kevin Kruse from Leadx, for leaders to have efficient nudges they should implement a behavioural nudge strategy, in which the following points have to be determined: A goal, a target audience, the message cadence, the form of the nudges, who to coordinate with, and how to measure the impact of the nudge campaign/ strategy. (Kruse, 2019a)

Nudges can boost change initiatives up to 80%, which is an enormous percentage if we take into account that more than 50% of change initiatives fail to accomplish expected results and that most managers and organization fail to implement strategy on a rate of 70 to 90% (Tawse, Patrick and Vera, 2018; Mistry, 2014). When "starting with nudging", organizations have to take 4 key guidelines into account. These are exposed in the following figure:

Figure 2: Nudges for behavioral changes

Source: Dhar et al. (2017)

Moreover, there are certain factors to be taken into account for a nudge to be effective. It has to be noticed, read and acted upon. Moreover, there are certain aspects needed to be taken into account for nudges in the form of reminders, messages or emails. For example, when using digital technologies, the sender and the subject are of tremendous importance, moreover, the body of the email should not be too long, especially when targeting busy managers. The nudge should be personalized to keep the attention of the subject and timing is also a key aspect to take into account as the hour and day of the week are of great importance in influencing the power of the nudge over an individual. (Kruse, 2019b)

The author refers to nudge management as the new scientific management approach which applies insights from behavioral economics to optimize organizational productivity and line up organizational and managerial objectives. Most managers focus on implementing strategies that influence system 2, while successful companies like Google implement a nudge management approach, that aims at targeting not just system 2 (reflective, logical and slower) but mainly focusing on managing the automated system 1 (fast and intuitive) by implementing techniques like nudging to strengthen knowledge workers performance and contribute to reaching the organization's goals (Ebert and Freibichler, 2017; Kahneman, 2011). According to Ebert and Freibichler (2017), some nudging techniques for managers to put into practice are the following:

- Adjust the default assumption of meeting times in your business (lower the "standard" time) and increase efficiency.
- Improving planning fallacy and the knowing-doing gap by establishing "implementation intentions" (Gollwitzer 1999, as cited in Ebert and Freibichler,

2017) which consists in communicating openly your plans to a peer so that individuals are more likely to commit to act on their goals to prove their commitment to the peer.

- Improving task efficiency by implementing a “no-meeting” day, or other actions as automatically switching off access to social media or email as other distractions.
- Encourage knowledge sharing (eg. Google, 2019 by installing micro-kitchens).

> “Small interventions based on insights from behavioral science makes it possible for knowledge workers to be more productive”. (Ebert and Freibichler, 2017, p.1)

Nudge management can be a great opportunity to influence knowledge workers or managers through using the power of nudges implemented to affect system 1 (Kahneman, 2015). Nudges are not intrusive, are easy to implement, costly and effective; it is the perfect strategy to influence workers behaviour towards better habits and implementing action. The only issue might be the way to measure the effectiveness of these nudges. Many studies have been conducted on the topic, however, a company might want to know the effectiveness of nudge management applied to their business. Here is where digitalization comes into place with constant data collection and analysis. (Ebert and Freibichler, 2017) The more data companies own, the more they can target the behaviour and design personalized nudges to affect their employees. This topic will be discussed in detail in the following chapters.

3.3. The use of nudges for business’ success

Nudges are a crucial element of BE for organizations, simplifying decisions and making it easier to stick to new habits (Sunstein, 2019). Recently, public as well as private institutions started showing interest and implementing nudges in their organizations due to the low cost and high effectiveness. (Tikotsky, Pe'er and Feldman, 2019)

When nudging is implemented as a "generalized mindset", it can help change an organization's culture. Therefore, it could help change implementing action in an organization. A problem-solving approach in the entrepreneurial world is key for staying ahead of competition, and it could be done through implementing and developing behavioral insights. (Hall-Ellis, 2015; Tawse, Patrick and Vera, 2018)

According to Hall-Ellis (2015), by adopting a nudge theory strategy, organizations are able to positively change the workplace environment. Many companies around the globe started building and implementing nudge units to target organizational and strategic challenges. Two countries

who paid special attention and interest to nudges and its implementation are the USA and the UK (Thaler, 2015; Hall-Ellis, 2015).

As follows, some successful examples of nudge implementation in organizations:

In 2010, the UK created the world's first governmental "Nudge Unit" officially called the Behavioural Insights Team. After the success of this nudge unit, the US created the American Social and BS Team in 2015. Nudging is being also implemented in other countries like Germany, the Netherlands, Finland, Singapore, and Australia mainly for military or governmental issues. (Sunstein and Thaler, 2009) Moreover, countries like the UK also used nudging to encourage people to pay their taxes.

Some electricity companies have nudged their clients through gentle messages in their bills by telling them the amount of energy they save in comparison to their neighbours and making them feel more accountable for their use of electricity. (Thaler, 2015)

Google, considered as one of the most successful business companies in the world, presents an agile management system that influences knowledge workers by choice architecture. Google implements simple nudges to determine default rules for the productivity and decision-making of their employees. Simple examples are the healthy choices in the cafeteria or the design of the building. Google bases its strategy on a nudge management approach based on the dual-process theory from Kahneman. Most of the companies use to focus on addressing system 2, while smart companies like google use a nudge management approach, targeting system 1 and sending nudges to have a greater effect on workers. (Ebert and Freibichler, 2017; Schmidt and Rosenberg, 2014)

Swiss Re started to use the potential of BE in insurance and implemented the Swiss Re's Behavioural Research Unit, which helped them to increase sales, efficiency, and offering more personalized policies with simple strategies such as redesigned emails or marketing strategies. Swiss Re claims a 180% increase in sales due to implementing nudging. Moreover, other companies like AIG, HSBC, Lloyds Bank, Ipsos, the Obama campaign, JPMorgan, Barclay's bank, and others have also experienced the positive effect of behavioural economics. (Thaler, 2015)

Virgin Atlantic used nudges to influence pilots towards saving fuel by simply informing pilots that they were participating in a study for saving fuel. The results were astonishing by saving about 3 million pounds and reducing carbon dioxide by about 20,000 tons. Virgin demonstrates that a simple nudge can be sufficient and more effective towards achieving a change in behaviour. (Thaler, 2015)

Other companies like Amazon, Netflix, Airbnb, and Duolingo bet for personalization and selection nudges, like the "watch next", "similar accommodation" or "based in your previous search", topics that will be further analysed in following chapters dedicated to personalization (Terres et al., 2019; Sandburg, 2019).

Some of the main impacts, along with the corresponding action, of implementing nudges in business are the following:

Table 2: The impact of nudges in businesses

Impact		Action
14%	increase in customer retention[1]	Changing the language of support-center conversations to encourage customers to think about the long-term benefits of a product
2.5x	more customers won from referrals[2]	Offering "selfless" incentives that reward a referred friend rather than the person doing the referring
35%	increase in employees following safety procedures	At a steel plant, placing posters of watching eyes to remind employees where safety procedures are critical
33%	increase in loyalty to employer[3]	While onboarding, focusing on newcomers' potential and opportunities instead of on the organization's own "PR"
18%	increase in sourcing of new loans in the first 2 weeks of the month[4]	Offering reminders and small prizes (eg, movie tickets, restaurant coupons) to loan officers to encourage early achievement of monthly targets
15%	less time on average for doctors to send back approval[5]	Having patients send personal notes to doctors to request sign-off on medical claims; letting doctors know via claim forms the speed with which the fastest doctors return forms
4x	increase in retirement-saving rate[6]	Defined-contribution program designed to encourage employees to commit to saving a larger share of salary by, among other things, timing the savings increase to coincide with a pay raise (thus mitigating perceived loss)

Source: Güntner, Lucks and Sperling-Magro (2019)

Nudges have been successfully implemented in military, government, healthcare, finance and other business fields; some businesses already adopted this strategy for increasing business preferences and are obtaining positive results. The next step for further development could be to add more value by incorporating the technological variable to the nudging equation.

4. Artificial Intelligence as a value adder (to nudging)

Technology and digitalization open great doors for behavioral economics and specifically for nudge management theories. The special feature of collecting and analyzing data can be used to send personalized nudges. Depending on the type of individual, a different type of incentive or nudge will be more effective. To strengthen the potential of knowledge workers, managers focus on implementing innovation and digitalization to create value for clients, shareholders, and employees. (Ebert and Freibichler, 2017; Euchner, 2019)

The use of AI-technologies allows companies to leverage data-powered insights and pay more attention to other social science fields for developing decision-making within the firm. AI is an area of interdisciplinary research that has much to do with computer science, can be divided into many different categories and used for many different purposes in different sectors. John McCarthy shaped the term AI in 1956 in the Dartmouth Summer Research Project where he gathered experts in the field to contribute with the definition of the concept of AI. (Dartmouth Artificial Intelligence Conference, 2020; Luxton, 2016; Borenstein and Arkin, 2016)

Even though there are many definitions for AI, in this paper, the author would like to refer to AI as a sub-field of computer science, which can be defined as machines imitating intelligent human-like behavior or tasks characterized by features such as visual perception or speech recognition. AI can be divided into strong AI, systems that can imitate a human's brain; and weak AI, which does not necessarily know how the human brain works but is useful for a particular task, in this paper the author mostly refers to weak AI also considered as machine learning (ML). Moreover, many companies using this technology do not have as an end goal to replicate the human mind, but to use this as guidance to provide better products for humans. (Chen and Liu, 2016; OECD, 2019)

4.1. Why AI?

Nowadays digital technologies make it easier for leaders to introduce techniques such as nudge management for reducing the knowing-doing gap and obtaining better organizational outcomes. (Kruse, 2019a) Nudges combined with better data analytics and developed intervention techniques have helped to increase the speed in applying behavioral economics into organizations. Web-based nudges are also known by the name of persuasive technology, which is mainly used in the behavior and health industry, mainly influencing behaviors and attitudes towards healthier choices. (Aldenaini, Alqahtani, Orji and Sampalli, 2019; Earley, 2017; Sunstein and Thaler, 2009)

AI refers to the study and design of intelligent machines. Which can be used for many different purposes like learning, assistance with decision-making, care management and many other already proven to be useful in some fields, mainly in the health industry. ML is used the most for automated tasks like cost cutting or basic customer assistant which normally optimizing processes and cuts costs for companies, the higher the more well developed the machine is. Whereas, AI might present greater technological complexities, but experts and practitioners are starting to apply it specially in the health industry with advance care tools that improve patient's life's and bring many opportunities which are rapidly advancing in behavioral healthcare. Moreover, the so-called affective computer is another field that focuses on the recognition and expression of emotions by machines, which will be analyzed in detail in following subchapters (Luxton, 2016; Chen and Liu, 2016)

Accenture, leading technology consulting firm, defines AI as a science of technologies, methodologies, and appliances that allow machines to sense, comprehend, act and learn, either on their own, through automation, or imitating and human-like activities. One of the most important aspects for companies to be and stay successful is to become agile making their business processes more flexible. To make the transition easier and more accessible, the key factor is the introduction of AI technology. (SAS, Accenture Applied Intelligence and Intel with Forbes Insights, 2018; Accenture, 2016; Accenture, 2017a)

When we focus on applying AI technologies to the business sector, creating an AI strategy supports the organization's business strategy. The core factors of an AI strategy are data, infrastructure, algorithms, skills, and organization. The AI team in a company shall consist of product managers, data scientists, and business developers, and a good AI strategy focuses on mid-term goals. Moreover, data is core to a company, and even more important is to know how to analyze that data for successful decision-making that leads to the benefit of the company. Data continues to increase and the technology in charge of processing becomes less expensive, there will be an increasing impact in sectors of society. (Anandarajan, 2002; Euchner, 2019)

To achieve an agile business transformation, organizations need to focus on outcome-driven dynamic business processes. However, the main challenge in doing so is the "timely data and analytic methods" of the organization's performance. Nowadays, technologies like AI are allowing companies to simplify and optimize business processes, mainly regarding speed and cost. For example, by analyzing unstructured piles of data from different sources, automating business processes amongst other factors that can become the "game-changing innovators". (Accenture, 2017a; Euchner, 2019; OECD, 2019)

AI technologies can enable a business to gain superior market intelligence, which business executives should use to optimize their corporations. For example, by providing companies or business units with intelligent reports based on automated search consisting of more detailed and faster processes than the ones provided by humans. This type of technology can signify a great advancement for businesses, providing them with an end to end overview of their supply chain and therefore, optimizing costs, quality, delivery time, etc. AI technology has been also much used for enhancing customer engagement and services offered by businesses. Resolving up to 80% of customer communication, claims, emails, and requests. AI can also be used to manage content such as monitoring social media to tackle inappropriate content, for image recognition, and tagging and categorizing products from images optimizing these processes. AI can greatly help businesses and their leaders with decision-making by providing certain information and advice, which can be very helpful for leaders. Moreover, AI provides personalization features based on previous choices. (OECD, 2019)

Another sector in which AI is also helping greatly, is in the banking business, with online procedures focusing on liability, fair processes, and transparency. For example, implementing systems for fraud detection. Moreover, AI can also be used to determine when machines or other equipment will fail, allowing businesses to act upon it before it happens. However, implementing AI solutions can be challenging and requires a change in mindset from leadership (Accenture, 2017a; OECD, 2019).

As has been shown, AI is much better than real humans in performing certain jobs like diagnosing disease, translating and customer service, just to name some. This fact has generated some fear amongst humans of technology taking over their jobs. However, even though AI will modify how work gets done, this technology shall be seen as an enhancer of human capabilities, and not as a substitute, allowing employees to focus on higher-value work and reinforcing their roles by driving business growth. (Moldenhauer and Londt, n.d.)

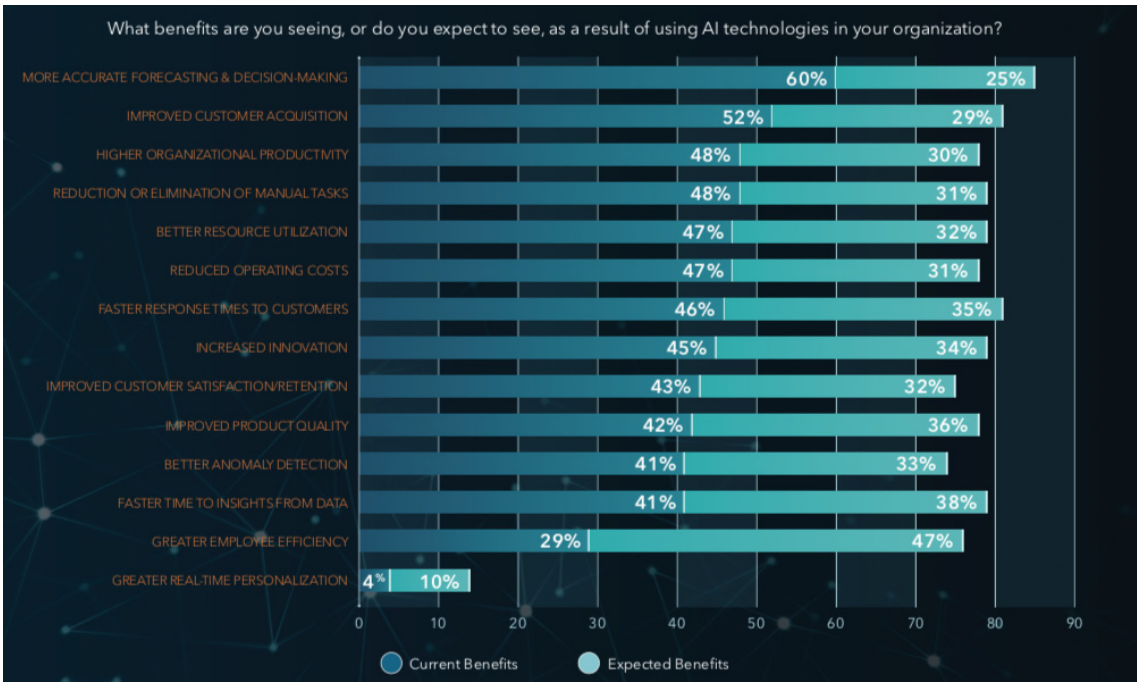
Businesses are one of the most benefited when it comes to AI-human collaboration, by optimizing the collaboration between humans and technology. Some milestones that can help businesses achieve this cooperation are through experimentation and active involvement of employees in the AI strategy, helping with data collection and embracing the human skills in connection to the new technology. A survey conducted to 1075 businesses amongst 12 industries showed that the more the company adopted the principle of human-technology cooperation, the better its AI strategy performed in terms of speed, savings, profit, and other measures. (Wilson and Daughterty, 2018; Moldenhauer and Londt, n.d.) AI assistants are even starting to show emotions such as sympathy, like the Koko system from MIT Medialab by, for example, giving advice when the assistant's user is having a bad day. Machines assist humans by amplifying and interacting with them and

providing advice. Moreover, Table 1A, to be found in the Appendix, shows some examples of how AI enhances performance in various organizations.

