

BALANCING INNOVATION

**AN INVESTIGATION ON THE EFFECTS OF INDIVIDUAL
AMBIDEXTERITY ON EMPLOYEE MOTIVATION**

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Balancing Innovation: An investigation on the effects of individual ambidexterity on employee motivation

Abstract:

Like Darwin's finches that adapted to their changing natural environment, firms must also adapt to their changing business environment to survive. Determining which firms are the survivors and which are not, can be explained by Organizational ambidexterity. Today, the world is changing at an extremely fast pace, increasing the need for firms to both exploit existing capabilities and explore new ones through innovation. The field of ambidexterity has been researched extensively on the organizational level, but not yet on the individual level. Ambidexterity is a phenomenon that has an impact on all aspects of an organization, and here we seek to explore the effects that it has on motivating individuals. As ambidexterity is often used to measure effects on output, as its financial performance, we wanted to measure its effects on a firm's input, its employees. This study investigated the impact of individual ambidexterity on work motivation and hypothesized that ambidextrous individuals differ from non-ambidextrous individuals by being motivated by both intrinsic and extrinsic factors. A quantitative study was conducted at Sweden's largest and oldest telecommunications firm. Through the use of self-reported surveys, 160 innovation workers participated in the study. The study concludes that individual ambidexterity does have a positive effect on work motivation, but only to a certain extent. A negative interaction effect between exploration and exploitation was found, suggesting that organizations aiming to become more ambidextrous need to assist their employees in managing the tensions between exploration and exploitation.

Keywords:

Individual ambidexterity, work motivation, motivators, hygiene factors, innovation

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Definitions

Innovation	Innovation refers to the commercialization of an invention, where invention refers to the development of a new idea or an act or creation (Ahuja & Lampert, 2001)
Innovation workers	By the term Innovation workers, the researchers refer to employees who work directly with innovation or meet innovation in their daily jobs
Exploration	Exploration involves the pursuit of new knowledge (March, 1993)
Exploitation	Exploitation involves the use and development of things already known (March, 1993)
Organizational ambidexterity	Organizational ambidexterity is defined as the ability of an organization to simultaneously pursue both explorative and exploitative innovation (O'Reilly & Tushman, 2004)
Structural ambidexterity	Ambidexterity achieved by creating separate structures for different types of activities (Birkinshaw & Gibson, 2004)
Contextual ambidexterity	The capacity to simultaneously achieve alignment and adaptability at a business-unit level, achieved by building a business-unit context that encourages individuals to make their own judgments as to how to best divide their time between the conflicting demands of alignment and adaptability (Gibson & Birkinshaw, 2004)
Individual ambidexterity	An individual's behavior orientation towards combining exploration and exploitation activities within a certain timeframe (Mom et al., 2009)
Large firm	<p><i>Large enterprise</i></p> <p>A large enterprise is an enterprise that checks at least one of the following two conditions:</p> <ul style="list-style-type: none">• has at least 5,000 employees• has an annual turnover greater than 1.5 billion euros and a balance sheet total of more than 2 billion euros <p><i>In this thesis we have defined "large firm" as large enterprise.</i> (The French National Institute of Statistics and Economic Studies, 2019)</p>

Motivation	An individual's grasp of what needs to be done and that individual's drive to do it at any given moment (Amabile & Kramer, 2007)
Work motivation	The set of internal and external forces that initiate work-related behavior and determine its form, direction, intensity, and duration (Pinder, 1998)
Intrinsic motivation	Motivation that involves people doing an activity because they derive spontaneous satisfaction from the activity itself (Gagné & Deci, 2005)
Extrinsic motivation	Motivation that requires an instrumentality between the activity and some separable consequences such as tangible or verbal rewards, so satisfaction comes not from the activity itself but rather from the extrinsic consequences to which the activity leads. (Gagné & Deci, 2005)
Motivator	Factors that are intrinsic to the job, which include: achievement, the work itself, responsibility, and growth or advancement. (Herzberg, 1968)
Hygiene factor	Factors that are extrinsic to the job, which include: company policy and administration, supervision, interpersonal relationships, working conditions, salary, status, and security. (Herzberg, 1968)
Motivating factor	By the term Motivating factor, the researchers refer to a factor that results in any type of motivation in the individual, both intrinsic and extrinsic. Thus, this consists of both motivators and hygiene factors.

1. Introduction

“All managers face problems in overcoming inertia and implementing and change [...] to remain successful over long periods, managers and organizations must be ambidextrous -- able to implement both incremental and revolutionary change”

- Tushman & O'Reilly, 1996

1.1. Background

In 2019, Google, Amazon and Apple were ranked as the top three most innovative firms on BCG's annual list (BCG, 2019). That particular year's ranking is not unique for its kind. Apple was ranked as the most innovative firm for thirteen consecutive years, and only in 2019 was this ranking toppled by Google. Meanwhile, other regulars such as Microsoft and IBM have received high rankings for decades. The question of how large firms remain successful over time is something that has puzzled managers for a long time. How do firms like Google and Apple continue to grow their success story and stay relevant even though their large global environments look nothing like they did when they first started out?

In the sole endeavour to stay successful in the long-term, firms more often than not fall into the ominous *success trap*. This leads firms to continue to develop the same capabilities that once made them successful, to the detriment of other capabilities that may determine their future success (Ahuja & Lampert, 2001). In terms of March's (1991) exploration-and-exploitation framework, the success trap implies that successful companies become very good at exploiting their current capabilities, but less so at exploring new ones. As most organizations do not exist in a vacuum where the environment is constant and predictable, firms will go through periods of discontinuous change where the very prerequisites to a firm's success can become what drags them down (Tushman & O'Reilly, 1996). The classic tale of the organization that failed to adapt to discontinuous changes in its environment can be seen in the fates of the former photocopier giant Xerox (Forbes, 2012), and the once leading camera producer Kodak (HBR, 2016).