According to a survey conducted to more than 300 executives from leading business companies in the world, AI provides real success for business optimizing processes. Moreover, the companies that were most successful in implementing AI state that the positive results are mainly linked to analytics. Ethics of AI is, however, a very important factor companies should focus on, 63% of the business interviewed in the survey had an AI ethical committee reviewing the AI processes, and 70% had ethics training for their technologists. As Keith Collins (CIO from SAS) says, it would be incorrect not to use AI technologies to improve the human processes (SAS, Accenture Applied Intelligence and Intel with Forbes Insights, 2018)

AI contributes to solving real business problems, and to build trust by developed data and greater transparency. According to SAS & Accenture Applied Intelligence and Intel with Forbes Insights (2018), the most noticeable benefits for businesses are the following:

Figure 3: AI benefits for businesses



Source: SAS, Accenture Applied Intelligence and Intel with Forbes Insights (2018)

Moreover, the importance of combining analytics or data with AI for organizational success must be emphasized; 66% of the business leaders that were questioned agree that AI will allow businesses to process data for business decisions way faster than it was done before. Data analytics has a “major role” in implementing AI business strategy.

Even though there are already existing benefits for businesses, AI and new technologies have a growing potential, as it is remarked in Figure 1A shown in the Appendix.

To sum up this subchapter, it is important to recognize the benefit and potential of a positive impact lead by AI technologies. Moreover, taking into account that one of the great aspects of AI is its potential when combined with other technologies or fields. For example, AI combined with Internet of Things (IoT), Data & Analytics, Automation or with behavioral economics.

4.2. Organizational success driven by AI

In this chapter the author will focus on presenting companies that have reached success through AI Solutions, in order to demonstrate the positive impact and value creation it can provide for businesses and users. For example, companies like Grammarly, Gmail, Textio, and other AI writing applications are all about sending nudges combined with technology to assist individuals to create documents faster and more accurately (Sandburg, 2019).

> "Technological advances can help enhance our intellectual and physical capabilities and increase our overall productivity." (Luxton, 2016, p.19)

AI technologies have been around us for many decades, however, it is nowadays when most companies are taking AI to the next level. Many individuals and businesses still doubt the use and benefit of AI. Therefore, this section of the thesis will be dedicated to probe that AI in most of the cases is a value adder, and this can be seen in some of the most successful companies in the world, which have already invested largely in these technologies. Firms that fail to take the next step and implement AI and new technology in their leadership will lose competitive advantage and probably the business' success. Furthermore, leaders can take the most advantage of technology as a value adder through changing efficiency of providing services, improving operational practices and optimizing their work (Moldenhauer and Londt, n.d.).

Amazon is one of the world's trade giants and has invested in AI targeted for consumers as well as AI for business operations. A great example is Alexa, amazon's AI language assistant. Moreover, Amazon Web Services (AWS) consists of a group of machine learning programs and has currently more than 10,000 clients including Siemens, Netflix, Tinder, Airbnb, NFL, and NASA. AWS offers businesses a great variety of successful services powered by AI. The company assisted Siemens to deliver better care at a lower cost, helped Unilever to analyze digital marketing campaigns faster, Formula 1 to analyze data in real-time, Pinterest to let users find pins similar to the pictures they take, and TuSimple to implement autonomous driving systems. (Amazon Web Services, Inc., 2019) AWS uses a great number of AI technologies such as facial

recognition, object and scene detection, lifelike speech generator, transcriptions, machine translation, natural language processing, speech recognition, data protection, etc. With AWS, amazon claims to be decreasing the cost and impediments of businesses and allowing them to generate a great benefit from AI and ML technologies. (Amazon Web Services, Inc., 2019) Moreover, Amazon (2019) claims that without ML they wouldn't have been able to grow their business, enhance its user experience and optimize logistics speed and quality.

Another firm that successfully applies ML in a variety of ways is Netflix. For example, the personalization of movie recommendation**,** as the type of user who is likely to watch movie "x", will also be likely to be a target audience of movie "y", this is a well-known feature from Netflix as it recommends its users certain movies that might be potentially interesting for the user based on the watching story of similar users with a coincidental taste. The company also tracks aspects like the number of movie watches by the user, the minutes watched, the level of affinity based on previous choices, the percentage of overall watched content, etc. (Botha, 2019)

Netflix is one of the businesses that has applied the potential of AI, data science and ML in a proper manner and business-driven perspective, using an approach based on products and business needs. Therefore, it can be said that Netflix is a great example to show the effectiveness of AI when personalizing content or personalizing the experience, at least, according to customers' satisfaction and the number of subscriptions. (Netflixinvestor.com, 2019)

Facebook is also greatly investing in AI technologies. The company has its own AI research group called FAIR, which is engaged in developing new technologies powered by AI to allow people to communicate better. FAIR has developed into an international research organization and has become essential to Facebook. Focusing its research on questions related to the fields of reasoning and understanding and aiming to unlock the full potential of AI. In the 5 years of FAIR's existence, Facebook has accomplished great results, such as end to end memory networks, self-supervised learning, which offers new chances for generating data, text classification from phrases processed by machines, machine translation, and computer vision. All these characteristics have helped Facebook to advance and make its business greater and more efficient.

Google is using AI, mainly in the form of deep learning, for many of its products and services. It has enabled its data scientists to solve several problems such as speech and image recognition and natural language generation. Google's Brain Project for deep learning began in 2011, in just one year, Google's AI could simulate human cognitive processes running on 16,000 computers and by 2014 the company acquired Deep Mind, which is pioneer in associating existing ML techniques to great neuroscience techniques resulting in systems which showed the most similar

to “real” brains intelligence. Deep Mind, currently working on healthcare-focused projects, proved the ability of their algorithm to perform a task and become great at it. (Marr, 2017)

IBM has been active in AI since the 1950s. The company was involved in the “birth” of AI. With Watson, has created a ML platform that can integrate AI into business processes, such as building a Chatbot into its customer support department. IBM Watson is a computer that interacts with humans answering questions in a natural language, which can be applied in many different branches and business areas. (Ibm.com, 2019) IBM Watson is considered, if not the best, one of the best AI Chatbots in the world, the assistant can be trained with material from a specific industry, the technology also allows the assistant to understand historical chat and direct you to human representatives. This implementation has driven success for the company. (Chi, 2019)

Microsoft developed AI for customers and businesses with Cortana, Microsoft’s AI digital assistant, a current competitor of Alexa, Siri, and Google’s assistant. Cortana allows individuals to achieve optimization through their processes, this is one of the characteristics that AI technologies bring to our businesses. The assistant helps to save time by action upon requests like playing music or giving directions, Cortana also helps on the planning and organizes appointments, sets reminders according to the time and location, and it works across different devices. (Cortana - Your Personal productivity assistant, 2019)

Huawei’s chip manufacturer, HiSilicon, has developed the world’s first AI smartphone chip (Kirin 980), which can do things like face and object recognition, image segmentation and intelligent translation, optimizing business processes. (Botha, 2019)

Apple claims seeing AI as a critical part of their future. The company acquired many AI start-ups in the past years, and implemented in 2011 a program that talked, called Siri, which was one of the first AI implementations and revolutionary technological innovations available in the market. Vocal AI chatbots like Siri act as virtual agents for humans. Apple introduced Siri as an intelligent assistant that helps humans accomplish tasks they asked for, such as setting reminders or assisting in optimizing a search. Moreover, Siri also was programmed to have a personality and social status by being a “humble feminine self-aware personal assistant”. Technologies like Siri are considered neither to be a miracle, due to its technological features, nor a danger, due to its programming; but useful due to its success and the revenues created by the firm. (Guzman, 2017)

Intel is another company betting for AI technologies. The company’s platforms are mostly based on AI models and are being used by many organizations like banks, hospitals, grocery stores, and many other businesses that are being transformed by AI technologies. AI has proved to be

lowering operational expenses for businesses and allowing them to get the most for their resources. (Intel, n.d.)

Unilever used AI for its recruiting systems by setting a series of algorithms based on personality traits in the form of games that the applicants will play and according to their answers in topics like risk aversion and other characteristics, the system will figure out if the candidate was adequate for the position. Moreover, the applicants also had to submit videos in which the system will evaluate not just their responses but also the tone of voice and body language. (Wilson and Daughterty, 2018)

Banjo is an application that uses AI to track real-life events in social media that could be threatened by emergencies. The app allows emergency services organizations to act faster and in a more efficient way. Moreover, DJI, a Chinese start-up that owns 70% of the global drone market and started implementing AI technology to its newest drones. DJI and Microsoft have recently made a partnership for a drone-to-computer streaming project, which has the potential to be very successful. (Botha, 2019)

The company Nvidia integrated AI and autonomous driving and is active in other sectors such as healthcare, higher education, retail, and robotics. OpenAI is another business dedicated to research targeted on AI for the benefit of humankind. SenseTime supports the Chinese government using face recognition to track citizens, the firm also focuses on autonomous driving. Twitter is developing ML approaches for recommendations. *And Aliexpress* uses image recognition to find similar clothes to the ones in the picture submitted by the user. Even institutions like *NASA* use AI and ML to enable the collection and use of data better and faster (Wilson and Daughterty, 2018)

Accenture's (2016) research on the impact of AI in 12 developed economies shows that AI could double annual economic growth rates for 2035 by altering the way work is currently done and establishing new methods with a new working relationship between human and machine. Moreover, the study found out that the impact of AI technologies on business is projected to increase labor productivity by up to 40 percent and enable employees to use their time more efficiently.

These are just a few examples of how companies are applying and making a benefit from AI technologies. There is an infinite number of other companies using AI to optimize processes and resources and for its ultimate business success. AI technologies are proven to have a positive impact in almost every business that implements them. This chapter aims to argument how AI technologies are a clear value adder to businesses increasing drastically their profits, as well as to

society by developing technology which aims at optimizing processes and simplifying life for human beings, and even saving lives.

However, there are not only positive examples but also other cases where companies fail to implement a proper AI strategy or fail in developing it correctly. One example is the case of Google's project about intelligent robots Bob & Alice. This project had to be canceled because the intelligent robots started developing their common language and communicating in a way that was not understandable for humans. This example, together with others where companies fail to implement AI in a proper way for their businesses, shows that there is still a long way for companies to examine and apply the full potential of AI technologies.

4.3. Personalization through AI

Personalization can be defined as the granting of targeted specific products, services, and information. Personalization is very much needed in the technological and online context since it provides guidance and faster as well as a more efficient solution to users. Personalization technology is key to digital market success, however, is much more complex as it involves software patterns together with the study of preferences. (Mulvenna, Anand and Büchner, 2000)

The first attempt of utilizing AI for personalization in a more intelligent way was done through collaborative filtering, by focusing on similar user preferences, past navigation preferences or searcher of the current user to personalize products and services more accurately. In this sense, AI can make the internet more usable. According to Mulvenna, Anand, and Büchner (2000), there are 3 principal components to observational personalization: data analytics, representation, and development. (Mulvenna, Anand and Büchner, 2000)

Personalization can be described by the customization of experiences for the users by using customer insights. However, data is important, as if there is too less data the insights won't be as good either. Therefore, through the data and content collection and processing by ML and AI, technology could offer users and companies innovative personalization capabilities. (Earley, 2017)

The new step for digital technologies is to develop personally for human behavior. "…digital leaders that are focused on customer analytics are rapidly turning insights into profits" (Accenture 2017b, p.3) Regarding personalization we can talk about offering from small personalized techniques to full experiences. For example, Startup Stitch Fix customized every order of clothes specifically for the customer's taste, not only based on size and color recommendations but also

factors like the customer's social media interests. This advancement has meant an increased revenue of $250 million for the company. (Accenture, 2017b)

Most customers claim that they are more likely to buy an item recommended by the company and based on their preferences. Therefore, the challenge is not just personalization but the understanding of customers' behavior to deliver the best possible experience and adaptive technology to make it possible. (Accenture, 2017b). However, a challenge for personalization is that a user might exhibit different types of behavior or search patterns during different times. To avoid this, it might be interesting to establish a user interest hierarchy that will represent the different interests of the user. (Kim and Chan, 2007)

The approach needed for businesses to implement AI-powered behavior-centered technologies requires an adaptive framework where organizations must not just collect data but also adapt and readjust to customers changing preferences. (Accenture, 2017b; Garrido Tejero, Morales and Serina, 2016).

For example, Netflix takes into consideration user's ethnicity to personalize the content and offer specific thumbnails. It might be that two individuals from different countries and ethnicities see different title pictures for a movie due to the personalized nudges for making it more likely that this person will click on this determined movie. (Botha, 2019) Moreover, Google uses DL as one of its core services for offering personalized and useful recommendations on YouTube. Through DL, Google tracks user viewing habits and preferences on YouTube, which helps the company to continue offering feed that can be potentially likable by the user according to his preferences and viewing history. (Marr, 2017) Personalization advertising offers users and businesses significant benefits, it can be used in a great number of ways from pricing strategies to personalized content, AI-powered augmented reality for entertainment and business purposes, and much more. However, it is important to take into account the ethical concerns and the reinforcement of existing bias that comes along with AI technology (OECD, 2019; Borenstein and Arkin, 2016)

Toyota is already focusing on customer behavior targeting categories that help the company give them better advice. Other companies like Betterment financial investment company helps investors reacting to their behavior. For example, the company acts on predictable human biases by hiding a daily portfolio in their internet-based investment portal knowing that humans tend to overreact to volatility. The behavioral approach seems to be working, as the company has managed to make investors save more than they would usually. Companies can also enhance the customer journey. For example, the company FullStory tracks human behavior when checking on

a website, meaning the number of clicks, observations, and other user's relevant interest hierarchy user preferences. (Accenture, 2017b)

AI and personalization are the main components of games, whether they are teaching games or entertainment ones. Furthermore, it is important to analyze the main challenges related to user modeling and content adaptation. According to Brisson et al. (2012), user identification is a must in current technology-enhanced learning systems such as the one provided by the American company LeadX to managers. User identification enables user adaptation, which will result in a better experience and simplicity of the use of new technologies or applications for the user and more efficiency of the instructional support. (Brisson et al., 2012)

User engagement is a key factor for any business, for learning or other user applications. Engagement can increase through content adaptation, or in other words personalization, which is a key factor that AI technologies can provide to their users. User identification and personalization can be considered as main challenges, an issue that technologies like AI can make easier for businesses and users by enabling learning modeling and developing a better context for user personalization to adapt the content in an automated way depending on the user. (Brisson et al., 2012; Garrido Tejero, Morales and Serina, 2016)

> "According to UNESCO, adoption of personal mobile technology in learning is likely to supersede 'one-size-fits-all' models of education that do not cater to individual requirements." (Kukulska-Hulme 2016, p.2).

Customization and personalized learning are some of the main achievements in the development of mobile technologies, all supported by AI technologies, which make it possible to determine the type of personalization for different users. This new methodology takes into consideration the individual's interests, preferences, habits and behavioral traits. Personalized learning is a great advancement that offers different models for different types of users with non-identical behaviors and ways of learning, or prior knowledge; providing a strategy that adapts content and methods to an environment and specific user. (Kukulska-Hulme, 2016)

Learning nowadays is a collaborative culture (Hargreaves, 2015). AI has the potential to improve explanatory agents and therefore its application for personalization and learning is of great use. Taking the ethical concerns rigorously into account, AI technologies are proven to be useful for nudging user's behavior, decision-making of leaders for better performance and offering personalized content for customer satisfaction and optimized learning for users with different styles. (Miller, 2019; Moldenhauer and Londt, n.d.; OECD, 2019; Aldenaini, Alqahtani, Orji and Sampalli, 2019)

Yu et al. (2017) also agree that personalization is a key aspect for effective learning and states that the fact of business trying to unlock the potential of AI technologies is an ongoing process that can optimize processes by using the data available; for example, AI which uses data can predict which students are more likely to drop out of a course.

A way AI can support personalization for learning is through the multi-agent development environment, which is known to be an AI knowledge representation tool based on goal-setting theory, which aims to motivate users to reach their goals. An example is Jill Watson, an AI teaching assistant built with IBM Watson, and that is being used to assist students and their questions in a MOOC offered by the Georgia Institute of Technology. (Yu et al. 2017, p.3) Another example is the American company LeadX, which uses this same goal-setting theory based on a personalization test to improve effectiveness (Leadx,2019).

It must be mentioned that advanced AI technologies are greatly contributing to making business processes more efficient especially with features such as personalization. However, it must be said that even though AI has presented great advancement in many fields; there is still a gap in their "social intelligence", which limits the social phenomena that can be generated or imitated by AI technologies, a great example are emotions, which is a social behavior that humans manifest and machines might not be able to fully replicate. (Pereira, Prada, and Santos, 2016)

The so-called affective computer focuses on the recognition and expression of emotions by machines. For example, the DARPA and the DCAPS use affective detection systems based on ML, NLP and computer vision to evaluate language, gestures and other social signals that help the machine find psychological distress in individuals. Moreover, this type of emotion-sensing technology is also growing in the gaming field platforms like Microsoft's Xbox One Kinect (Luxton, 2016).