With the advent of the internet in the 90s and the advent of AI today, the world has started to change a lot and fast in the last thirty years (Forbes, 2013). When these radical changes occur in the surrounding environment, organizations are at danger of becoming extinct in an environment that is no longer suited to them (Tushman & O'Reilly, 1996). What then, is it that helps organizations survive? According to Tushman and O'Reilly, the antidote against extinction is called *organizational ambidexterity* (OA), meaning that firms need to be able to both *exploit* existing products to enable incremental innovation, and to

explore new opportunities for radical innovation (Andriopoulos & Lewis, 2010; March, 1991).

Despite the growing body of research that continues to document the consequences and antecedents¹ of OA (Lavie et al., 2010; Junni et al., 2013), the majority of research only examines traditional performance measures and remains at the organizational level (Turner et al., 2012). Recent studies have attempted to address this gap by shifting the focus towards the micro-level, examining *individual ambidexterity* (IA) (Mom et al., 2007; 2009; Bonesso et al., 2014; Good & Michel, 2013; Gurtner & Reinhart, 2016). Yet, studies on IA remain underexplored.

The relevance of examining IA emerges from Birkinshaw & Gibson (2004), who assert that OA manifests itself in the actions of individuals throughout the organization. Studying ambidexterity at the individual level with the aim of improving innovation in large firms has brought light to the following revelation: being innovative does not only have to do with *what* kind of work employees do but also *how* they work. Managing employees to be innovative and giving them the right prerequisites to do innovative work is vital for innovation to thrive (Gibson & Birkinshaw, 2004). Therefore, we want to investigate *what* motivates employees who do innovative work, as motivation is regarded as a key psychological determinant of employee behavior (Caniels et al., 2017).

¹ Factor that induces or precedes (here) Individual Ambidexterity

1.2. Purpose and Research gap

This study contributes to ambidexterity research in three ways. First, we improve the understanding of how ambidextrous individuals function, by examining the effects of individual ambidexterity on work motivation, and its role as an alternative performance measure. Second, we examine how individuals manage to balance exploration and exploitation. Third, we explore what factors are most effective in motivating innovation workers.

With the aim to increase managerial understanding of ambidextrous individuals in firms that seek to become more innovative, we adopt a micro-level approach. Additionally, we hope to contribute to current studies that advocate the importance of IA by adding to the contemporary debate on the consequences of IA. As earlier studies have investigated how to induce IA in employees, we chose to investigate the outcomes of IA in employees, to increase understanding on what it means to be an ambidextrous individual and how they function in organizations. We use the following research question to guide our research:

To what extent is there a relationship between individual ambidexterity and work motivation for innovation workers in large firms?

2. Theoretical Framework and Hypotheses

2.1. Literature Review

2.1.1. Organizational Ambidexterity

Research on ambidexterity dates back to the 1970s and has grown significantly over the past two decades (Birkinshaw & Gupta, 2013). The concept of *ambidextrous organizations* was coined by Duncan (1976) and encompasses the notion that firms can simultaneously exploit existing products to enable incremental innovation and explore new opportunities for radical innovation, in order to prosper and survive (Andriopoulos & Lewis, 2010). Conceptually, high levels of explorative and exploitative activities are needed in order to be highly ambidextrous (Cao et al., 2009). An increasing number of studies report that ambidexterity leads to superior performance (Junni et al., 2013). For example, Birkinshaw & Gibson (2004) show that ambidexterity positively affects business-unit performance as rated by middle managers. In line with these findings, He & Wong (2004) found that the interaction between explorative and exploitative innovation strategies positively relate to sales growth rate.

Two streams of research. Ambidexterity literature can broadly be divided into two streams of research. They conceptualize ambidexterity differently and disagree on how to best achieve it. First, *structural ambidexterity* says that ambidexterity should be undertaken independently, in separate organizational units (Tushman & O'Reilly, 1996). These scholars claim that OA is difficult to achieve due to inherent tensions and seemingly contradicting demands of explorative and exploitative activities (March, 1991). Through structural mechanisms, employees are either focused on exploiting or exploring (Raisch et al., 2009). Hence, separating exploration and exploitation activities into distinct organizational units, is the best way of achieving OA (Duncan, 1976; Tushman & O'Reilly, 1996). Yet some studies acknowledge that a few people at the top, e.g. managers, need to act ambidextrously, by integrating explorative and exploitative activities (Smith & Tushman, 2005).

Second, *contextual ambidexterity* implies that OA is achieved by “building a set of processes and systems that enable and encourage individuals to make their own judgement about how to divide their time” between explorative and exploitative tasks (Gibson & Birkinshaw, 2004). These scholars argue that organizations can achieve ambidexterity through its employees. By developing a supportive organizational context, the organization allows employees to pursue both goals simultaneously. Organizational context is defined in terms of two factors: performance management and social support (Gibson & Birkinshaw, 2004).

The second stream of research emphasizes the role of the individual, as employees are the ones who have to perform explorative or exploitative activities (Gibson & Birkinshaw, 2004; Raisch et al., 2009). From a contextual point of view, IA is important as it promotes OA (Schnellbacher et al., 2019). We assume this line of reasoning, especially as IA remains an underexplored area (Caniels et al., 2017). However, considering that Schnellbacher et al., (2019) show that employees' IA can be induced with both structural *and* contextual means, we do not want to exclude the structural perspective. In fact, Birkinshaw & Gibson (2004) argue that the two approaches of achieving OA are complementary and continue to cite various successful companies who use a combination of both approaches.