There is existing prove that AI technology could develop empathy for human beings through mimic of empathic behaviors. A robot's design can contain complex features that offer them relevant feedback from which they learn and can develop and shape their behavior towards being more empathic, however, technology might not be there yet. (OECD, 2019; Borenstein and Arkin, 2016)

Lastly, AI is remodeling the economy, aiming at increasing productivity, efficiency and reducing costs, and therefore contributing to support individuals, governments and organizations reach a more favorable environment through improving their decision-making. However, technology is still on its way to accomplish these goals with great challenges to be solved like the previously

mentioned lack of empathy or other greater issues like ethical concerns related to data protection and privacy in online environments. The main aim shall always remain to use technology for the benefit of our society. (OECD, 2019)

5. Intelligent nudging

Technology and digitalization open great doors for behavioral economics and specifically for nudge management theories. Its unique feature of collecting and analyzing data can be used to send personalized nudges, which will be way more effective. Depending on the type of individual, a different type of incentive or nudge will be more or less effective. (Ebert and Freibichler, 2017)

A new era for behavioral economics in businesses is provoked by advanced analytics and ML-applications, developing the so-called digital nudges. Tech-based nudges can be quickly introduced and adopted within an organization influencing group behaviors and motivating individuals to think or act differently. The Digital nudge influences individuals in many fields. In the case of businesses, it offers the advantage of producing relevant information for the company, that can be analyzed for organizational success. (Beerbaum and Puaschunder, 2018)

As previously exposed, AI and behavioral economics share a common ground in which they could offer a great advancement and future developments. The interaction from human-tech requires new knowledge from BE related to attention, the nature of assembled preferences, and perceived fairness. BE can increase utility maximization in the choice of humans. Moreover, AI enters the equation by providing better tools to figure out what a specific person wants and to what type of incentives does this individual react.

5.1. What are intelligent nudges?

The so-called intelligent or digital nudges are simply the combination of AI technologies with behavioral economic insights used to influence individuals, the difference is that by using AI technologies the efficiency and effectiveness of the nudge increases. Digital nudges can be viewed as an approach that uses user interface (UI) design to influence the choices of individuals in digital environments. (Mirsch, Lehrer, and Jung, 2017; Eigenbrod and Janson 2018; Beerbaum and Puaschunder, 2018)

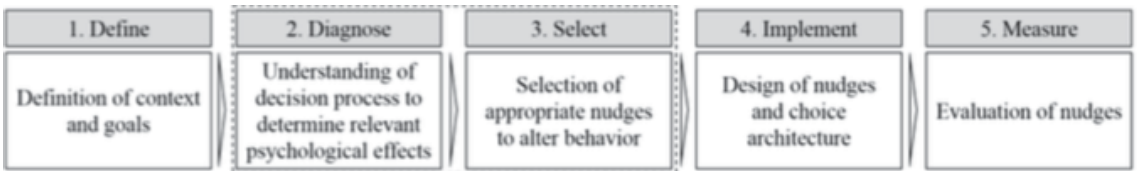
As nowadays products and services are increasing its web-based offer, also increased knowledge of digital nudging is required (Bertheim, 2018). Thoughtful consideration of nudges will lead to a desirable state of consumer behavior (Eigenbrod and Janson 2018). BE can be a key feature to

achieving a greater balance between the human-machine equation, by integrating human behavior and characteristics into artificial systems. One of the most common digital nudges is the 'default bias', like the pre-selected checkboxes which appear online aiming for the user to make a choice based on a predetermined setting, these predetermined settings are also known as choice architecture or 'dark patterns' (Beerbaum and Puaschunder 2018).

Most of the decisions made nowadays are online, in an environment where default decisions and bias play a key role; and where choice architecture greatly influences how decisions are presented and made. In other words, decisions become perfectly nudgeable in the digital field. (Mirsch, Lehrer, and Jung, 2017) Digital nudges evoke the use of mobile devices and online communication to boost the adoption of new behaviors. But for digital nudges to affect, they have to be designed in a proper way to fulfill the needs of the individual who is willing to be nudged. (Dhar et al., 2017)

Weinmann et al. (as cited in Misch, Lehrer and Jung, 2017) propose a five-step process for developing and implementing digital nudges, which is shown in the following figure:

Figure 4: Steps for the implementation of intelligent nudges



Source: Mirsch, Lehrer, and Jung (2017)

The "diagnose" and "select" phases are especially important and related with the efficiency of the digital nudge. Humans make decisions on a personal basis and with different situations and contexts, and yet many businesses still want to improve decision-making on a "massive scale". The importance of AI must be highlighted to successfully implement the personalization component to predict what exactly will work for which individual in what specific situation and through which channel. Technology might be essential when nudging certain behaviors and during the phases of implementation of a digital nudge. The "behavior value proposition" offered by digital nudges relies on the outcome of the change of behavior and not the utility. We are growing towards an era in which services and products are specially made on a behavioral-based basis and where the potential is huge to influence people's way of acting. (Mirsch, Lehrer, and Jung, 2017; Schneider, Weinmann and vom Brocke, 2018; Pe'er et al., 2019)

Nudges can influence individuals more effectively if being connected with IoT and big data. Intelligent nudges are based on personal information such as location, preferences, demographics,

health, and other similar aspects about the person being nudged that they can bring the way of influencing individuals to the next level. (Beerbaum and Puaschunder, 2018)

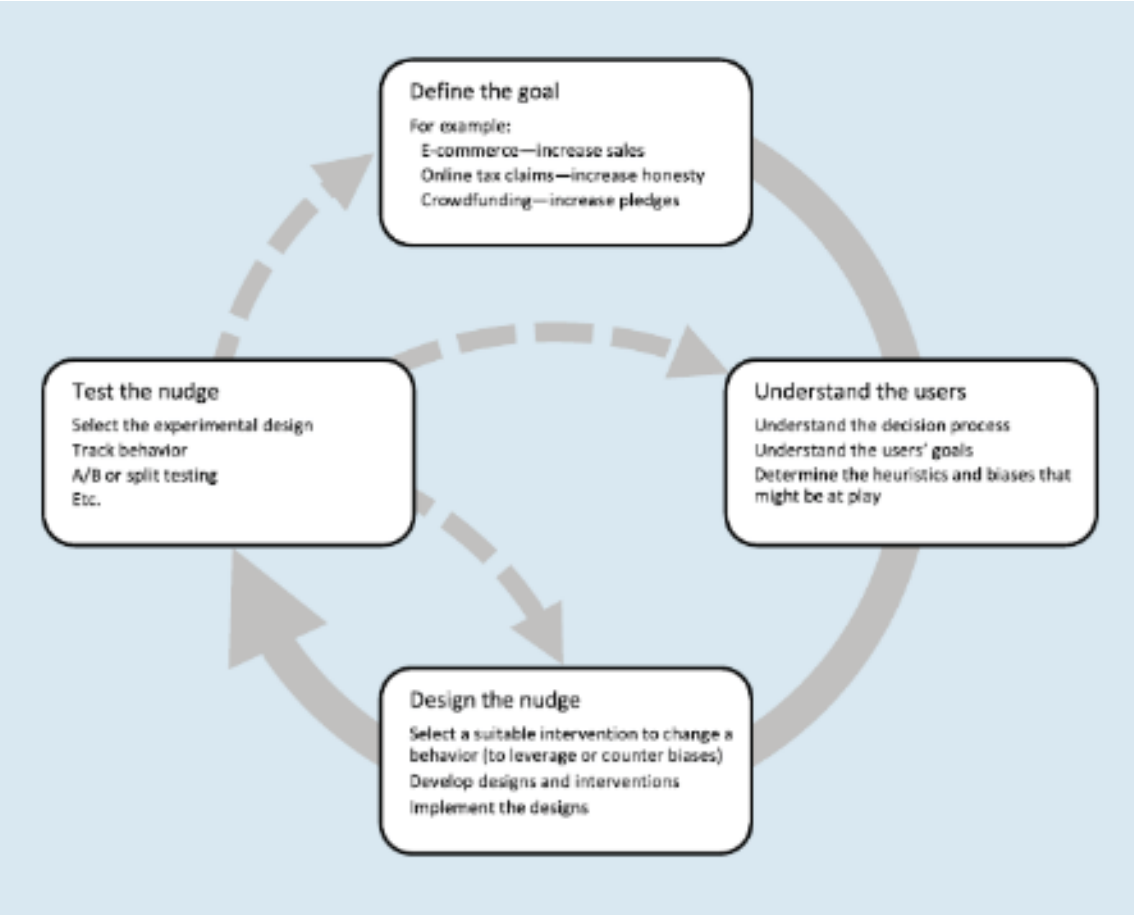
> "Big-data analytics can be used to analyze behavioral patterns observed in real time to infer user's personalities, cognitive styles or even emotional states." (Schneider, Weinmann and vom Brocke, 2018, p.72)

Individuals are even more exposed to be nudged in the digital environment through choice architecture and the way choices and available information is presented to them (Schneider, Weinmann and vom Brocke, 2018). Digital nudges target mainly the uninformed citizen who is not aware of the technique being implemented. And even if most of the times nudges are used to influence individuals in complex situations where limited information is available and mostly favoring the interest of the user or society, technology still enables the choice architect or nudger to control the users being nudged. Therefore, nudges, should always be used taking into account data protection and the ethical concerns and information overload that arise when creating personalized nudges, especially in online interfaces. (Beerbaum and Puaschunder 2018; Eigenbrod and Janson 2018; Pe'er et al., 2019) An example of digital nudges being used for good are Ayuda Heuristics. For example, by a company that uses machine learning for diet patterns to help patients with diabetes or for making sustainable decisions (Bertheim, 2018).

The term digital nudging provides a new user experience (UX) design. It provides a deeper understanding of psychological traits in human behavior and decision-making that supports UX designers to develop effective nudges for reaching specific goals. Nowadays, most decisions are made in screens, allowing technology to be the one driving our decisions, actions like online shopping, and in many cases where users unconsciously engage in automated decision-making. When designing digital nudges, the main aim is to either power or counteract the influence of certain psychological effects. Moreover, an interesting aspect for further analysis is the influence of digital nudges on an individual's decision-making in diverse digital contexts. (Mirsch, Lehrer, and Jung, 2017)

Schneider, Weinmann and vom Brocke (2018) propose the life cycle of digital nudges that can be used by choice architects to design the digital nudges, which shall not only nudge towards organizational goals, but also be based on the user's personal characteristics. The stages of "goal setting", "understanding users" as well as "systematic design" and "experimental testing" are crucial for the success of nudging. The life cycle of digital nudges can be appreciated as follows:

Figure 5: The life cycle of digital nudges



Source: Schneider, Weinmann and vom Brocke (2018)

Intelligent nudges use persuasive technology, which nowadays is really strong in the health and wellness domain and consists in influencing individuals' choices motivating them to commit certain changes of behavior or attitude. There is substantial evidence that digital nudges can be effective when promoting many behaviors in health, like physical activity, for example through reducing sedentary behavior. This can be translated to the behavioral field in the business world to reduce the implementation gap or knowing-doing gap present in managers from all businesses and motivate them towards operational action the same way persuasive nudges do in behavioral health, changing attitudes towards action. (Aldenaini, Alqahtani, Orji and Sampalli, 2019)

A behavior influencing or persuasion technique is the so-called persuasion profiling where it can be proven that different people respond to different strategies or incentives. This technique sustains the personalization theory and helps to better target the right people to be nudged. If the "machine" understands the behavior of a certain person, it can inform the model with this additional information and result in a particular personalized technological nudging technique, increasing accuracy in prediction by adding new data on a certain individual. (Schneider, Weinmann and vom Brocke, 2018; Pe'er et al., 2019)

Pereira (2019) states that the opportunity in the digital world is to use the scale of digital interactions and capabilities for mass-personalization to nudge large numbers of people simultaneously. Behavioral economics and nudges have helped to understand the decision-making process as well as influencing the motivation of humans and the irrationality behind some of their choices. Combining BS with technology can lead to personalized nudges, which will target the desired user and have a major positive impact on performance. (Pereira, 2019)

It must be mentioned that the use of behavioral economics and digital nudges has been wider in the public sector than in the private sector. Government agencies in England, the United States, Australia, and other countries have used digital nudges since around 2010 to influence individuals into taking actions, such as paying taxes on time, or becoming organ donors. This adoption into the public sector must be spread to the private one and implemented by companies and other non-governmental organizations to motivate employee's productivity, develop customer service, and implement other beneficial actions for private institutions. (Tikotsky, Pe'er and Feldman, 2019)

5.2. Intelligent Nudges for organizations

The mix of the two components, AI and BE can be explosive for many businesses. By using AI or more specifically ML, the business can augment the user's rational self by "providing a decision engine that finds insightful patterns in the life of the customer". Moreover, BE targets the specific combination of biases and heuristics that a user utilizes to make their decisions, and finally, protects the person from those biases resulting in control of their irrational self. A great example is Google Goals in google calendar, which manages your events as well as optimizes your free time; or Amazon check-out free store, where the customer does not have to waste time in queues. (Risdon et al., 2017; Bertheim, 2018)

Digital technology has a huge potential for businesses, especially when combined with behavioral theories like anchoring or loss aversion. Its successfully implemented for increasing online shopping sales was showed by introducing personalization and AI to facilitate business processes during online shopping. Most organizations are getting smarter by implementing new technology combined with behavioral features or other forms of digital transformation that allow them to gain competitive advantage. (Tziokas, 2017)

> "The deployment of advanced technologies is one step towards business transformation. The application of behavioral science on top of those technologies is what will help organizations "crack the code"' (Tziokas, 2017)

Technological devices such as wearables accompany us almost everywhere; let it be the bracelet that beeps to announce its time for some sport after a long day of sitting down, the icon in the car telling you to make a stop after a long period of driving or the phone that alarms the user when it's time to take medication. All these devices are starting to know us even better than we know our selves. They start telling us what type of diseases we have, how much sport we do, when do we wake up and even how do we like our coffee and how is our agenda looks like. This can seem very harmful, however, when used wisely technology and AI advancements can be of great benefit to humankind. For example, it can save us time when planning our days and various meeting in different places to provide us with the most effective route, it can even take the role of secretary telling an individual when to take a certain medicine, if this medicine has side effects or if it should not be mixed with other medicaments; when shall we do sport, suggest movies or books that might be of our likeliness based on past preferences, etc.

Another example of great use of AI in nudging is the benefit many businesses are making from location-based services in a way that sales and pop-ups will appear to a user walking by in the area of a certain store or restaurant. The potential of AI, the internet of things and technology in general together with data can be an explosive combination to nudge a person in many aspects of their life, hopefully, as the father of behavioral economics says, for the best interest and happiness of individuals. (Thaler, 2015)

AI has the power to unlock business value, however, it cannot substitute human behavior and intelligence. The way to take a benefit out of AI is to use it to influence humans to perform or make better decisions (Beerbaum and Puaschunder, 2018).
Dhanrajani (2018) proposes 3 key areas where AI together with behavioral science can unlock massive value for enterprises:

"Appeal to the non-conscious"
All biases influencing humans do it in a not so conscious way, meaning that if AI is willing to bias humans it shall do it targeting those same unconscious parts of the human brain.

Build with humans
As behavioral science practitioners have a big role to play when designing and developing AI technology for nudging, they should be careful with ethical issues concerning self-awareness and empathy between human-robot interactions.

Artificial Emotional Intelligence
The key for intelligent nudges to succeed is to use behavioral science to make tech more human. The main challenge is to identify whether Emotional intelligence (EQ) can be added to AI.

Chatbots are the most common and basic form, however, there is still much to be developed in this field. To develop in this field, it is essential to focus on the target user for whom the software or technology is made and cover their unconscious and intrinsic needs. Through BE, AI could reach the way of covering the emotional needs of human beings. For example, Street Sense is an application developed to track when an individual has high levels of stress to act upon it. Some other examples of companies already implementing EQ in the field of AI are businesses developing tech-based companions for elders or coaching apps for autistic children.

The machine learning leap allows technology to actualize the accuracy of its predictive nudging and helps increase the probability of desired outcomes. Nudging with ML models are useful to find some person-specific and situation-specific behavioral patterns, allowing businesses to analyze influencing variables like personality traits, context, and environment. (Risdon et al., 2017) Sometimes these tools can be helpful and sometimes harmful. A clear example in which AI can help people is through recommender systems like the ones used by Netflix where past behavior and previous elections determine new possible and likable choices for the user. However, AI can also harm people's choices by personalizing the price, for example through price discrimination, of a product or service depending on previous choices of the buyer based on their willingness-to-pay (WTP), which through AI can be quickly spotted by businesses. (Camerer, 2018) Moreover, the example of Facebook and Cambridge Analytica to nudge voters for political campaigns in the form of online nudges and using user's sensitive and private data show us examples where digital nudging and personalization are being used non-ethically and without wanting to influence individual's decisions for the best of their interest. (Pe'er et al., 2019)

> "Extending the body of knowledge of the computing profession through insights into digital nudging will help choice architects leverage the effects of digital nudges to support organizational goals" (Schneider, Weinmann and vom Brocke, 2018, p. 72)

Social media plays a great role as information and data collector for implementing intelligent nudges that target user's preferences enabling to divide individuals into different social groups to target personally and even decide who are the ones being nudged. Moreover, nudges are valuable to change a behavior, to do it fast, it has to be done digitally. Digital technologies support nudges turning them into a great tool for change management. The nature of today's businesses is very fast-changing, especially regarding the need for introducing new technologies and keeping up with business and client expectations. Therefore, maintaining employees happy while implementing change is crucial for business success, and digital nudging plays a great role in making this happen by acting as a leading factor for organizational change programs. Digital nudges use common online technologies such as text messages, emails, gamification, and other

push notifications to encourage individuals to make certain decisions. (Pe'er et al., 2019; Puaschunder, 2017)

Digital agents, like Alexa or Siri, have entered human life and they will soon enter our workplace as well. A major number of companies have relied on conversational interfaced and the so-called chatbots to deal with business issues and assist customers, for HR candidate selection, handling claims and many others. (Kruse, 2019c)

Results prove that personalize nudges offer a better outcome than one-size fits all standard nudges. However, it is not easy to personalize nudges, and its design and implementation will determine its effectiveness. In businesses, one of the most important aspects is to coach your employees and embrace leadership development. According to Kurse (2019c), the most effective way to influence behavior is by coaching. However, it is also one of the most expensive ways of influencing behavior and is typically reserved exclusively for senior leaders. (Schneider, Weinmann and vom Brocke, 2018; Pe'er et al., 2019)

On the one hand, a study made by the company showed that 83% of leaders are willing to implement or work with a human executive coach, and just 47% are willing to work with and AI-powered coach. Meaning there are more leaders not wanting to work with an AI-powered digital coach than the ones that are willing. Some of the reasons are due to dealing with human issues, empathy and personal or social capabilities like emotions. On the other hand, according to a study conducted by Leadx, once leaders have tried the coach, 83% liked it and are willing to work with it. Seems like when the users interact with the coach, they actually understand its capabilities and mostly like them. (Kruse, 2019c)

Intelligent nudges are a great discovery, which can be used as a huge benefit for humankind. Nowadays, the 24/7 nudge economy is emerging with a great desire from almost every business. Organizations want to engage clients, patients, consumers, members or simple users and can succeed with the technology provided, however, this may soon lead us to nudge fatigue. Nudge fatigue or “digital noise” can happen to individuals and to professionals in the sense that there is a moment when a person might no longer pay attention to nudges send to them. This can be similar to any mobile application sending the user notifications that will be postponed or ignored. Nudge remains a powerful and valuable tool, even more with the digital and big data components adding value to it. But that also depends on how much of it is an individual willing to take. (Beerbaum and Puaschunder 2018)

One of the many concerns about machines is the emotional and sentimental feature they lack. Even if the robot’s designer can control the way and type of nudges sent to the user, for a robot

to send ethical nudges that influence human behavior, it would have to be sophisticated enough from a technical point of view to identify familiar users and not so familiar ones for its nudges. There are many possible design pathways to consider, however, an ethical issue takes place concerning how much power do designers have to decide if and when reshaping human behavior through non-human artifacts is ethical. (Borenstein and Arkin, 2015) As by now, results related to digital nudge implementation experiments are incomplete, however, according to the proven impact of nudges, it's potential combined with technology can be tremendously efficient. (Beerbaum and Puaschunder, 2018)

In this part of the thesis, the author will evaluate, according to the previously exposed literature, if intelligent nudges reduce the knowing-doing gap in the frame of a study. To evaluate the hypotheses, the author decided to implement a personalized digital coach that sends intelligent nudges in the life of a group of managers and contrasts the results in the form of an intervention study. The personalized digital coach was created by an American company called Leadx, which claims to have developed the first AI-powered personalized digital coach. Moreover, the results from the intervention study will be supported by material from surveys conducted by Leadx that were shared with the author. This part of the thesis will start with an introduction to the company as well as to the personalized digital coach evaluating its main features; followed by supportive documents, the methodology, expectations, analyses, and evaluation of results, findings, limitations, further research, and conclusion.

6. LeadX

LeadX is an American company that combines behavioral science, AI and expert content to dramatically improve leadership behaviors offering every manager a personalized coaching focused on general management skills and based on expert content. "From delegation and effective feedback to coaching and one-on-one meetings, managers will implement the fundamentals that drive team engagement and performance." (Kruse, 2019b)

Leadx is a Company that aims to empower leadership in the modern workforce. The company's philosophy states that coaching leaders might be too expensive, however, every one of them deserves a coach. Furthermore, ultimate technology combined with behavioral economics might be a solution to this problem. (LEADx, 2019)

6.1. AI-powered leadership development platform

Leadx aims to drive leadership by nudging its leaders through AI. Kevin Kurse, CEO of the company, identified the so-called knowing-doing gap, which, as previously mentioned, is one of the greatest still existing gaps that affect humans to put their words into action. This gap greatly affects managers and it might even be increased by factors like stress or lack of time. (LEADx, 2019)

The main features of the company are the feed given in its "home page", video courses, webinars and podcasts, documents and articles on different topics relevant to management and the personalized digital coach called Amanda, which takes the form of a chatbot. The company presents different features through the units of its application, which can be used in various digital devices like mobile phones, laptops or tablets (LEADx, 2019):

One of the units of Leadx Is the "LEADx Nudge Stream" where AI and behavioral economics connect to create nudges powered by AI. These types of nudges are used to gently lead managers to become better leaders and drive specific behaviors helping them to bring out the best version of themselves with various relevant aspects for leaders such as coaching, employee recognition, meetings, time management, etc.

Another unit of the application is "LEADx Library for management training", where managers can access various materials including book summaries, micro-learning sessions, podcasts, webinars and other material which can be useful for enhancing manager's skills.

LEADx presents many features for improving the manager's leadership, however, one of the highlights presented by the company, is the unit called "LEADx personality insights". This feature is the first one a manager's encounters when installing the application and it provides the user with personality insights. The author claims that "leadership begins with self-awareness", therefore a manager should know his weaknesses, strengths and in general his/ her personality traits to know how to best manage other teams. The personality feature offered by leadx consists of the big 5 personality test, which after having questioned the user (manager), can offer a wide view of the type of personality, classifying the manager into a certain persona. Once the manager is classified into a certain persona, it is easier to know how to work on the strengths and weaknesses and even more, which nudges are more effective, and when shall they be sent to be more effective. The big 5 personality test from Robert McCrae is one of the most validated by world psychologists.

Defining the manager's personality is a key aspect of a successful approach to great coaching. Many authors claim that technology lacks on emotions and empathy, however, letting the digital coach get to know the user and knowing how to treat and motivate him according to his personality traits is a great advancement for stepping towards a more digitalized coaching with the personal touch in it.

The greatest of all features and the one this paper is based on is the unit of the Chatbot called "Executive coach Amanda" or personalized digital coach, which aims to coach leaders for better performance and in a more efficient manner. Coach Amanda "is the only AI-powered chatbot built for management training and coaching". Coach Amanda aims to provide the best coaching according to the established goals. It analyzes the type of persona the user is and sends different nudges to different personality types. As a result, the nudges sent are more effective since they are personalized.

The manager can ask coach Amanda about "typical" manager questions such as employee satisfaction, team leading, feedback, time management, delegation, meetings, etc. In other words, as the chatbot knows your personality, she'll personalize your training and nudge you most effectively. (LEADx, 2019)

Another feature developed lately is the "LEADx leadership effectiveness quotient (LQ-i)", which was a feature developed during the work in progress of this paper and therefore not included in the experimental part. This feature offers an evaluation of 40 key skills for effective leadership, evaluated with different levels of difficulty, adding the results obtained in the test to the big data platform that powers the application.

Another feature developed after the implementation of the application for the experimental part of this paper was the "LEADx Leadership Effectiveness Quotient – 360 survey edition (LQ-360). 360 feedback is the most accurate measure of leadership effectiveness and provides information on the level of engagement and effectiveness of the manager on these 40 competencies; providing them with their top and bottom competencies. All this conforms part of the data acquired by the application that will be used in the future to target the user for its leadership development.

According to CEO from LEADx Kevin Kurse, a business should assemble their behavioral nudge strategy targeting certain aspects. First of all, setting a goal, which could be something like increasing employee engagement. Secondly, the company should establish who is the nudge designed for; it could be for all managers, a specific group, employees with a lower rate of engagement, new leader, etc. Thirdly, it is key to establish the timing and frequency of when the nudges will be sent, every two months, every week. Moreover, the form of the nudges is to be established; will they be sent via email, app; and to whom and what you have to explain to start running the nudges. Finally, it is of great importance to track to results and "measure the impact of the nudge campaign" (Kruse, 2019b)

For the nudge to have an effect it has to be "noticed, read and acted upon". Nudges can't fully nudge everyone, however, there are some "tricks" to increase the odds for efficiency in nudging. Like paying attention to the sender, the subject line the content, timing and especially the level of personalization of the digital nudge are key to increasing the efficiency of nudges. (Kruse, 2019b)

Leadx appears to be one of the companies that supports training through the multi-agent development environment, which is known to be an AI knowledge representation tool based on the goal-setting theory (Yu et al., 2017); in this case, the application lets the manager set their goals and nudges them with expert knowledge and other supportive material towards achieving these goals. Various companies have tapped the power of AI to democratize leadership

development, with proven positive results from LeadX in companies like RedNucleus, where managerial confidence greatly increased. In 2019 Leadx enhanced leadership development in seven companies (LEADx, 2020) with the support of coach Amanda, whose features will be analyzed in the following chapter.

6.2. “Coach Amanda”: A personalized digital coach

The experiment of this paper is mostly based on the unit of the Chatbot called "Executive coach Amanda" or personalized digital coach, which aims to coach leaders for better performance and in a more efficient manner. Coach Amanda "is the only AI-powered chatbot built for management training and coaching" aiming to provide the best coaching according to the established goals. The coach is developed according to the principles of the goal-setting theory explained by Gollwitzer (1993) and Yu et al. (2017). It analyzes the type of persona the user is and sends different nudges to different personality types. As a result, the nudges sent are more effective since they are personalized (LEADx, 2019). Moreover, it based on experimental learning, proven to have a positive effect in users (Bronfman, 2007).

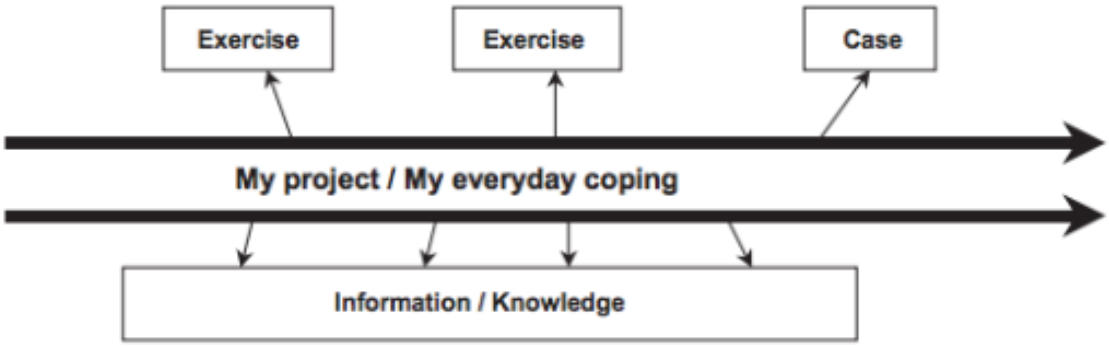
Coach Amanda is the first world's AI-powered Leadership Acceleration Platform for modern leaders. (Kruse, 2019b) The manager can ask coach Amanda about "typical" managerial questions such as employee satisfaction, team leading, feedback, time management, delegation, meetings, and more; and as the chatbot knows your personality, she'll personalize your training and nudge you most effectively. (LEADx, 2019) The coach takes into account the preferences of the managers and fields where they would like to improve. The app focuses on helping managers pay attention to their goals and areas of the desired improvement by breaking the journey and making goals specific as well as acting as a reminder on the topic to incentive the change of behavior.

Amanda is a chatbot powered by IBM Watson, which is considered, if not the best, one of the best AI Chatbots in the world. IBM Watson's assistant can be trained with material from a specific industry, the technology allows the assistant to understand historical chat and direct you to human representatives. IBM Watson Assistant, which introduces a new age where technological systems start being more similar to humans "through senses, learning, and experience." With assistants like IBM Watson, the world is benefiting from AI to transform businesses.

> "Coach Amanda combines behavioral science, artificial intelligence, and expert content to dramatically improve leadership behaviors, employee engagement, and productivity." (LEADx, 2019)

Virtaula is an example of an initiative from a Spanish bank that applies the learning by doing approach using components like interaction and practices. Instead of asking managers to read theoretical content, they do some exercises and case studies related to their field. The platform acts as a coach asking managers to write a couple of lines about their professional field and making them more involved in the process of learning by applying the concepts to their daily business operations. (Bronfman, 2007; Virtaula.eu, 2019) The model corresponds with the learning by doing philosophy exposed in the following figure:

Figure 6: Model of the "Learn to Do" Design



Source: Bronfman (2007)

The research on the uses and results of Virtaula showed that this framework and model for instructional design are of great help in bridging the knowing-doing gap. (Bronfman, 2007) Moreover, the approach used by Virtuala can be comparable to the one from Coach Amanda, as she constantly sends push notifications on the matters the manager decided to approach, develops leadership on the aspects chosen and influences the manager with daily input from other successful leaders by offering them video tutorial, podcasts, articles, and other material; involving them in the goal-setting process and doing the follow-up. Moreover, LeadX facilitated the author some previously conducted assessments that will be used as supportive documentation, and from which the main results are exposed in the following subchapter.

6.3. LeadX Questionnaires (Supportive information)

LeadX conducted a study with managers who participated in a pre- and post-trial assessment of the application, which was evaluated through a questionnaire sent by Leadx with the most important aspects that required feedback. Just the main results and averages will be discussed in this part, as the main part of the experiment focuses on the intervention study and in-depth interviews exposed in the following subchapters.

Main findings pre-assessment:
The typical profile represented a manager with an average of 10 years of experience, with a clear understanding of their personality and behavioral traits, mostly satisfied with their performance, mostly claiming to handle people and common employee problems very well, with the majority of the managers agreeing on being extremely productive and accomplishing enough with their time. Most managers with high-stress levels and feeling overwhelmed and sometimes taking the stress home. With an average of most of them giving constant daily feedback to the team.

Main findings post-assessment:
High positive responses for accomplishing more in a typical day, prioritizing, feeling less overwhelmed, managing stress adequately, giving constant feedback to employees. Most managers are very likely to recommend Leadx. All managers agree that the content was engaging and active and would feel somehow disappointed if they could no longer use the app. Managers are generally satisfied with their performance as a leader and with the application.

As follows some of the questions the author found relevant from the survey are exposed in more detail:

To the question "Why would you recommend/ not recommend Leadx?" some of the responses were the following:

- Easy to use app, based on a user's time, good content, easy to follow and understand.
- Love the phone app. Easy to navigate through. Courses are short and the information very beneficial.
- Product is user friendly the app is very easy to use, information and classes relative.
- The regular reminders and tips were nice. I enjoyed listening to the various podcasts/webinars and I found the information to be current, relevant and easy to follow.
- There is a lot of good information to obtain from Leadx.
- The program offers helpful advice and solutions to common management concerns.
- There is a lot of valuable information
- Chunks of information, Coaching and new ideas you can put to work each day.

To sum up, most of manager showing satisfaction with the application and its content.

To the question “Which areas do you think should have the highest priority for improvement?” were participants had to choose from the following areas:

- Ease of finding relevance,
- Quantity of content
- Course quality
- Webinar quality
- Toolbox quality
- Big 5 Personality Assessment quality
- Other (Own suggestion)

Regarding the previous areas, only the quantity of content was mentioned as an aspect for improvement and one recommendation was made: "to add tracking elements to the lessons and individual videos, this way we will know which one is completed and which one is pending."

The next question approaches “What would you particularly recommend about your LEADxAcademy?” and gives certain options to choose from, which are the following:

- Overall LEADxAcademy appearance 0
- Ease of finding relevant information x2
- Quantity of content x1
- Course quality x2
- Webinar quality x1
- Toolbox quality x1
- Big 5 Personality Assessment quality x2

Ease of finding relevant information, course quality and the big 5 personality test got elected the most; followed by quantity of content, webinar quality, and toolbox quality; the overall Leadx academy appearance wasn't selected.

The participants were also asked "What topics would you like to see added in the future?", to what they freely responded: Conflict Resolution (when there are different perspectives, a different approach, different thinking - for the common goal) and Emotional Intelligence.

The managers were also asked about the best features of the app as well as the ones they would change, the answers were the following:

- Best: Easy to use and does not take a lot of time. Change: Have topics to choose from to help generate ideas from Coach Amanada
- I like the documents available in the tool box and the 30-minute training videos
- The app and the content brought relative to what I need to be my best for the team. Change: Add classes and tips as needed to always stay relative to what is happening.
- I liked the reminders as it helped me remain engaged and thoughtful of different leadership habits.
- I like the quick email tips from Coach Amanda.
- The ability to ask questions and get feedback right away.
- Ideas, and short segment videos

Lastly, the participants were asked to evaluate from 0 (not likely) to 10 (extremely likely) the features from the application. As follows the list of the given features ordered from the least to the most likely with the average of the grade given by all participants next to the feature being graded:

- How valuable was the **Feed** feature? **5,8**
- How valuable was the **Webinars** feature? **6,1**
- How valuable were the **Podcasts** feature? **6,4**
- How valuable was the **Notifications/Nudges** feature? **6,9**
- How valuable was the **Coach Amanda** feature? **7,4**
- How valuable were the **Documents/Articles** feature? **8,1**
- How valuable was the **Video Courses** feature? **8,4**

LeadX claims that its users report measurable improvements in key behaviors and attitudes in months (Managerial confidence +9%, employee engagement habits + 78%, productivity +33%, and stress – 35%) (LeadX, 2000)

The selection of participants from the Leadx assessment seems to be similar to the one established by the author. Moreover, the results from Leadx's assessment complement and support the ones from the conducted interviews, providing more specific insights about the application features. However, this was put into practice by the author through an intervention study which will be explained as follows in the experimental part of the thesis.