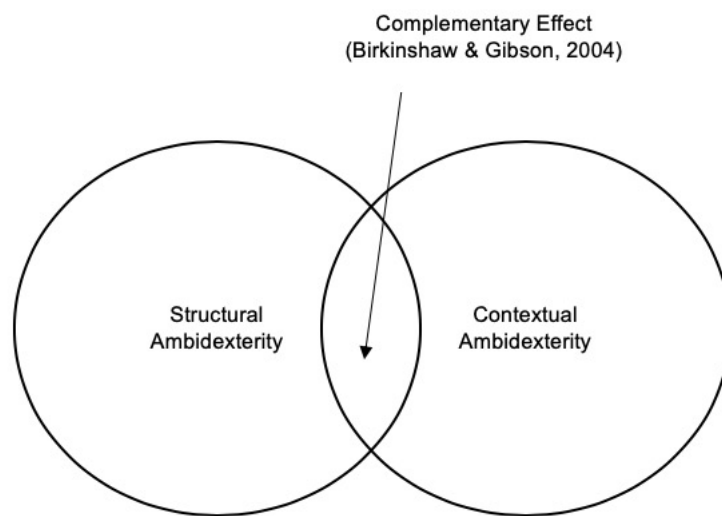


Figure 1: Structural and Contextual Ambidexterity

2.1.2. Individual Ambidexterity

“... although [organizational] ambidexterity is a characteristic of a business unit [or organization] as a whole, it *manifests itself in the specific actions of individuals throughout the organization*”

- Gibson & Birkinshaw, 2004

The IA Concept. Mom, van den Bosch, and Volberda (2009) define IA as “an individual’s behavior towards combining exploration and exploitation within a certain time”. Based on previous studies, Mom et al. also propose three behavioral characteristics of ambidextrous individuals. First, ambidextrous individuals host contradictions, meaning that they are able to pursue and understand seemingly contradicting opportunities, needs, and goals. Second, ambidextrous individuals are *multitaskers*, meaning that “they fulfil multiple roles and conduct different tasks within a certain time period”. Third, ambidextrous individuals “both refine and renew their knowledge, skills and expertise”.

This study follows He & Wong’s (2004) reasoning, who regard an individual² as ambidextrous if they score high on both explorative and exploitative tasks. However, unlike groups and larger entities, individuals might find it highly challenging to simultaneously excel at exploration and exploitation (Gupta et al., 2006). In fact, Schnellbacher et al. (2019) contest that individuals cannot simultaneously explore and exploit at a single point in time, but have to switch between exploiting and exploring, or partially perform both at once (Schultz et al., 2013). This implies that individuals not only have to integrate and coordinate exploration and exploitation activities, but also have to *switch* smoothly between the two (Schnellbacher et al., 2019).

In contrast to these reasonings, Farjoun (2010) suggests that explorative and exploitative activities are mutually reinforcing. He argues that routine tasks involve some degree of experimentation, and that creative tasks involve some degree of routine. Thus, he argues against March (1991) and the majority of other researchers who heavily emphasize the contradicting demands of these two activities. In this study, we measure IA with an interaction variable between exploration and exploitation. As such, we will join the debate on how exploration and exploitation affect each other’s ability to influence employees’ work motivation; and take a stance based on our empirical findings, on what we believe regarding the relationship between exploration and exploitation.

Work Motivation and IA. Within IA literature, an overwhelming amount focuses on examining the antecedents of IA. The few previous studies that have linked IA and work

² He & Wong (2004) regard a *firm* as ambidextrous if they score high on exploration and exploitation. We transfer this reasoning to the *individual*.

motivation are no different, focusing mainly on intrinsic motivation. Based on prior research findings on motivation and psychology, these propose that intrinsic motivation is a driver of IA, moderated, amongst others, by extrinsic motivation (Kao & Chen, 2016; Caniels et al., 2017).

However, the arguments remain inconsistent. For instance, Caniels et al., (2017) effectively link intrinsic motivation as a source for explorative activities, but never addresses the linkage between intrinsic motivation and exploitative activities at all. The most pressing flaw of their theoretical basis is that they do not argue for why more intrinsically motivated employees would be more inclined to *balance* explorative and exploitative activities, as opposed to less intrinsically motivated employees.

This study takes a stance on the possibility that the relationship is reversed; that ambidextrous individuals are different and can be motivated in more ways than non-ambidextrous individuals, leading them to become more motivated on the whole. This reversed relationship is of interest for firms that are attempting to become more innovative by applying IA in their HR-management. Understanding how IA affects work motivation is a core field of interest when it comes to management control and HR practices. If it is shown that ambidextrous individuals indeed are more motivated, then this could be of value for HR-managers seeking to employ individuals for work related to innovation.

2.1.3. Motivation

Motivation is an important factor as it determines *how* motivated employees are to do their jobs, and in turn, how willing they are to stay (Blomberg, 2017). Finding sources of motivation in employees is thus extremely valuable to employers so that they can manage employees in a way that will motivate them to perform well.

Intrinsic and Extrinsic Motivation. Different theories have different views on intrinsic and extrinsic motivation. *Self-determination theory* posits that individuals have an innate need to be active, curious and playful, despite any potential external rewards (Ryan & Deci, 2000). Thus, according to this theory, intrinsic motivation is the primary and most basic form of motivation that exists in every individual. According to *Cognitive Evaluation Theory*, intrinsic motivation can be diminished by various types of extrinsic rewards, however it depends on the type of extrinsic rewards (Gagne & Deci, 2005). Because of this, intrinsic and extrinsic motivation are not mutually exclusive, and can work to motivate an individual in combination with each other. This goes in stark contrast to Herzberg's theory on motivation, where *motivators* that are intrinsic to the job and *hygiene factors* that are extrinsic to the job work against each other, to increase or decrease satisfaction (Herzberg, 1968). Additionally, Self-determination theory states that extrinsic motivation is not the opposite of intrinsic motivation, rather it is the absence of motivation, *amotivation* (Ryan & Deci, 2000).