7. Methodology

This chapter describes the research methodology used for conducting the experimental part of the thesis and collecting results. As previously mentioned, the implementation of the personalized digital coach Amanda will take place amongst managers to evaluate if coach Amanda supports them to optimize their implementation and reduce the knowing-doing gap.

The methodology used is based on qualitative research methods as the evaluation of certain variables like implementation, performance and efficiency are hard to measure quantitatively, and to get deeper insights from experts that implemented the coach. Moreover, Qualitative research methods are especially valid for explaining and "verifying outcomes obtained from standardized instruments and clarifying and evaluating interventions in their real-life contexts." (Sandelowski, 1996, p.1)

The research method used consists of an intervention study supported by open in-depth semi-structured face-to-face interviews, which will be supported by the material offered by Leadx. (Kumar, 2014) The study as a whole consists of:

- 12 interviews in total, two types of interview (pre- and post-assessment) with each of the six participating mangers

- An intervention study based on the implementation of the digital coach and comparing the intervention group with the control group

- Supportive material from Leadx on the previous pre and post-assessment surveys they conducted

A group of six managers will take part in the intervention study, were three of them will implement coach Amanda and act as the intervention group and the other three will be used as the control group and will receive no treatment[5]. The intervention study was determined as a more interesting study instead of having all six managers implement the coach due to the comparison factor of treatments by analyzing both groups and establish the differences of applying or not applying coach Amanda. The intervention study is supported by the interviews, which take place with all the participants before and after the implementation of the coach.

[5] all managers were randomly allocated into the groups

The first interview is conducted to determine the type of manager, personality and behavioral characteristics, as previously exposed in literature, psychological factors, personal attitudes, competencies and the way individuals operate is key for effective management, which influences goal setting and implementation (Angehrn, 2005; Bandura, 1986; Gollwitzer, 1993). After the first interview, each manager will establish a goal, as goal-setting automates the process of implementation by enhancing motivation and leading to higher performance and makes it more likely to reach the implementation stage (Locke, Shaw, Saari and Latham, 1981; Gollwitzer, Heckhausen and Steller, 1990). The digital coach is then implemented by half of the group (three managers randomly chosen for the implementation group) during the given time frame of 2 months which was extended to 2 months and a half. A time frame was selected to help the participants choose their goal according to the given frame and to measure results objectively, as at least 30 day are needed to start observing results from the digital coach (Leadx, 2019).

After the implementation of the treatment, the second round of interviews takes place again with all participants and intending to contrast the results between both groups. Moreover, the result analysis is conducted through thematic qualitative content analysis based on the category division of Mayring's method, which will be explained before the analysis in following subchapters (Mayring, 2000).

7.1. Sampling method

To select the participants for the interviews, certain criteria had to be taken into account:

All participants had to be managers. As the digital coach is through for managers with stress and lack of time, the author decided to target managers from the advisory department of a competitive consulting firm, where stress level is known to be above average and managers barely have time. Therefore, all managers belong to a Big4 consulting firm based in Europe, specifically in Vienna.

The age from the participants varies between 30-45 years approximately, targeting manly middle management and with one manager currently promoted to partnership; all managers with at least 5 years of experience in management. However, all managers must be working on a full-time basis. The author wanted a variety of gender, having found two female managers and four male managers willing to take part in the study.

The managers did not need to be familiarized with intelligent nudges or any type of technology, they just needed to complete the features mentioned above and were chosen randomly as they agreed to be part of the study.

7.2. Recruiting participants & research sample information

To find the participants, the author decided to target managers likely to find themselves in a stressful situation with lack of time, therefore the author decided to approach some work-colleagues from an international consulting firm part of the Big4 based in Vienna, Austria.

The profiles of the participants will be categorized from M1 to M6. "M" standing for 'manager'[6]. As follows a brief description of the participants:

M1: Senior Manager in the Department of Insurance and Financial services in management consulting. Female, in her 30s.

M2: Manager in AI, Data and Analytics in management consulting at the time the study began. From the middle of the study and currently he is self-employed as a consultant in the implementation of technologies and management for cloud, data, AI, and digitalization. Male, in his 40s.

M3: Recent partner for the divisions of insurance and financial services in management consulting. Male, in his 40s.

M4: Recent senior manager in the department from IT-Advisory – Cybersecurity in management consulting. Male, in his 30s.

M5: Recent manager in the department of customer and operations in management consulting. Female, in her 30s.

M6: Senior manager in the department of IT -Advisory in management consulting. Male, in his 30s.

After the sampling, the selection of participants and receiving the confirmation it must be noticed that there are three managers that are experts on the field of technologies, whose opinion can be considered as expert knowledge greatly valuable regarding this topic. The managers who are experts in the technological field are M2, M4, and M6.

[6] Management position hierarchy in the firm is as follows: Manger, Senior Manager, Director, and Partner

8. Expectations

Research Question: Can the knowing-doing gap in management be reduced by implementing intelligent nudging in the form of a personalized digital coach?

Hypotheses: Implementing intelligent nudging through a personalized digital coach decreases the knowing-doing gap.

As exposed in the theoretical part, intelligent nudges have a huge potential for businesses. However, it is still a new concept that must be tested to withdraw consistent results. According to the features of the personalized digital coach, the author expects that the implementation of such a coach would have a beneficial effect on leadership development and performance by reducing the knowing-doing gap for the group of managers implementing it. However, the author is also skeptical about certain aspects of the coach such as the information overload coming from the push notifications and if the chatbot will be able to cover the social and emotional aspects that are expected from a coach and might be useful for establishing implementation or committing an action in certain managerial situations.

9. Analysis of Intervention study & Interviews

The research is conducted through an intervention study that was implemented during the time of 2 months and 2 weeks, an average of 75 days per manager, as LeadX claims results are visible after 30 days of implementing the coach and the author wanted to at least double the time due to holidays that might interfere with the treatment and to have enough time to measure results. The intervention study or implementation of the coach was supported with pre-implementation interviews before using the coach and post-implementation interviews after its use. The main aim of the study is to compare the implementation group receiving the treatment of the coach with the control group, not receiving any treatment. (Kumar, 2014)

To conduct the study, the author decided to assign relevant categories based on the theoretical framework that were targeted by different questions to the managers. The first interview consists on the same questions for both groups, after the first interview all managers from both groups will establish their managerial goals for the selected time frame, the intervention group will install the digital coach after the first interview and give the same goals to the digital coach. After the selected period has finalized, both groups were once again interviewed, this time with some questions formulated differently (due to the fact of having or not having implemented the coach), however, having the same categories for both groups. (Kumar, 2014; Mayring, 2000)

The author decided to follow a structure were the categories will be defined, followed by the questions corresponding to this category and the answers from the participants exposed in the form of a table. This will be followed by the explanations of the selected questions and the analyses. After the first interview, the goals will be listed. The same structure will be used for the second interview, exposing the participant's answers in tables and followed by the evaluation and analyses of results per category.

For the interview transcripts as well as for the abstracts taken for this paper, the interviewer will be marked as "I" and the managers will be marked from "M1" to "M6", numbers that were randomly assigned to them as they accepted to take part in the experiment. Moreover, the questions presented will be marked with a "Q" followed by its corresponding number.

9.1. First Interview

The first interview was conducted with all six managers, targeting the following categories:

- The type of manager (personality)
- The perceived likelihood of implementing plans into action
- The efficiency of previous trainings
- Managers thoughts of implementing a human coach vs. a digital coach
- The willingness of adoption and perception of new technologies

These categories are tackled by ten questions made in the first interview corresponding to the different categories. The author presents each category followed by the corresponding questions and the corresponding answers of the managers exposed in a table, followed by the analyses of results per category.

9.1.1. Type of manager

This category aims at finding out the personality, behavioral characteristics, psychological factors, personal attitudes and competencies of the managers to determine the personality, which influences performance, managerial style and likelihood of implementation (Angehrn, 2005; Bandura, 1986; Gollwitzer, 1993). Moreover, it aims to find out if the goals set by the managers relate to the ones supported by Coach Amanda. Q2 and Q3 aim to establish a relationship between the company pre-settled goals and the personal managerial goals.

Questions

Q1. How do you consider yourself as a manager? "or" What type of manager are you? (eg. Open, extroverted, conscientious, agreeable, dominant, influencing, steady)

Q2. Are there any management goals related to your position?

(eg. Acquire a certain number of projects, manage a team, leadership tasks, budget)

Q3. What are your personal goals as a manager?

(eg. Bonuses, acquire a certain project, employee engagement, reach a certain amount of sales, meet certain deadlines)

Manager/Question	Q1	Q2	Q3
M1	Young manager Open but dominant	Clear structure on leadership tasks, and budget goals	Improve performance in the team and get good feedback
M2	Adaptable, open and agreeable	Mainly sales and project goals	Improve soft skills, engage team members, keep an open and playful environment and help team members develop new skills and themselves
M3	Encouraging, caretaker and challenging	Team growth (quantity) and market impact	360-degree feedback, and make the team feel comfortable but challenged
M4	Open and flexible, but goal focused	Number of projects and team growth	Work-life balance and feedback
M5	Open, looking for joint solutions and feedback culture	Yearly formal meeting	Constant meetings with team member and to be able to develop them
M6	Openminded and leading by example	Monetary and project-related goals	Deliver good work, acquire new projects and develop my team

Analysis of results

Most managers are openminded and use a feedback culture. It can be seen that on the one hand, goals established by the company itself focus on material, measurable goals; and on the other hand, managers' personal goals focus on performance, team engagement, feedback, time management, leadership, self-efficiency, and other soft skills, which are the main fields supported by coach Amanda for improvement.

9.1.2. Likelihood of implementation

This category is one of the most important and aims at finding out how able managers are or how able they think they are for transform strategy planning into operational action, or in other words if they are successful at implementing and if they are effective managers (Cline, 2000). Moreover, the questions in this category aim at creating a sense of self-awareness and reflection to prepare the managers for establishing clear goals aligned with their strengths and weaknesses and

comparing their performance to the one from their idea of "ideal" manager (Bandura, 1986; Gollwitzer, 1993; Bourne et al., 2003; Nicolaidis and Michalopoulos, 2004). Determining if managers use a clear strategy, sense of understanding and implementing strategy (Floyd and Wooldrige, 1992) ability of evaluating situational adaptability and awareness of challenges (Bourne et al., 2003; Mistry, 2014; Engert and Baumgartner, 2016).

Questions

Q4. From the previously mentioned goals, could you say that you fulfil them 100%?

If not, where could you improve?

Q5. What is your strategy to accomplish your managerial goals?

And what are the main challenges for reaching them?

Q6. How would you describe a good manager or "the perfect manager"?

(eg. Regarding leadership skills, commitment, employee engagement, time management)

Manager/Question	Q4	Q5	Q6
M1	Fulfilled: No Improve: Receiving more feedback	Strategy: Open leadership and feedback culture Challenge: To perform with the clients and take care all the time of your team members	"Be hard on the subject but soft to the people"
M2	Fulfilled: No Improve: Be more consequent, time management, work against own habits and work on topics that are not as interesting	Strategy: Scrum approach to structure time management (Backlog) Challenge: Constant change of plans and rescheduling	Empowering, supportive and knowledgeable
M3	Fulfilled: No Improve: improve in education, training, qualification, hard and soft skills	Strategy: No real strategy, but focused on frequency of talking to team members, visiting clients etc. Challenge: To "just do it" (implementation)	Leadership, social intelligence, emotional intelligence, reliability and knowing how to manage expectations
M4	Fulfilled: No Improve: Work-life balance, decision-making	Strategy: Structure and framework Challenge: To make time for implementing the structure and framework	To be there when needed, take responsibility and give a lot of feedback
M5	Fulfilled: No Improve: Have a clear strategy and be able to communicate it to the team	Strategy: Self-reflection and feedback Challenge: You cannot develop everyone	Has the teams back, challenges and develops them; understands work-life balance and doesn't assume he/she knows everything
M6	Fulfilled: No Improve: Delegate more, time	Strategy: To have a vision and communicate it to the	Setting vision and being able to communicate it clearly to the team and

	management and more focus	team as a long run target Challenge: Time, work-life balance and finding qualified workforce	understanding work-life balance

Analysis of results

None of the managers fulfilled the managerial goals they have in mind, mainly due to aspects like feedback, time-management, implementation of the action, work-life balance and decision-making, together with some other soft skills they assume should be improved. Moreover, managers seem to have some type of strategy, mostly informal and consisting of setting a clear mission, vision, communicating it to the team clearly, based on feedback, self-reflection, and organized structure. However, the impediments for not reaching their goals are related to work-life balance, having to pay enough attention to the team while still delivering to clients and increasing business performance, implementing action, implementation of the structure, implementation of the strategy, and finding qualified workforce for the team.

Lastly, the definition provided for the perfect manager is comparable with the goals established by every manager and mainly focuses on soft managing aspects and social aspects like leadership, team empowerment, social and emotional intelligence, reliability and communication. Managers don't focus on business performance goals, this shows that managers care about team development and leadership and rate it as one of the most important aspects valued in management, as this is the main mentioned aspect they state when thinking of the perfect manager. Therefore, it can be said that leadership skills, which are the ones were coach Amanda focuses are greatly valued by managers and should be where the focus of the "training" relies on.

Moreover, a very interesting sentence mentioned by M1 when describing the perfect manager is "Be hard on the subject but soft to the people", which exactly describes the current situation of business goals versus personal managerial goals.

9.1.3. Efficiency of previous trainings

This category aims to compare the academic literature, which mentions that concepts from management training are neither applied daily nor useful, with the personal experience of the managers (Nicolaidis and Michalopoulos, 2004; Spitzer, 1984; Lu and Betts, 2011; Ebert and Freibichler, 2017). Moreover, evaluates if managers were previously trained.

Question

Q7. Did you previously take any management courses?

If yes, do you apply the concepts you learned daily?

Manager/Question	Q7
M1	Previous management courses: Yes, and currently taking part on a mentoring program Applies concepts: Not applied on a daily basis but tries to keep them in mind
M2	Previous management courses: Yes Applies concept: Not everything as not everything is useful, but trying to take something out of it
M3	Previous management courses: No Applies concept: Believes it will help to implement some trainings
M4	Previous management courses: Yes Applies concept: Generally a good exercise, but does not agree with some concepts and doesn't apply them
M5	Previous management courses: (Yes) Just a personality assessment (360-degree feedback) and other courses apart from the company ones Applies concept: Not taking everything, just few concepts. "You are not a better manager for taking the course"
M6	Previous management courses: Couple of courses Applies concept: Partially

Analysis of results

Most managers did take part in some type of training or course, however, not applying many concepts they have learned in these courses. As M6 mentions: "You are not a better manager for taking the course". Even though managers claim some concepts might help in meetings, they are only partially applied on their daily basis.

9.1.4. Expectations of implementing a human coach vs. a digital coach

The following category has special importance due to the nature of the coach. The comparison is being made between a human and digital coach and the expectations the managers have on both. This category aims at evaluating the willingness or unwillingness of the managers for implementing the different types of coaches (Yu et al., 2017). As previously exposed in the literature part, technology offers many benefits for managers like personalization, automation, speed, and many more (Pe'er et al., 2019; Beerbaum and Puaschunder 2018; Ebert and Freibichler, 2017; OECD, 2019). However, it also lacks some valuable factors that might be helpful for the mangers (Beerbaum and Puaschunder 2018; Borenstein and Arkin, 2015; OECD, 2019). Moreover, it must be mentioned that three of the managers that conducted the interview are experts in the field of this type of technology, therefore, their opinions are extremely valuable due to their expertise.

Question

Q8. Do you think a coach offering personal feedback would help you to reach your goals? Would there be a difference if it is a digital coach?

Manager/Question	Q8
M1	A coach is surely useful to learn and get feedback from outside and drive self-reflection. There would be a big difference if it is a digital coach, as it is not comparable due to the human capabilities (like emotions and gestures) which are not imitable by robots
M2 (expert)	Surely useful, and there is definitely a difference because AI is limited. A digital coach can be useful as a reminder, but it won't be nearly as efficient as a real person in discussing the reasons of why one is not doing "x" and what can be done against it
M3	Coach definitely useful. Digital coach can be useful for reminders, to-do lists, and alerts but probably not for more
M4 (expert)	Coach useful because of receiving feedback from outside and it could benefit in an ongoing basis. Very sceptical about the digital coach, as he will probably ignore the notifications
M5	Coach useful, due to being forced to self-reflection. If the coach is digital, it can help as a reminder but maybe not on the personal side. However, the reminder could also force someone into self-reflection
M6 (expert)	A coach will be useful is you do it constantly. And there is a difference as the digital coach cannot represent a human person.

Analysis of results

This question is very important to understand the nature of a digital coach, and its limitations compared with a human coach. It is of special importance as three of the managers are experts in the technological field and their opinions on the matter might have great value due to their expertise and understanding of how the backend of the digital coach works.

Every manager agrees about the efficiency of a human coach and mentoring mainly because they will get external feedback and it will force them to self-reflection. However, most if not all of the managers are skeptical about the capabilities of the digital coach and consider it could be useful as a reminder and by sending alerts, but it would not be able to cover basic qualities represented in a human coach, for example, being able to discuss a certain matter or situation, or expressing emotional and social traits that are human-like and very valuable qualities of a coach. In conclusion, all managers will be willing to use a coach, however, if the coach comes in a digital form they are very skeptical of its capabilities and limitations regarding human-like behaviors that cannot be imitated by technology and might be necessary when talking about a coach.

9.1.5. Predisposition to the adoption of new technology

In this category the main aim is to find out how comfortable the managers feel and the willingness they have about trying or implementing new technology (Chen and Liu, 2016; OECD, 2019; Moldenhauer and Londt, n.d.; Wilson and Daughterty, 2018). And to get more insights into the

manager's knowledge and perception of Chatbots, which is the form of the digital coach being implemented in the experiment (Leadx, 2019).

Questions

Q9. Do you adapt easily to the implementation of new technologies?

Why/ why not?

Q.10 What do you think about Chatbots[7]? Are they useful technology?

Manager/Question	Q9	Q10
M1	Not sure. Open to it, but it will cost an extra effort and will be exhausting	Yes, useful technology as they are a mixture of technology and human aspects
M2 (expert)	Yes, it is in the nature of the job	Absolutely, Chatbots have a huge potential
M3	No, too old and slow	Absolutely. Many are very stupid, but in general if it is well done it can be really powerful
M4 (expert)	Yes, it is part of the job	Hates chatbots. Technology is still not there
M5	Yes, likes trying new things	They always make sense depending on what the chatbot can do
M6 (expert)	Yes, digital native, is part of he's life	Very useful mainly because of cost cutting and high-quality service support.

Analysis of results

Four out of the six managers feel comfortable and find it easy to adapt to new technologies; as previously mentioned, three of them are experts on the field (M2, M4, and M6), and M5 likes to try new things and feels comfortable with adopting new technology. As of M1 and M3, they do not find it easy to adapt due to the extra effort derived from age and lack of familiarity.

Regarding the Chatbots, mostly all managers agree on the fact that this technology can be very useful and has a high potential if properly developed and implemented. M4 disagrees with the usability and efficiency of Chatbots refusing to use them with the argument of "technology is still not there". However, the next point will be to analyze the Chatbot in the context of a personalized digital coach, which will be done through the intervention study.

An interesting fact to point out is that M6 mentions that Chatbots offer high-quality service support that humans can't, as chatbots are equally efficient, while only 50% of humans are. However, he refers to chatbots as a tool for cost-cutting and service support referring to the business context and efficiency for companies. These are all performance business goals not

[7] Chatbot: a computer program which conducts a conversation via auditory or textual methods.

related to leadership, social and other emphatical human-like behavioral traits. Which are useful for enhancing leadership and reducing the implementation gap.

9.2. Goals

After the first interview, managers from the control group will set goals they would want to accomplish in the established time frame of 2 months prolonged to about 75 days. The managers from the intervention group will set their goals and give these same goals to the digital coach once installed. As follows, the goals established by each manager after the first interview:

M1: Time management, manage the deliverables better, plan better, not to be a last-minute type and to improve in some soft skills like leadership.

M2: Self-organization, engagement with the team members and increase delegation on specific areas.

M3: Team growth, enlarging the social footprint in social media, development of new products, employee engagement, and cross-functional projects within the company.

M4: Onboarding for new interns, work-life balance, new projects.

M5: To sit 15-30 min a week with her counselee to talk personally (feedback meetings), and delegate in within the team more efficiently.

M6: Time management (changed to decision-making), innovation and creativity and give feedback sessions with the team.

9.3. Second Interview

The second interview was also conducted with all participants, however, in this case, the questions varied between the intervention and the control group. The aim was to evaluate the implementation of goals amongst all managers. Furthermore, evaluate if the managers that implemented the coach expressed a greater level of performance, or in other words, found it easier to implement their goals into action than the control group.

The interviews conducted with each group present common questions as well as some different ones. The common questions serve to study the common ground regarding implementation for

both groups, and the different questions are due to the implementation or non-implementation of the coach, which involves that the question will be formulated differently. The common questions in both groups are marked with a "Q" followed by the number of the question, and the varying questions between groups will be marked with a "Q" followed by the number and, the letter "a" for the intervention group, or followed by the letter "b" for the control group. In this way, it can be differentiated which are the common questions and which are formulated differently.

The structure used for the second interview is the same as for the first interview. Firstly, the division of categories per group followed by the corresponding questions and the corresponding answers from the managers exposed in a table. Moreover, an explanation of the questions per category will be provided followed by the analysis of the results.

The division of categories for the second interview is as follows:

- Implementation (reducing the knowing-doing gap) & goals achievement
  This category aims at evaluating not just if managers beliefs and expectations about implementing their goals, but to evaluate in a real-life scenario if they are able to do it with a set timeframe and personally set goals.

- Time frame
  The category is evaluated to prove if it plays a role for implementation or if it influences managers to commit for implementation (Spitzer, 1984; Crittenden and Crittenden, 2008).

- Digital coach
  In this category, the treatment of using a digital coach is evaluated in comparison not having used one and the willingness to still try one. The category is subdivided in two group categories:

    - Feedback on the digital coach (for implementation group)
    - Willingness to try a digital coach (for control group)

Firstly, the intervention group will be analysed, followed by the control group:

9.3.1. (A) Intervention Group

The intervention group is the one known to have received the treatment, in this case, the ones that implemented the digital coach Amanda. The three managers that belong to the implementation

group were selected randomly, from which two are digital natives (M2 and M6) and one doesn't find it easy to adopt new technologies (M1).

During the implementation period, M2 left his job at the company and due to this and external factors, he did not implement the digital coach. Therefore, his full contribution cannot be taken into account. M2 just inspected some of the features but did not use coach Amanda, however, he still committed to conduct the second interview and explain the reasons why he did not use the coach. Furthermore, the structure from the interview and questions vary from the original questions to finding out the reason why he didn't use the coach. The question presented to M2 will be presented under the original question marked as "M2".

9.3.1.1. Implementation

<u>Questions</u>

Q1. Did you achieve your goal(s) for the first interview (2 months)?

Why? Why not?

Q2a. How was coach Amanda? Did she help you achieve your goals?

M2: Why did you not manage to install the coach? Do you think it would have helped you?

Q3. Did you use any specific strategy? (to transform plans into action)

Q4. What was the greatest impediment to reaching your goals?

Q6a. Was it difficult to put your plans into action? Did coach Amanda help you to plan? And with putting plans into action?

Q10. Do you think you are efficient in implementing your plans into action?

Manager/Question	Q1	Q2a	Q3	Q4	Q6a	Q10
M1	Goals not achieved due to “lack of time”	Was okay for reminders but sometimes very annoying (too many notifications)	A matrix for time-management but it was not given by the coach	Lack of time	Reminders were helpful but the coach was time consuming, so it was not the best way to support time management issues	I am efficient specially when I am forced to it
M2	Partially yes Made challenge in he’s situation but didn’t	Couldn’t find the time to set it Change of job	It simply had to get done, I had to delegate because I was leaving work. So,	Prioritizing, sticking to habits and finding a structure	Putting plans into action is one of the main challenges	Depending on the time pressure

	use the coach		it just had to get done and it worked Uses scrum to schedule on a daily basis			
M6	Yes Feedback sessions worked Creativity and innovation got better but the structure is missing, and time-managemen t was changed for decision-making and accomplish ed	Was “a nice person” Was a useful reminder for checking the goals, reading, and doing self-assessment. Personalizati on helped to save time for example when looking for an article on a certain topic	Checking the emails and push notificatio ns from the coach	Lack of time	It was sort of difficult, but it worked out to implement my goals. The coach was useful.	Compared to others quite efficient based on business goals and carrier. But could do more if there was more commitme nt or structure

Analysis of results

The goals were not achieved by manager M1 because of lack of time, they were partially achieved by M2 as he had to delegate because of quitting his job. The other goals were omitted due to the change of situation, M6 did achieve in great part he's goals.

Coach Amanda had some contradictive opinions, for M1 it helped with the reminders, but it was too annoying with the notifications and required time which was not available to M1. Manager M2, as previously explained did not use the coach due to a change in the situation of no longer working for the company, and M6 used the coach and was quite happy with its usability especially with the reminders, suggesting articles that targeted he's personalized goals, and by pushing him to work on self-assessment when there wasn't enough time.

The different managers used different strategies, M1 used a matrix for time management, however, she claimed that the goal was not met. M2 uses a scrum methodology that works in the cloud and helps him plan and schedule tasks. And M6 used coach Amanda as a strategy to accomplish the goals established.

Mostly the greatest impediment is lack of time for all managers, as they have to complete business deliverables which determine the business success in numbers before focusing on other leadership tasks. Moreover, M2 also mentions sticking to habits and finding a structure.

Putting plans into action remains a challenge, coach Amanda helped with the reminders, however, M1 claims it was time-consuming.

Regarding efficiency, all three managers claim to be fairly efficient, especially when under pressure.

9.3.1.2. Timeframe

Questions

Q5. Did setting a determined timeframe help you to achieve your goals?

Q7a. How often did you use coach Amanda?

Manager/Question	Q5	Q7a
M1	No	Read Emails daily but did not use the application much
M2	Yes, but because of a different situation (quitting the job and having the pressure to delegate)	Did not use the coach
M6	Yes, it puts pressure	Actively using it at least an hour a week

Analysis of results

The established time frame (2 months prolonged to an average of 75 days) was in some cases very useful acting as a pressure factor for getting the goals done, and in other cases seemed not to have any influence at all. Manager M1 seemed to have read the push notifications and Emails but not to log in into the application to check on her goals and personal development, apparently because of lack of time. And manager M6 actively used the coach to reach his goals and confirmed it helped.

9.3.1.3. Digital Coach (Feedback)

Questions

Q8a. What are the aspects you like most and least from the coach?

Q9a. Would you recommend the coach to other colleagues?

Q11a. Did you increase efficiency in implementing your tasks because of the digital coach?

Manager/Question	Q8a	Q9a	Q11a
M1	Most: Personalization Least: Annoying push notifications	No, would recommend a human personal coach	Maybe regarding time management or project planning but not for the soft skills

			I would say as a reminder of course, but content wise not
M2	- (believes such a coach in the long term can be very useful)	-	-
M6	Most: Provides good suggestions on articles based on your goal preferences, reminders, and pushing you to self-reflection Least: Sometimes the notifications were too much, and it was annoying that in some cases you started reading an article and it leads you to the amazon book so you can buy it	Depending on the cost, but in general he would recommend it	It helped in improving but not necessarily efficient as such. It helped in thinking as a team leader and taking time to self-reflect and check my goals

Analysis of results

According to both managers who used the coach, M1 and M6, the most positive aspects from the coach are personalization, article suggestions, reminders and pushing to self-reflection. The least likable aspects were the push notifications and the fact of the articles leading you to amazon to buy the book.

Manager M1 wouldn't recommend the digital coach, rather a human one, and M6 would generally recommend it.

In the author's opinion, it is difficult for the managers to evaluate the perceived increase of efficiency lead by the coach, as it cannot easily be measured. They mainly do not recognize the nudges that come along with the push notifications and even if these might seem annoying at first, the notifications pushed the manager to commit to some sort of activation towards the selected goals. M1 claims it might have helped as a reminder with time management or project planning but not for the soft skills, and M6 claims it helped him to think as a better leader and push him to self-reflect on his goals but not necessarily to an increase of efficiency.

9.3.2. (B) Control Group

The control group is composed of managers that did not implement coach Amanda in their daily routine but still set some goals. They will be used to compare the implementation driven by the coach versus receiving no treatment. The three managers selected for the control group were selected randomly, one digital expert (M4) and two managers from other departments (M3 and M5).

9.3.2.1. Implementation

Q1. Did you achieve your goal(s) for the first interview (2 months)?
Why? Why not?
Q2b. What helped you the most to achieve these goals?
Q3. Did you use any specific strategy? (to transform plans into action)
Q4. What was the greatest impediment to reaching your goals?
Q6b. Was it difficult to put your plans into action? How did you organize yourself to ensure you will achieve those goals?
Q10. Do you think you are efficient in implementing your plans into action?

Manager/Question	Q1	Q2b	Q3	Q4	Q6b	Q10
M3	Partly, progress for all goals except one	Carrying the goals with me all the time. No specific strategy	Keep goals in the back of my head constantly	Turn plans into action and finding new employees for the team was difficult	Yes By prioritizing	Yes
M4	Partially, onboarding goal was met, the others ongoing	To have a structure	No strategy	Workload	Yes because of workload By learning to say no	Usually yes
M5	One goal was met (feedback meetings) the other not really	Scheduling ahead for the meetings.	Just kept it in the back of my head	Timing issue Workload & complexity of the task	Yes, hard to push yourself to do something. By forcing yourself to action	75% efficient

<u>Analysis of results</u>

All three managers did just partially achieve their goals, some were completed, some ongoing and some not completed. What helped them most was keeping the goals in the back of their head and have a structure. Moreover, none of the managers did use a specific strategy but keeping the goals in mind.

The greatest impediments were implementation, turning plans into action, timing and workload. All managers claim it was difficult to put their goals into action due to workload or lack of implementation, and that to combat this by prioritizing and forcing themselves to implement

action. Lastly, all managers claim they are fairly efficient, but none of them has fully implemented the goals.

9.3.2.2. Time frame

Q5. Did setting a determined timeframe help you to achieve your goals?
Q7b.How much time did you dedicate to ensuring you will reach those goals?

Manager/Question	Q5	Q7b
M3	It always helps. Structure always helps, but you don't always have it	About a day a week
M4	Not really, it was an ongoing process independent of the time frame	Ad hoc basis
M5	Partially, not so relevant. Is important to set goals regularly	Taking a moment every day when commuting for example

Analysis of results

Setting a determined time frame does not seem so important for the managers in the control group, however having a structure and regular goals are important. Moreover, the managers dedicated some time to reflect on their goals in an unstructured way.

9.3.2.3. Digital Coach (Willingness to try digital coach)

Q8b. What was the most challenging aspect of putting your strategy into action?
Q9b. Would you like to try a digital coach who helps you to put your managerial goals into action?
Q11b. Do you think you could increase efficiency in putting plans into action with a digital coach?

Manager/Question	Q8b	Q9b	Q11b
M3	(previously responded)	Always tries new things but would like to know the features. If he sees some value add he would definitely implement it to the daily routine	For administrative tasks/ goals yes but not for strategical goals
M4	(previously responded)	No	No. Maybe in terms of work-life balance
M5	(previously responded)	For sure. Would like to get a tip a day	It really depends on how its set up

Analysis of results

It can be seen that the willingness of trying the coach varies, manager M3 would be willing to try it if he sees some value add, M4 would not like to try it as he does not like chatbots and M5 is willing to try it and recommend it if she finds it useful. Moreover, the opinion also varies about the efficiency of the coach, as M3 mentions it could be useful for administrative tasks but not for

strategical goals, M4 does not think the coach will be efficient, maybe for improving work-life balance, and M5 states it might depend on the features the coach can offer.

The results obtained through both interviews, will be analysed in detail in the following section.

10. Analysis of Results

Both interviews, pre- and post- assessment, will be analysed in further details. Firstly, providing a general analysis of the interview findings, followed by a deeper analysis of the categories in relation with the interview answers and quoting useful sentences from the participants.

10.1. Interview I

All participants were classified as open culture managers that focus on leadership development, which can be identified with the servant managerial style. Most managers expressed trouble for implementing their leadership goals, contrary to business goals, where all managers claim to be very efficient when implementing planning into action. Regarding leadership development, the main goals and topics managers wanted to improve were time management, stress or work-life balance, team engagement and communication with the team.

Managers mostly claimed that, if they had participated in previous management training, they could be useful as a reminder of some concepts, but it would not influence much in the implementation gap or by making them a better manager, as not all concepts could be applied daily. Comments mentioned they would prefer if the training was done in an ongoing feedback-based basis.

Not all participants felt comfortable with implementing new technology; most managers who are experts in the field, state they feel comfortable to implement new technology, but some other managers state it would cost them an extra effort. Moreover, all managers claimed to prefer a human coach or mentor rather than trying a digital one. The main arguments related to lack of empathy and communication misunderstanding from the digital coach. However, most managers claim it could be really useful for administrative tasks or as a reminder, but not for specific to-be-discussed topics or situations.