Work motivation. When discussing employees' motivation in a work context, we talk about *work motivation*. Work motivation is the set of internal and external forces that initiate work-related behavior and determines its intensity and duration (Pinder, 1998). Thus, we infer that work motivation encompasses both intrinsic and extrinsic motivation.

Work motivation is also one of the key factors that impacts employees' performance (Ambrose, 1999). Amabile and Kramer (2007) propose a framework that explains this relationship. These researchers find that positive emotions, favorable perceptions of work itself and interpersonal relationships at work increases motivation, allowing employees to perform their best. These effects of emotion and perception increase employees' motivation, which materializes into higher performance. Although Amabile and Kramer mainly talk about the positive effects of *intrinsic* motivation, they do acknowledge that employees also perform their best under pressure and when *extrinsically* motivated, e.g. by deadlines and competition with peers.

Herzberg: Motivators & Hygiene factors. Herzberg asserts that not all factors of one's job determine an employee's level of motivation. Instead, factors can be divided into *Motivators* and *Hygiene factors*. Motivators are factors that directly increase motivation and thus job satisfaction, whereas hygiene factors directly decrease job satisfaction (Herzberg 1968). We have chosen to use Herzberg's theory as it differentiates between factors that target intrinsic and extrinsic motivation. By differentiating between these factors, we will be able to infer if ambidextrous individuals are better motivated through intrinsic or extrinsic means, or a combination of both. However, we do not follow Herzberg's theory that increased work motivation *only* comes from intrinsic motivation as we believe both intrinsic and extrinsic motivating factors play a role.

Herzberg's theory shares many similarities with *Maslow's hierarchy of needs*, which assumes that people's needs are universal. Both Maslow and Herzberg have been criticized for this assumption. Hackman and Oldham take individual differences into account in their *Job characteristics model* (1976), but we have chosen not to use this model because it does not isolate motivators from hygiene factors, and thus does not measure the effect separated into intrinsic and extrinsic sources of motivation.

In our study, we seek to investigate whether or not sources of intrinsic and extrinsic motivation can work together to produce higher levels of work motivation in individuals. Furthermore, we examine if individuals that respond to more sources of motivation are more motivated in their work. We will thus use Herzberg's motivators and hygiene factors as proxies for various sources of motivation.

2.2. Hypothesis Development

2.2.1. Individual Ambidexterity and Work Motivation

Individual ambidexterity and Motivators. The strongest³ motivator identified by Herzberg (1968) is a *sense of achievement*. Drawing upon previous research findings, IA increases performance on different levels (Schnellbacher et al., 2019). For instance, IA increases individual performance (e.g. Schultz et al., 2013; Mom et al., 2015), team performance, and department efficiency and effectiveness (Schnellbacher et al., 2019). By extension, the relationship between IA and performance infers that ambidextrous individuals feel a stronger sense of achievement and are therefore more intrinsically motivated.⁴

IA also relates to other motivators. If IA is valued by the organization, ambidextrous individuals will consider themselves valuable to the organization. That is, their achievement will be *recognized*, and they will in turn become more motivated (Amabile & Kramer, 2007). Furthermore, Mom et al.'s (2009) third behavioral characteristic of ambidextrous individuals⁵ describes that ambidextrous individuals acquire and process different kinds of knowledge and information, as well as engage in different kinds of learning activities. This behavior characteristic seems to signify the motivator that Herzberg calls *growth*. Herzberg assumes that growth is synonymous with learning and writes that “new and more difficult tasks not previously handled” induces growth. As both *growth* and *recognition* are motivators identified by Herzberg, the satisfaction of these two should increase intrinsic motivation for ambidextrous individuals, and by extension work motivation.

Individual ambidexterity and Collaboration. Birkinshaw and Gibson (2004) emphasize that ambidextrous individuals behave cooperatively “seeking opportunities to combine their efforts with others”, and that they are brokers “always looking to build internal linkages”. Furthermore, Schnellbacher et al. (2019) contest that ambidextrous individuals also are more likely to share their acquired knowledge with colleagues and in turn leverage the knowledge of the team. This view on ambidextrous individuals corroborate other research findings (e.g. Mom et al., 2009). Employees who participate in cross-functional interfaces (e.g. liaison roles, task forces, teams) and integration mechanisms that facilitate knowledge flows between separate units, are more ambidextrous. Therefore, ambidextrous individuals behave in a way that increases cooperation between them and others. This makes them think outside their own roles and

³ Strongest, referring to the motivator that most frequently appeared as an event on the job that led to extreme satisfaction

⁴ Herzberg's theory only takes into account intrinsic motivation, which is why we do not write “work motivation”. However, as intrinsic motivation is encompassed by work motivation, the argument is still relevant.

⁵ Previously described in section 2.1.1 Individual Ambidexterity

take into account the interests, beliefs and perspectives of others; which in turn increases trust (Mom et al., 2009). Therefore, we should expect that ambidextrous individuals feel more motivated by other employees and superiors that they work with on a daily basis. This directly connects to the way we measure work motivation in our survey (section 3.3.1) as dependent on work itself and motivation received from interpersonal relationships.

Based on the reasoning that IA induces Herzberg's motivators, this should increase intrinsic motivation.⁶ Moreover, when ambidextrous individuals act in a collaborative manner, the motivation they derive from various interpersonal relationships at work should increase. Therefore, we propose the following hypothesis:

H1: There is a positive relationship between individual ambidexterity and work motivation, mediated by the number of factors that motivate employees.

2.2.2. Individual Ambidexterity and Number of Motivating Factors

Individual Ambidexterity and Multitasking. One of the most prominent characteristics of ambidextrous individuals is the idea that these individuals are multitaskers. Mom et al., (2009) cite previous authors, writing that ambidextrous individuals are more often generalists than specialists, conducting both routine and non-routine activities, carrying out both creative and collective actions, and acting outside the confines of their own jobs. Birkinshaw and Gibson (2004) concur with this description, adding that ambidextrous individuals are comfortable taking on dual roles that consist of several tasks with inherently different natures. Moreover, Schultz et al. (2013) also uses multitasking as a way of describing ambidextrous individuals. In their study, they show that R&D employees optimize their performance if they engage in both explorative and exploitative activities. These findings oppose conventional wisdom that R&D employees should only engage in explorative activities, leaving exploitative tasks to other organizational functions.