Regarding implementation the results varied between and within both groups, however, when comparing them it can be seen that within the intervention group, the manager that used the coach on an ongoing basis did reach all goals successfully overcoming the implementation gap, while the other manager who implemented the coach and did not fulfill all goals claimed that she was

overwhelmed with the push notifications but that the coach helped as a reminder. On the control group, none of the participants fully accomplished the goal(s) set, they did not use a strategy for implementation claiming that it was a great challenge due to lack of time and stress.

10.1.1. Type of manager

The participants are openminded managers with personal goals focusing on leadership, team engagement, time-management, decision-making and feedback and mainly looking to improve their soft skills. The main challenge seems to combine business and soft-skill goals.

M1 summarizes the main opinions, stating that "…the branch of business is very busy, so that is a very big challenge. You have to perform and you can't take care all the time for your team members so they don't feel bad, but you have to perform, the performance it's a hmm, in a connex, in a direct connex with the money and not with the feeling of my team members and leadership itself. That's the main challenge."

10.1.2. Likelihood of implementation

For all managers, implementing the business goals relating to profit or number of projects was not a big problem. However, the personal goals as a manager weren't implemented; in other words, they are not implementing their managerial plans into action, especially the ones related to leadership development. Most managers assume to have problems with implementation mainly because of lack of time and high level of stress. Moreover, another concern was related to lack of team engagement, as it plays a secondary role for the company, as performance, in the end, is measured based on profit, the number of projects and clients; and not on the number of feedback sessions conducted with the team members. However, every manager seemed to have a strategy they are willing to put into action by communicating mission and vision to the team.

M5 states “I would say 75% efficient. Yeah, I’d say I’m rather efficient because I am a person that wants to get things done and have a life after that”. M6 mentions “In general, compared to others I see myself as quite an efficient person, because I achieve a lot, you know, when looking at my business goals in my carrier”. And M2 states that the likelihood of implementation “depends on the time pressure”

Even though most managers would like to improve leadership aspects, sometimes it is not possible due to the prioritization of objectives given by the company. The managers seem to have a better implementation ratio for business goals than for personal ones. Generally, managers

perceive to be efficient, however, once the experiment concluded just one participant out of six was able to reach his goals.

10.1.3. Efficiency of previous trainings

Most managers did participate in previous management training courses, which they found somehow useful to remind them leadership practices. However, they do not apply the concepts on a daily basis.

M6 mentions "You are not a better manager for taking the course" agreeing with M5, that states: "So I think is rather about impulses, I don't think is that because you took part on a course and you sat there for four hours that makes you a better manager." summarizing the main point of all participants.

10.1.4. Expectations of implementing a human coach vs. a digital coach

The efficiency of a human coach or mentor is perceived as clearly helpful for all participants, mainly when implemented on an ongoing basis. However, the participants become somehow skeptical about a digital coach. Most of the managers stated that the digital coach could be very helpful as a reminder and for administrative tasks, however, not for solving a specific situation or managerial problem that needs to be discussed, in other words, the participants perceive the digital coach as a value-added on the administrative side but they are not sure if it could help them in situations where human-like behaviour might be necessary. Moreover, some managers would like to receive feedback for self-reflection and there are not sure if the coach can provide this.

M1 mentions: "a digital coach is nice to have, of course, but a digital coach is related to clear facts and a personal coach is a human being and there are also things like gestures and the, yeah, it's not the same."

M2: "there is definitely a difference because I have a good understanding of how AI-based algorithms work how they operate, how these things happen and I think this is applicable only to certain level today. Based on what AI can do now I would say there would be a big difference between a person and the digital coach, for all these non-task, nonrepetitive stuff. Yeah, a digital coach could be good in reminding me to do stuff but it won't be nearly as efficient as a real person in discussing why I am not doing this and what can be done against it."

M3: "if it comes to the soft skills I am skeptical about the digital coach, if it comes, to let's say, rule-based to-do list alerts, reminders, ... this definitely"

M4: "I am really skeptical concerning the digital coach, (…) I mean, in the end, I will receive push notifications, and I will be like nah… (…) Everybody knows like, oh yeah, I haven't done that, and then you forget all about it because you are too busy doing other kind of stuff. And that is different with a person, you have to face somebody and look at them in the eyes and say yeah, I don't care. That's a whole different level."

M5: "if it's digital, the question is always, ahm, that I think personal the feedback is more… would be more personalized, but still if I set goals and that thing reminds me of those goals I set, I think that already helps. (…) I think that would also help because is a reminder of self-reflection"

M6: "a digital coach is a different thing than if a person sits in front of you."

10.1.5. Predisposition to the adoption of new technologies

Not every manager feels comfortable with implementing new technologies, even though most of them are curious to try it. M2, M4 and M6 are digital natives and stated they feel confortable implementing new technologies. Moreover, M5 stated she like trying new things. But M1 and M3 find it harder to adopt new technologies. For example, M1 claims “there is a strict time planning and to adapt digital aspects… they are different to the normal daily business and will be a bit exhausting and therefore I am not sure if I will be happy every day with these.” Or M3 who claims to be too old and not enough agile for the implementation.

Moreover, managers were asked about their main opinion of Chatbot technology, the one supporting Coach Amanda. Most participants agree that chatbots have a huge potential if properly developed and for automation processes, M4 disagrees with the effectiveness of Chatbots as he finds the technology is not well developed. As follows some of their comments:

M6: (Expert) "The rationale behind it is costs, its cost-cutting, you implement chatbots to have less people working at the service centre, but also chatbots can support very high-quality service if you train a Chatbot well then you will always have the right answers, if you train people then 50% of the people always have the right answer, 50% don't care or are just not trained well enough. So, the quality of chatbots is always higher. I have been working with chatbots myself as a consumer, and I think it's fine, it has to be a good technology understanding language, understanding your individual vocabulary, having voice recognition… but of course, it is a good thing yes!"

M3: "… in general if a chatbot is well done it can be really really powerful and it can be a huge efficiency gain for the companies."

M2: (Expert) "Absolutely. Chatbots offer a huge potential, even nowadays for specific use cases irreplaceable, absolutely. As mentioned before, it depends on the use case we are trying to cover. Deep down understanding and communication and uncovering hidden motives and stuff like this no way, it's not about chatbots. Chatbots you can do it also with the web-based form, this you can a few years ago, it doesn't matter. The language understanding and the motive understanding are not that far, but yes, chatbots is a very good technology, totally. We will see much more of them."

M1:" Yeah, definitely useful, because that's a good mixture between digital aspects and also the known human being and aspects to talk to somebody. The chatbot is also somebody, hmm I think it is somebody, but it is not the same that to talk to someone on the phone or in person."

Manager M4 (Expert) had a contradictive opinion to the rest of managers and stated: "I personally hate chatbots, I refuse to talk to chatbots. (…) They are really bad. In my point of view, technology is still not there."

10.2. Interview II

Regarding the time frame factor, it seems to affect just some of the managers amongst both groups and act as a push factor, but not to be a determining factor for implementation. Regarding the digital coach, two out of three managers from the control group expressed willingness to try the coach after the experiment. From the intervention group, results once again vary as one of the managers did not implement the coach because he left his job, the second participant of the intervention group claimed the coach helped as a reminder to fulfill tasks but the push notifications were overwhelming, and the third coach who used the coach actively, was the only participant that accomplished all goals and would recommend coach Amanda to colleagues as it helped him set goals, offered personalized content and induced him to self-reflection through the notifications, which helped to put these goals into action.

10.2.1. Implementation

10.2.1.1. (A) Intervention Group

The intervention group exposed different results. M1 did not fully commit with the coach, and did not reach to implement her goals, she was sometimes annoyed by the push notifications from the coach, in the end, claiming that the coach might have helped as a reminder, but it was time-consuming. M1 stated "Maybe the coach gave me some reminders (…) and I thought okay I have to talk to my team and make jour-fixes to have short term goals and discuss every week with them the next steps, so maybe it was a little bit helpful because it was all day reminder"

M2 quit he's the job at the company during the time of the study and did not implement the coach due to lack of time and stress and also because most of his goals except delegation had been omitted. M2 claimed: "I really couldn't find the time to set it up on one hand, and I played a bit the App but I needed more time. I had real problems and I just couldn't manage it. Especially with this change of job of mine and this situation needed a lot of attention, and simply there was no time for me to work with Amanda so unfortunately, I cannot give you any input in that. "

M6 was the manager that took the experiment most seriously, implemented the coach and used it as his strategy to implement the managerial goals, he managed to achieve his goals and seemed to be quite happy with the digital coach. M6 states that Coach Amanda "was quite a nice person, first of all. Ahm... it reminded me quite a lot of checking into my goals, reading, doing self-assessment, more reading, and also looking at the app. Especially during days where I didn't have enough time, where I felt… okay, I just do it. All in all, it's really good, yeah."

The main challenge for all managers was lack of time and prioritizing; all managers claiming that implementation is a challenge but that they are quite efficient, especially when they are forced. To sum up results, the only manager who accomplished all goals set is M6, who is also the only that used the coach actively engaging with it daily.

10.2.1.2. (B) Control Group

All three managers just partially achieved their goals, most of them are still ongoing. Managers barely used a strategy but keeping the goals in the back of their heads. The greatest challenges for fully achieving their goals were implementation, timing, and workload.

M3 states "the goals (…) I am carrying them with me all the time, and I am constantly asking myself how to operationalize them within management meetings"

Some factors that helped with the achievement of the goals were scheduling and structuring as well as committing with others. For example, M5 decided to schedule team meetings for the next month in her calendar to drive team engagement and feedback and be pushed by previously committing with them. However, the meeting might be pushed for some other more of more importance. There id no clear strategy or push factor driving implementation.

10.2.1.3. Summary

Results were varying across managers, from the treatment group, M6 was the only manager that fulfilled all the goals made full use of the coach and succeeded with implementation. M1 did only

find the coach useful as a reminder and did not accomplish all her established goals, while M2 dropped out of the implementation study due to a change of situation regarding work.

From the control group, all managers seemed to have advanced with the goals, they haven't used a clear structure just setting reminders for themselves, but none of them accomplished to implement all established goals.

When comparing both groups, it can be said that the group that used the coach embraces the managers diving them to divide the main goals into smaller goals for better approach to implementation.

10.2.2. Time frame

10.2.2.1. (A) Intervention Group

The time frame established just worked as a push factor for some managers, for example for M6, others do not find it relevant for the implementation of goals. M6 states that establishing a time frame helps "because if I knew I had two months I need to do something, of course, yeah... if it would be half a year or a year, you know... you leave it"

Moreover, the frequency of use of the coach varies, as mentioned, M6 engaged the most, followed by M1 who checked on her goals just from time to time due to lack of time, and finally M2 who didn't use the coach.

10.2.2.2. (B) Control Group

Setting a determined time frame helped somehow but the participants of the control group found it more important to have a structure, set goals regularly, and self-reflection. M5 summarizes the answer of the control group stating that setting a timeframe "I would say not so relevant, I think it's always important to set goals, and I do that regularly, but it didn't stress my out, so partially I would say."

10.2.2.3. Summary

Regarding the time frame factor, it seems to affect and act as a push factor just some of the managers amongst both groups, but not to be a determining factor for implementation. However, it must be said that most managers did only partially accomplished their goals and the one manager that accomplished them all successfully took into account the time-frame as a determining factor.

10.2.3. Digital coach

10.2.3.1. (A) Intervention Group: Treatment

According to the participants from the intervention group that applied the coach, the most positive aspects of the coach are: personalization, article suggestion, reminders and pushing one's self to self-reflection through push notifications. The least likable aspects are the push notifications and that some articles lead you to buy the book in amazon.

M1 had a personal mentor during the same time of the study, and she would not recommend a digital coach, but rather a human coach or mentor claiming that "at the same time I had a mentor, and I discussed a lot of things with my mentor, especially leadership tasks, and that was very helpful because I could address special situations, discussions with my team, how to handle it, and so on"

Even though M2 did not implement the digital coach, he mentioned "I saw the content a little bit in the app so reading from time to time, getting additional ideas, additional impressions. I pretty much think this would help, in the long run for sure."

Moreover, M6 would recommend the digital coach stating that "the coach thinks of your personality and delivers the articles that fit into your goals. And I think that's a good thing because I think, otherwise I would receive tons of newsletters, tons of different information… you would never be able to filter what's the most important to you, so this actually reaches your personal preferences and this is already a good part of it, so I just read the articles and learn. I think I take something from it. And there are also some recommendations on how to move on, approach the team for some feedback session, doing your decision journal and so on... So yes, I think that is nice because is targeted and not just random information."

Some general comments about the coach were the following:
M1 states that the coach would help "maybe regarding time management or project planning or something like this. Soft skills not, because for soft skills it is very important to discuss the own position and the meaning, experience…"

M6 states that "the coach is like a person that keeps reminding you all the time, and no person would do that. Maybe once or maybe twice but then leave it. And the coach every day keeps asking you, and that really helps." Moreover, the coach helped him "thinking as a team leader, and as a manager of topics that I should do but I wouldn't take enough time for it without the coach. (…) I like the way it works."

10.2.3.2. (B) Control Group: No Treatment

The willingness to try the digital coach varies amongst participants of the control group. Manager M3 would be willing to try it if he sees some value add, M4 would not like to try it as he does not like chatbots and M5 would be willing to try it and recommend it if she finds it useful. Most of the participants claiming that their efficiency might depend on the features of the coach.

M3 states that the coach could be helpful "on the administrative side definitely! Ahm… if we are more or less on the strategic side... I am not sure, maybe I cannot… I am not creative enough to imagine the functionalities of this digital coach, but, ahm… but if the digital coach works like a kind of intelligent to-do list for me, then definitely. But I am not sure if for example, he gives me hints on how to operationalize my strategy (…)."

M4 believes that such a coach won't be useful for him claiming that: "Maybe in terms of work-life balance it would have helped but as I briefly said during the last interview, if my phone starts annoying me with push notifications, I just ignore them. So that would maybe help for the first two or three times and then maybe it will come that time when I just start ignoring it and turning it off eventually" M5 believes that "I think for sure it would help because it brings the topic back to your mind regularly"

Moreover, most participants of the control group found it more important to have a structure, set goals regularly, and self-reflection. Features that were given by the coach to the intervention group and which the control group found challenging to do on their own.

10.2.3.3. Summary

Regarding the topic of the digital coach, it once more depends on the personality of the managers and opinions vary within both groups. To sum up, the coach seems to help with planning and as a reminder for administrative tasks, even for some managers, it was helpful as a way of forcing themselves into self-reflection which is already a good point towards implementation. However, the digital coach seems not to be for everyone and even if in some cases it might drive the manager towards implementation; it does not guarantee the implementation of managerial goals, as that seems to be dependent on the commitment of the individual itself.

To sum up, the intervention group had many helpful comments about the coach but no clear conclusion can be withdrawn. From the control group, results show that some participants would be willing to try the coach, one of them doesn't think it would be helpful for him; however, all agree that the efficiency depends on the features offered by the coach.

11. Findings: Digital coach implementation *versus* no treatment

In accordance to the literature, managers from both groups claim implementation is one of the biggest challenges for reaching their managerial goals, especially combined with stress and lack of time (Floyd and Wooldridge, 1992; Pfeffer and Sutton, 2000; Bird, 1988; Knight et al., 2007; Ajzen, 1991; Ebert and Freibichler, 2017). However, managers agree that when they are forced by external pressure, like the push notifications of Coach Amanda for the treatment group, they are much more likely to commit to action.

The effectiveness of reducing the knowing-doing gap through intelligent nudges seems to vary depending on the manager's personality and especially their willingness to implement new technologies. In the treatment group when comparing both managers that implemented the coach, M1, and M6; it can be seen that M1 is not familiar with new technologies and was not willing to take extra time to allow the digital coach to lead her, and M6 is a digital native who was willing to implement new technologies and succeeded reaching his managerial goals with the support of the coach. In comparison with the control group, it can be seen that this last group was more disorganized with strategy or barely had one, simply carrying the goals in the back of their heads; most managers in this group advanced just partially concerning their goals but none of them claimed to have completed them successfully.

When comparing the intervention and control groups, even though certain aspects vary between both groups, there are no outstanding differences between the results obtained from one group and the other, as the sample used is relatively small, and results seem to be mainly individual-based. However, certain treatments that come along with the digital coach have been proven by the intervention group to be helpful towards reducing the knowing-doing gap and supported the implementation of the desired goals in comparison with the control group. The only manager that successfully reached all goals belonged to the treatment group and found the digital coach to be useful, therefore, it can be considered that the treatment group obtained better results than the control group. However, is not representative enough to make a statement. The features that support the hypothesis presented by the treatment group and not present in the control group, will be exposed as follows.

Firstly, contrary to the control group, the treatment group exposed being able to understand and establish a clear strategy to reach their goals, which was divided into smaller goals and smaller time phases supported by Coach Amanda. This helped managers as a reminder to stick to their goals and to be organized, which can translate into a better operationalization of the strategy.

(Floyd and Wooldridge, 1992) Moreover, the application “forced” managers into a continuous measurement of their goals, which is also known to be an enabler towards implementation (Bourne et al., 2003).