Thus, ambidextrous individuals engage in many different tasks. According to Gupta, Smith and Shalley (2006), employees who focus on different kinds of tasks are motivated in different ways. For example, employees who focus on exploration tend to be intrinsically motivated, whereas individuals who focus on exploitation, especially for rewards, tend to be extrinsically motivated. Furthermore, Amabile (1996) suggests that individuals who focus on creativity, exploration and experimentation are different from those who emphasize appropriate actions. As such, ambidextrous individuals who engage in both routine and non-routine tasks are quite different from those individuals who are simply engaging in either. Following the argument initiated by Gupta et al., (2006)

⁶ Intrinsic motivation is encompassed by Work motivation

ambidextrous individuals should be motivated by both intrinsic and extrinsic means. Therefore, they should respond to more sources of motivation than non-ambidextrous individuals. Hence, we have chosen to measure the *number of motivating factors* (NMF) instead of the *extent* each employee is satisfied with different kinds of motivating factors.

Based on the reasoning that employees focusing on different tasks can be motivated in different ways and that ambidextrous individuals engage in several different tasks; we propose the following hypothesis:

H2: There is a positive relationship between individual ambidexterity and the number of factors that motivate employees.

2.2.3. Number of Motivating Factors and Work Motivation

We previously argued that ambidextrous individuals are different from non-ambidextrous individuals, proposing that the former would be motivated both intrinsically and extrinsically (Gupta et al., 2006). By extension, if an employee responds to more sources of motivation, they have a higher chance of being motivated by any motivating factor and will subsequently have a higher level of work motivation. The variable NMF uses Herzberg's (1968) motivators and hygiene factors as proxies to measure intrinsic and extrinsic motivation to quantify the potential to motivate employees. Having a higher NMF will thus directly translate to a higher potential to become motivated. To finalize our model (Figure 2), we argue that employees with a higher NMF have higher work motivation. Based on these reasonings, we propose the following hypothesis:

H3: There is a positive relationship between the number of factors that motivate employees and work motivation

2.3. Hypotheses

H1: There is a positive relationship between individual ambidexterity and work motivation, mediated by the number of factors that motivate employees.

H2: There is a positive relationship between individual ambidexterity and the number of factors that motivate employees.

H3: There is a positive relationship between the number of factors that motivate employees and work motivation

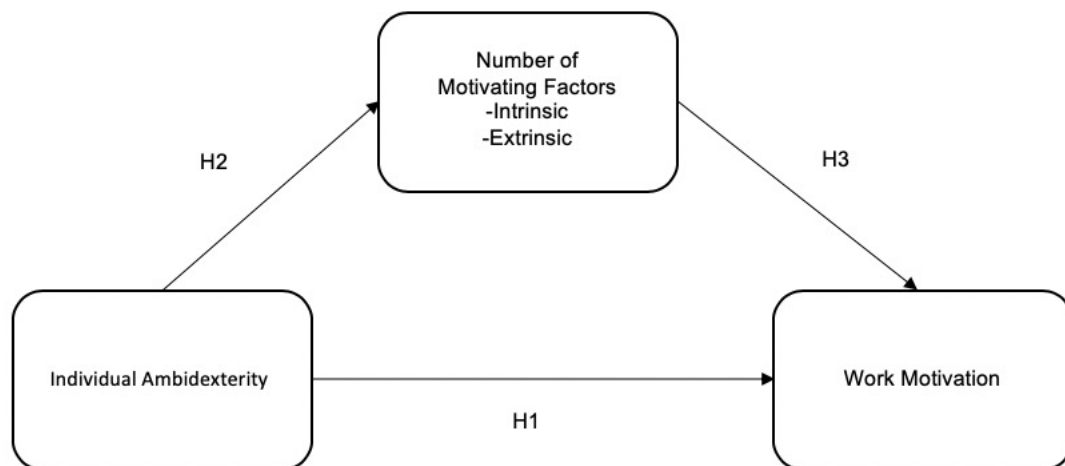


Figure 2: IA-NMF-Work Motivation Model

3. Research Design

3.1. Choice of Method

We follow previous ambidexterity research by conducting a cross-sectional, quantitative study (Turner et al., 2012). However, we have chosen to forgo the conventional method of studying ambidexterity at an organizational or business-unit level. Following the positivistic research paradigm, we apply a micro-level approach, targeting innovation workers at a case study organization. We chose to conduct a quantitative study using survey data from the case organization in order to collect a sufficiently large sample to make the study generalizable for other organizations.

3.2. Case Organization: Telia Company

To test the implications of IA on a large firm, we conducted our study at a case organization. Telia Company is Sweden's most well-renowned and largest telecom firm and this study targeted its innovation workers.⁷ With over a century and a half's experience in the industry, the firm has actively worked with innovation for many years which has manifested in several different iterations. Earlier, by allocating innovation to specific organizational units, as with Division X;⁸ and later, by implementing an organizational context such that innovation proliferates across the entire organization (Telia, 2016; Mimmi Mari-Chelo Jansson, 2020).

According to O'Reilly and Tushman (2009), it is ideal to study the path to ambidexterity in *large organizations* as these have enough resources to actually adapt to changes and are at an advantage in the plight to become ambidextrous. Because of its size and age, Telia fits the description of being a 'large organization' (Telia Annual Report, 2019). Being a telecommunications company in this time of tumultuous change for technological organizations (Forbes, 2013), Telia was a fitting case organization. However, Tushman and O'Reilly also discuss the possibility of survival bias when using older successful firms, as they already have survived the natural selection that eliminated previous competitors. Thus, the use of an older organization like Telia may lead to potentially misleading conclusions.

Conducting a single-case study with one large firm instead of a multiple-case study with several smaller firms was preferable, as it simplified the process of receiving access to different organizations. Furthermore, comparing individuals across different

⁷ By innovation workers we mean those who work with innovation or meet innovation in their daily jobs.

⁸ Division X was an organizational function founded in 2016 with the sole aim to innovate for Telia Company, but has since been dissolved into various national innovation teams and global coordinators (Telia, 2016).

organizations requires that data be normalized to take into account any significant differences between the organizations. Conducting a single-case study also enabled the researchers to adapt the survey to the case organization.

3.3. Data and Sample

As we aim to measure IA and work motivation on the individual level, surveys where respondents reflect on their own answers is the most practical method (Bell et al., 2019) and essential as motivation would be hard to measure any other way than individual self-reporting.

3.3.1. Survey Design

The survey was designed as a web-survey using Qualtrics XM. It was constructed for innovation workers and consisted of questions measuring IA, work motivation, motivators and hygiene factors, followed by measurements for control variables. These measures were adopted and validated in previous research. All variables (sin control variables) were measured on 5-point Likert scales, that aimed to identify the respondents' attitudes towards different statements. The respondents were asked to agree or disagree on a number of different statements.

Having adopted measures from previous research, we used an agree/disagree (AD) scale by default, despite criticism that it leads to acquiescence response bias and lower quality data (Revilla et al., 2013). Therefore, we followed the recommendations of their research findings, using a 5-point AD scale, rather than 7- or 11-point scales, to yield higher quality data. Higher-quality data refers to the strength of the relationship between the observed variable and the underlying construct of interest (Ibid).

Four different versions of the survey were developed before publication. Each revision was done to take into account feedback from our contact person at the case organization, three different supervisors, and our supervision group. These revisions were primarily made to decrease response bias by clarifying the questions in the survey (appendix 1.1).

3.3.2. Data Collection

The survey was administered in two parts, due to failing to collect enough responses in the first attempt. Initially, the survey was distributed by our contact person at the case organization, who emailed the HQ's assistants' network with the request to further distribute the survey to their respective networks at the company. This aimed to reach the entire population of the case organization's headquarters in Solna, consisting of approx. 3,800 employees (Telia annual report, 2019). However, this approach generated insufficient responses. The email presented our thesis work at the organization,

instructions and a link to the web-survey. It also provided our contact information to allow respondents to ask potential questions (appendix 1).

Finally, to gain more respondents, the survey was published on Telia's intranet dedicated to innovation, the Innovation Portal (appendix 1). This approach generated substantially more responses and was closed on the seventh day after publication. Thus, the sample was not randomized as we could not randomly select who would answer it, but a convenience sampling (Newbold et al, 2013).

The final population consists of all employees at Telia that had access to the Innovation Portal, approximately 2,000 employees. As the Innovation Portal is available to anyone working with innovation at Telia Company, employees could belong to regional branches other than Telia Sweden. Our response rate was not very high [8.05%], which is typical for web-based surveys, that typically have a response rate of 13% (Siah, 2005; Fricker, n.d.).

3.4. Measures

This study relies on multi-indicator scales validated in previous research to measure Work motivation, IA and Herzberg's constructs of motivators and hygiene factors.

3.4.1. Work Motivation (DV)

We adopted Lundberg et al.'s (2009) scale to measure employees' work motivation. Lundberg et al.'s scale was used in their study to test Herzberg's two-factor model. The scale consists of four items, measuring the extent to which respondents perceive they are being motivated by various interpersonal relationships at work,⁹ and by work itself. As such, Lundberg et al.'s measures of work motivation encompass both intrinsic and extrinsic motivation; as 'work itself' relates to intrinsic motivation, and interpersonal relationships refers to both intrinsic motivation and extrinsic motivation (e.g. competition with co-workers, rewards and praise from superiors).

The items were ranked on a five-point Likert-scale with values ranging from "not motivated" to "motivated".¹⁰ One item was revised for clarification purposes (appendix 1.3). To calculate the final variable, work motivation, the average of the four items was calculated, generating a score between 1 and 5 for each individual respondent.

⁹ Management, line-managers and co-workers

¹⁰ Which is a modification from the original scale, whose scale ranged from "strongly disagree" to "strongly agree".

3.4.2. Individual Ambidexterity (IV)

To measure IA, we used two scales for explorative and exploitative behavior, developed by Mom, Van den Bosch, and Volberda (2007; 2009). The scales originally consisted of seven items each to capture managers' exploration and exploitation activities, based on March's (1991) concepts. Previous studies have applied Mom et al.'s scales (Tempelaar & Rosenkranz, 2019; Vallina et al., 2019; Schnellbacher et al., 2019), in which both Vallina et al. and Schnellbacher et al. applied the scales to measure employee ambidexterity.

Additionally, Tempelaar & Rosenkranz (2019) modified the scales;¹¹ this is the version we used in our questionnaire. We also modified the scales on some aspects. First, we omitted one item from each scale based on feedback from our supervisors. As response rates were one of our major concerns, we prioritized scaling back on redundant questions over being exhaustive. Second, we revised the overarching questions to "to what extent did you during the *past twelve months...*", as well as two of the items for clarification purposes (appendix 1.3).

Consistent with our conceptualization of IA and previous studies on ambidexterity (Gibson & Birkinshaw, 2004; Tempelaar et al., 2017), this study calculated IA as an interaction variable between exploration and exploitation. Each respondent was given an individual score for exploration and exploitation by averaging the six items, respectively. Those scores were then multiplied to generate the IA-variable. This variable takes into account the potential interaction effect between exploration and exploitation, that has been accounted for in previous studies. For instance, He & Wong (2004) found a positive interaction effect between IA and sales growth. However, the emphasis that Tushman and O'Reilly (1996) put on the difficulties of reconciling exploration and exploitation argue that the interaction effect can be negative if not managed well.