As exposed by Gollwitzer (1993), implementation relies mainly on personality, apart from the situation and other influencing factors. However, aspects like goal-setting and implementation behaviour, which are also supported by Coach Amanda, who sets implementation levels and sends reminders, lead the participants from the treatment group towards the operationalization of goals and implementation. Coach Amanda, like the exposed example of Virtuaula, is a form of experimental learning. This type of training is well-known to lead towards implementation based on the learning-by-doing principle (Bronfman, 2007). According to the participants of the treatment group, Coach Amanda supports training on an ongoing and continuous basis, something where most management training fails at, and which is essential for reducing the knowing-doing gap (Spitzer, 1984; Crittenden and Crittenden, 2008). Furthermore, establishing a timeframe is known to help with implementation as a push factor (Drucker, 1954; Leimback, 2010; Engert and Baumgartner, 2016; Thaler, 2015). M6, manager from the treatment group who fulfilled all goals claimed that the time frame set by the study as well as the ones set by the coach was very helpful as pressure for reaching the goals at the desired moment.

Coach Amanda supports strategy based on goal-directed responses, which engages with organizational action (Burke and Collins, 2005; Speculand, 2014; Zaher, 2014; Gollwitzer and Schaal, 1998). Moreover, as mentioned by many authors in literature, managers shall take breaks for self-reflection, self-regulation and self-efficacy (Tikotsky, Pe'er, and Feldman, 2019; Bandura, 1986; Tawse, Patrick and Vera, 2018; Nicolaidis and Michalopoulos, 2004; Gollwitzer, 1993; Ajzen, 1991) aspect that managers from the treatment group highlighted as positive about the coach, creating an environment that promotes the action culture (Pfeffer and Sutton, 1999; Floyd and Wooldridge, 1992), which allows managers to have their goals constantly present and compare them with their desired target picture (Engert and Baumgartner, 2016).

One of the most positive highlighted aspects from coach Amanda by the managers of the treatment group is the functionality of acting as a reminder, one of the most well-known powerful nudges (Tawse, Patrick and Vera, 2018; Sunstein and Thaler, 2009). Coach Amanda mainly acts as a reminder, pushing the user towards action as the individual communicates his plans openly committing to the goals, and improving the planning fallacy as well as reducing the knowing-doing gap by guiding towards implementation intentions (Gollwitzer 1999).

Special attention must be also paid to the personalization component of Coach Amanda, which conducts a personality test and takes into account the manager’s goals for delivering personalized

content saving a great amount of time to the user. As mentioned by authors like Anand, and Büchner (2000), Garrido Tejero, Morales and Serina (2016), Borenstein and Arkin (2016) and many others, personalization through technology has meant a great step forward for education and individual development. Also proved by the treatment group in this study, were managers have highlighted this aspect for improving time-management when searching for information related to their goal topics. As mentioned by Yu et al., (2017), a way AI technology can support personalization for learning is through the multi-agent development environment, which is known to be an AI knowledge representation tool based on goal-setting theory, which aims to motivate users to reach their goals. Coach Amanda uses this technology for empowering managers to reach their desired goals and reduce the knowing-doing gap.

Technology has brought many benefits to the humankind and presents a huge potential in the business world (Pe'er et al., 2019; Puaschunder, 2017; Beerbaum and Puaschunder 2018; Ebert and Freibichler, 2017; OECD, 2019) fact to which participants of the study agreed to. However, many technology aspects cannot substitute human-like behaviours that are required in certain situations. For example, during the study M1, part of the treatment group had a personal human coach and claimed she did prefer to have a human coach rather than a digital one as with the digital coach she could not discuss specific situations were emotions had to be taken into account. Despite the great technological advancements, technology still has to develop to cover certain aspects like ethical issues, human-like behavioural traits or the fact of technology being overwhelming for humans (Beerbaum and Puaschunder 2018; Borenstein and Arkin, 2015; OECD, 2019) specially this last mentioned aspect was also stated by the participants from the treatment group, as managers from this group found that despite Coach Amanda's push notification were very helpful as reminders and for self-reflection, sometimes they were overwhelming.

While participants from both groups found it difficult to implement action and reduce the knowing-doing gap, on the one hand, the control group did not experience any incentives towards reducing the gap and simply intended to implement the goals set in the timeframe set, mostly using a poor or no strategy at all and either using some types of self-established reminders like calendar appointments for goals like weekly feedback team meetings, or simply carrying the goals in the back of their head and barely taking time to self-reflect and work towards implementation. On the other hand, the participants from the treatment group who implemented Coach Amanda stated and showcased behaviours accordingly to reduce the knowing-doing gap and therefore optimize implementation of their managerial goals and performance.

Overall the main difference between the control and treatment group, is that the control group had no clear strategy while the treatment group did. This last group also checked into their goals more

often than the control group, making it more likely to work towards implementation. The treatment group received reminders that encouraged self-reflection, while the control group barely took time to self-reflect on their goals. The treatment group had recommendations on articles, podcasts, and material to train the manager's knowledge for the desired leadership goals. Moreover, the control group informed themselves by simply talking to other colleagues but did not cover and ongoing training on the goal topics. In conclusion, it can be seen that participants from the treatment group that made use of the digital coach showcased better results when reducing the implementation gap than the ones with no treatment. However, as already mentioned the sample of participants is very small to make a clear statement and certain factors were simply dependent on personality, behavioural traits and willingness of implementing technology.

To summarize, the treatment group did experience valuable features from Coach Amanda that support reducing the knowing-doing gap. However, as the intelligent nudges provided by Coach Amanda come in a digital form, for the intelligent nudges to be effective, users need to be willing to implement and interact with this new type of technology. The coach will be helpful for individuals who are willing to implement new technologies and who can engage with them. Otherwise, if the manager is not committed to the machine, the push notification might be ignored, and this type of intelligent nudges won't be effective for the person.

12. Conclusion

In this master thesis, the author aims to evaluate if "Implementing intelligent nudging through a personalized digital coach decreases the knowing-doing gap.", or in other words, if intelligent nudging optimizes management performance through implementation.

The knowing-doing gap or implementation gap is an existing gap in management literature. Management training fails due to aspects like the lack of personalization, motivation towards action, and other factors that do not contribute to reducing the gap like lack of time, stress and forgetfulness. To bridge the gap and embrace implementation, psychological factors, personal attitudes, and competencies as well as the history and the dynamics of the social, emotional and organizational context in which people operate must be taken into account. Many factors like organizational culture, motivation, monitoring, self-reflection, automation, setting operational levels or a strategy based on goal-directed responses and experimental learning were aspects mentioned as likely to bridge the implementation gap in academic literature and were considered afterwards for the experimental part.

Moreover, nudging theories and strategies are proven to have a great impact together with AI technology for influencing behaviors in a personalized way that could potentially reduce the implementation gap in management. The so-called intelligent nudges influence and empower managers to implement organizational goals and therefore reduce the knowing-doing gap. The experimental part of this paper evaluates through an intervention study if the implementation of the so-called intelligent nudges in the form of a personalized digital coach can reduce the knowing-doing gap in management.

According to the study results, the implementation of Coach Amanda can be considered to have positive effects for reducing the implementation gap. The coach is based on the goal-setting theory that induces the manager to set a clear strategy and makes it easier to transform planning into organizational action. Moreover, the coach uses reminders and other types of digital nudges that lead the manager towards self-reflection, which at the same time leads to motivation and implementation willingness. Furthermore, it offers personalized content on topics related to managers' preferences and goals, saving them time and nudging them towards action. However, the desired outcome of the experiment was only fully exposed by M6, manager from the treatment group, who actively used the coach. According to some participants, technology is not there yet for a chatbot to act as a coach, as most of them would rather stick to a real human-being coach or mentor. Mainly due to aspects like empathy and social human-like traits that cannot yet be substituted by technology.

The managers who did not engage with the coach obtained worse results related to implementation and bridging the knowing-doing gap than the ones that did engage with the coach. The findings expose the potential of a personalized digital coach to reduce the implementation gap in management. Main features from the coach were highlighted to be helpful towards reducing the gap, however, personality is also an important factor to be taken into account when applying intelligent nudges, as the behavior towards this type of technology might be a determiner of the effect it has on the user.

Practical results match the previously exposed theory about the topic of intelligent nudges; this technological advancement has a huge potential especially for offering personalized services, helping with planning and goal setting, offering useful personalized material and inducing the manager to self-reflection and commitment to take action on the established goals. However, exposed in theory as well as in practice, there are some limitations related mainly to the emotional component required in a coach or mentor that cannot be offered by the personalized digital coach and other technologies based on intelligent nudges.

13. Limitations & future research

13.1. Limitations

The research sample used for the intervention study was relatively small, counting with just three participants per group; the small size of the sample could suppose a limitation of the study of a niche group not representative of all managers. Thereby, it is likely that this study was affected by a certain sample selection bias. The type of manager who participated in the study is mainly middle management experienced and with lack of time and high levels of stress, according to the type of managers that LeadX targets. However, it was limited to a small group, from just one company in one specific sector and a limited geographical region.

Interviews were not conducted in the mother tongue language of neither the participants nor the interviewer, however, every participant claimed a high level of English and felt comfortable interviewing in English. Therefore, the author assumes no misunderstandings.

Moreover, the time frame selected for the interview might act as a limitation as well, as the longer, the treatment implemented, the more reliable the results. Leadx claimed results to be noticeable from the first month on, however, other studies conducted by them take a length of approximately six months. Compared to the average of 75 days of treatment, it can be considered a short time for the implementation. However, results obtained positively correlate with the ones exposed by Leadx.

The American company LeadX was implementing new units and features on an ongoing basis while the study was taking place, as it is a new company and they are improving constantly. Therefore, these features were not evaluated in the study, meaning that once incorporated the new features, results may vary.

Lastly, the author aimed at studying digital nudges and their efficiency in reducing the knowing-doing gap in management. The focus of the experimental part of this paper relied on a specific type of digital nudges, limiting it to the form of a Chatbot that acted as a personalized digital coach, from one specific company. However, digital nudges can be present in many different ways; studying these might be interesting for future research, commented in the next chapter.

13.2. Future research

It has been expressed by academics and also commented in the interviews that apart from the powerful value of digital nudges some aspects might affect their implementation and usability and might make them less likable. The author believes it is important to find the value and place of digital nudges and take into consideration the limitations presented by this type of technology; like lack of emotional intelligence and human-like behavior or social traits. It might be interesting for future research to evaluate these aspects together linked with technology.

Moreover, as digital nudges have a great relation with data and AI, the topic of ethics will be one of great importance when evaluating further research and implementation or development of digital nudges. Another factor of interest is the overwhelming factor of technology, specifically from push notifications, present in various participants that took part in the study. The author believes that the aim is to find the place where intelligent nudges are useful, friendly and ethical influencing managers' behaviors and leading them to positive results through the implementation of their strategy.

Furthermore, the implementation of digital nudges in a bigger scale and with a greater sample of participants could provide much more concise results. It could be very interesting if an international company would offer their employees free access to such a coach that could ethically synchronize with the employee's calendar and see if such a coach with more data and information about the manager can be efficient. As Americans tend to be more open to share with technology and accept push notification, maybe conduct a study in this region and evaluate behavior and personal preferences according to cultural differences.

Another interesting area for research would be to deepen into personal factors or behavioral traits and evaluate the correlation with the willingness to implement digital nudges. Moreover, analyze the influence of digital nudges for changing personal preferences. In this study digital nudges show a great potential to positively influence behavior for change, however, even if there is progress on the topic, technology might not be there yet. Therefore, it could be also interesting to evaluate the features were technology could improve.

The topic of digital nudges and its appliance in management and businesses is very new, as technology is constantly developing, this will remain an interesting topic for future research.

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17. List of Abbreviations

AI: Artificial intelligence

AWS: Amazon Web Services

BE: Behavioural economics

BS: Behavioural science

CEO: Chief Executive Officer

CIO: Chief Information Officer

DARPA: Defense Advanced Research Projects Agency

DCAPS: Detection and Computational Analysis of Psychological Signals

DNA: Deoxyribonucleic Acid (Is this case used make reference to core identity)

DL: Deep Learning

EQ: Emotional intelligence

FAIR: Facebook Artificial Intelligence Research

HBR: Harvard Business Review

IoT: Internet of Things

MBA: Master of Business Administration

MBO: Management by objectives

ML: Machine learning

MOOC: Massive open online course

NLP: Natural language processing

OECD: Organization for Economic Co-operation and Development

UNESCO: United Nations Educational, Scientific, and Cultural Organization

UI: user interface

UX: User Experience

WTP: Willingness-to-pay

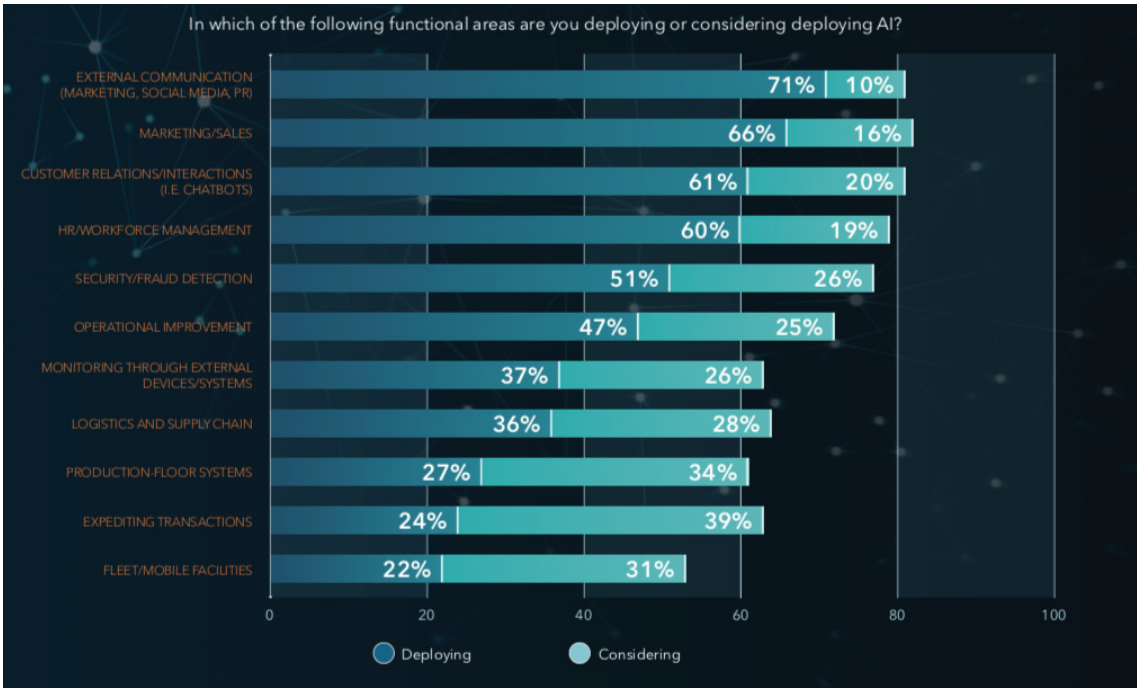
18. Appendix

Table 1A: AI enhances performance in an organization

Element	Business process	Company or organization	Type of collaboration
Flexibility	Auto manufacturing	Mercedes-Benz	Assembly robots work safely alongside humans to customize cars in real time.
	Product design	Autodesk	Software suggests new product design concepts as a designer changes parameters such as materials, cost, and performance requirements.
	Software development	Gigster	AI helps analyze any type of software project, no matter the size or complexity, enabling humans to quickly estimate the work required, organize experts, and adapt workflows in real time.
Speed	Fraud detection	HSBC	AI screens credit- and debit-card transactions to instantly approve legitimate ones while flagging questionable ones for humans to evaluate.
	Cancer treatment	Roche	AI aggregates patient data from disparate IT systems, speeding collaboration among specialists.
	Public safety	Singapore government	Video analytics during public events predicts crowd behavior, helping responders address security incidents rapidly.
Scale	Recruiting	Unilever	Automated applicant screening dramatically expands the pool of qualified candidates for hiring managers to evaluate.
	Customer service	Virgin Trains	Bot responds to basic customer requests, doubling the volume handled and freeing humans to address more-complex issues.
	Casino management	GGH Morowitz	Computer-vision system helps humans continuously monitor every gaming table in a casino.
Decision making	Equipment maintenance	General Electric	"Digital twins" and Predix diagnostic application provide techs with tailored recommendations for machine maintenance.
	Financial services	Morgan Stanley	Robo-advisers offer clients a range of investment options based on real-time market information.
	Disease prediction	Icahn School of Medicine at Mount Sinai	Deep Patient system helps doctors predict patients' risk of specific disease, allowing preventive intervention.
Personalization	Guest experience	Carnival Corporation	Wearable AI device streamlines the logistics of cruise-ship activities and anticipates guest preferences, facilitating tailored staff support.
	Health care	Pfizer	Wearable sensors for Parkinson's patients track symptoms 24/7, allowing customized treatment.
	Retail fashion	Stitch Fix	AI analyzes customer data to advise human stylists, who give customers individualized clothing and styling recommendations.

Source: Wilson and Daughterty (2018)

Figure 1A: The potential for AI in business



Source: SAS, Accenture Applied Intelligence and Intel with Forbes Insights (2018)