3.4.3. Number of Motivating Factors: Hygiene factors and Motivators (Mediator)

This study posits that ambidextrous individuals respond to more sources of motivation than non-ambidextrous individuals. Hence, we measure the number of factors that an individual considers themselves motivated by (NMF). To measure different kinds of motivating factors, we turn to Herzberg's two-factor theory (1968) that distinguishes between hygiene factors (extrinsic) and motivators (intrinsic). However, since Herzberg did not develop scales of his own, we have searched for scales in other studies.

Lundberg et al.'s (2007) scale for hygiene factors was adopted to measure the extent that a respondent's hygiene factors were satisfied. The scale consists of three items, which were measured on a five-point Likert-scale, ranging from "not important at all" to "very

¹¹ By revising the item "activities requiring *quite some* adaptability of you" to "activities requiring *significant* adaptability..."

important”. Motivators were measured using scales developed by Wallgren and Hanse (2007). The scale consists of six items, measuring how satisfied respondents are with certain aspects of their jobs. The items were measured on a five-point Likert-scale, ranging from “dissatisfied” to “satisfied”. Each item corresponds to motivators identified by Herzberg: responsibility, work itself, advancement, achievement and growth (appendix 1.4). The reason why Lundberg et al. (2007) was not also used to measure motivators was because their measurements consisted of multiple items for each motivator, which we considered redundant for this study.

To calculate NMF, each item was re-coded such that all responses that indicated 4 or 5 (‘important’ and ‘very important’, respectively ‘somewhat satisfied’ and ‘satisfied’) on the scale were interpreted as a motivating factor for that respondent (section 3.6). All items were then summarized to yield the final variable.

3.4.4. Control Variables

To provide a strong test for our hypotheses, we checked for the following control variables: age, gender, team size, years at the case organization, education level, and organizational function, adapted from Schnellbacher et al. (2019). Age was used as a proxy to see if work motivation changes depending on stage in career. Similarly, education level and organizational function controls for potential differences in work motivation.

3.4.5. Internal reliability

All multiple-indicator scales that were applied to the study (work motivation, exploration, exploitation, hygiene factors, and motivators) were adopted from previous studies (Lundberg et al., 2007; Mom et al., 2007; Wallgren & Hanse, 2007). To assess the internal reliability of the measurements for *our* sample, we calculated the Cronbach alpha for these scales (Table 1). According to Bell, Bryman and Harley (2019), an acceptable level of internal consistency requires an alpha of at least 0.8. However, previous studies have accepted lower levels, e.g. Patterson et al. (2005) accepted levels of 0.73 and above.

The only variable receiving an alpha above 0.8 was *Motivators* ($\alpha = 0.82$). Two scales received an alpha above 0.73: *Exploration* ($\alpha = 0.79$) and *Exploitation* (0.78). As such, these scales are internally reliable. However, both the scales for *Work motivation* ($\alpha = 0.68$) and *Hygiene factors* ($\alpha = 0.33$) received lower alphas than this, especially the latter one. One explanation is that the scales only consist of four, respectively three items. The Cronbach alpha is a function of the number of items in a scale, where the alpha is artificially inflated by larger numbers of items (Cortina, 1993). Therefore, the low numbers of items in both scales have surely contributed to the lackluster alphas exhibited. Despite this, hygiene factors have received an extremely low alpha. This would have been more of a concern, had the study aimed to measure the extent the *aggregated* variable,

hygiene factors, had been satisfied. But considering that the study is now interested in identifying whether ambidextrous individuals are motivated by a *variety* of different motivating factors (items of the scale), the lack of internal consistency for these particular variables is less concerning.

Table 1. Internal reliability for multi-indicator scales

Scale	Number of items	Cronbach Alfa (α)
Work Motivation	4	0.678
Exploration	6	0.785
Exploitation	6	0.777
Hygiene factors	3	0.331
Motivators	6	0.822

3.4.6. Measurement Error

We had reason to believe that the measures for Work motivation and Motivators were internally consistent. Therefore, we calculated the Cronbach Alpha for the six items constituting Motivators combined with the four items constituting Work motivation. Table 2 shows two different alphas. The first alpha was calculated using the original coding of the items constituting motivators.¹² The second alpha was calculated using the re-coded items constituting motivators.¹³

Table 2. Internal consistency Work motivation and Motivators

Variable	Items	Cronbach Alpha
Work Motivation + Motivators (original coding)	10	0.863
Work Motivation + Motivators (re-coded)	10	0.780

¹² The items were coded from 1 to 5, indicating the extent a respondent was satisfied with a motivator-item.

¹³ These items were coded 0 or 1, where 0 signifies that the respondent is not motivated by the item in question and 1 signifies that the respondent is motivated by the item. We re-coded the items to collect answers that actually represented what we chose to measure, *the number* of motivating factors, not *the extent* of motivating factors.

Table 2 shows that Work motivation and Motivators are internally consistent, when using the original coding of motivator-items ($\alpha = .863$) and the re-coded motivator-items ($\alpha = .780$), as they both exhibit alphas above 0.73 (Patterson et al., 2005). Furthermore, we investigated whether the internal consistency would lessen if we omitted certain items from the scales. However, despite that the alpha did decrease when omitting certain items, we deduct that this is most likely due to the decrease in number of items rather than an actual decrease in internal consistency (Cortina, 1993). Additionally, we examined the correlations between the items, and found positive correlations between all items at the 1%-significance level. This issue could have been mitigated, had we conducted a pilot study. However, because access to the case organization was limited, especially in the dawn of Covid-19, we did not have the possibility to carry through with it.

3.5. Statistical Method

Our hypotheses concern the links between IA, NMF, and Work motivation. Considering that both IA and NMF are the composite of two other variables, we chose to conduct *multiple regression analyses* to examine the extent these independent variables predict our dependent variables. Before running the regressions, we confirmed that the standard assumptions had been met, according to Newbold, Carlson and Thorne (2013, p.482). Considering that our main independent variable, Individual Ambidexterity, is operationalized as the interaction variable of exploration and exploitation, we have relied on Aiken and West's book "Multiple regression: Testing and interpreting interactions" (1991) to guide us in our interpretation of the interaction variable.

3.6. Coding

To demonstrate how the survey data was managed in SPSS, a coding manual has been written for all relevant variables as presented below:

Table 3. Coding Manual, SPSS

Variable name	Type of variable	Coding	Description
Work motivation	Continuous	Average[work motivation1, ..., motivation4]	How motivated the respondent is by executive management, line management, coworkers, and work-itself.
Exploration	Continuous	Average[exploration1, ..., exploration6]	Respondent's self-assessed exploration habits
Exploitation	Continuous	Average[exploitation1, ..., exploitation6]	Respondent's self-assessed exploitation habits
Individual ambidexterity	Continuous	Exploration * Exploitation	Respondent's self-assessed ambidexterity habits
Hygiene factors	Categorical	0 = 'not important at all', 'not important', 'no opinion' 1 = 'important', 'very important' Sum[hygiene 1, ..., hygiene 3]	Number of hygiene factors that the respondent is motivated by
Motivators	Categorical	0 = 'dissatisfied', 'somewhat dissatisfied', 'no opinion' 1 = 'somewhat satisfied', 'satisfied' Sum[motivators1, ..., motivators6]	Number of motivators that the respondent is motivated by
Motivating factors	Categorical	Hygiene factors + Motivators	Number of factors that motivates the respondent
Gender	Categorical	0 = man 1 = woman	The gender of the respondent
Age group	Categorical	0 = young adults (18-34) 1 = middle aged (35-54) 2 = older adults (55+)	Age group the respondent belongs to
Education level	Categorical	0 = high school 1 = bachelor 2 = masters 3 = PhD	The highest level of education that the respondent has completed
Organizational division	Categorical	0 = Telia Sweden 1 = CPS (Common Products and Services) 2 = Telia Global 3 = Other	Which organizational division the respondent works for
Years at Telia	Continuous	N/A	How many years the respondent has worked at Telia

3.7. Limitations

Having published our survey on the case organization's Innovation Portal, there is a possibility that our sample suffers from self-selection bias, meaning that the innovation workers who chose to participate in the study differ from the ones who did not (Smith, 2016). As the survey was framed concerning Telia's innovation process (appendix 1.2), inaccurately we might add, there is a possibility that the respondents have extreme opinions about innovation at the company; either being very satisfied or dissatisfied with the current state of affairs. By extension, this might affect the aggregated levels of IA and motivation exhibited in the sample. Despite the potential for self-selection bias, we chose this method in order to maximize the number of potential respondents.

An additional hurdle to our data collection was the situation regarding Covid-19. The crisis resulted in various circumstances that were not ideal; our contact person had other priorities, physical access to the case organization's HQ was limited to none, and all employees were less inclined to complete our survey. Furthermore, the uncertainty of the entire situation could have a large effect on the respondent's assurance of their own job security which also affects work motivation (Milicevic et al., 2014). The values of exploitation and exploration may have been significantly affected by Covid-19, as more emphasis was placed on exploitative activities to keep the organization afloat (Mimmi Jansson, 2020). However, the ambidexterity questions mitigate this by asking the respondent to reflect on the activity over the past *twelve months*, and not just at the moment, thus it is questionable whether there was an effect from the Covid-19 situation on the data (Appendix 1.1).

3.8. Reflexive and Ethical considerations

The research at our case organization was done with ethical considerations in mind. In order to conduct our research we signed a routine agreement with the organization on "confidentiality in connection to a degree project". This agreement stated that we may not disclose any sensitive information that we may come upon during the duration of our thesis project. This has been taken into consideration from the start of the research until the end so that we would not design our research in a way that jeopardized this agreement.

When designing our survey, we kept the principles of informed consent and privacy in mind (Bell et al., 2019). Our survey was sent out with an instructions page where we explained that the study was part of a thesis project done in collaboration with the case organization, who the authors were and that all data would be anonymized, so that the respondents' identities could not be inferred.

4. Results

4.1. Descriptive Statistics and Correlations

Table 4. Data collection statistics

Survey Summary	<i>n</i>
Administrators contacted via email	40
Administrators that responded	4
Innovation workers contacted directly via email	7
Recorded responses email	16 [^]
Innovation workers contacted via intranet	2000
Recorded responses intranet	145*
Inadmissible response to Q8	7
Incomplete responses	1
Total responses	160

Note: [^]signifies the first data collection, * signifies the second data collection

Table 4 summarizes our data sample. In the first round of gathering data, 40 administrators of groups from Telia Sweden, Telia Global and CPS were contacted. Four of these confirmed that they had forwarded the email to their respective groups. In addition, seven innovation workers for Telia Sweden and Telia Global were contacted directly. However, only 16 employees completed the survey. Consequently, the survey was posted on the case organization's intranet, which approximately 2,000 innovation workers across the entire organization have access to. For the published survey, 145 employees responded.

In total, 161 responses were recorded, but one was incomplete to the degree that it could not be used. Furthermore, 7 responses did not submit admissible answers for Question 8 (team size).¹⁴ For this reason, we chose to omit Question 8 entirely to be able to include these responses as well. In the end, we had a sample size of 160 responses. The problem with question 8 was not unique for our survey, as the case organization expressed that employees have experienced similar issues defining their 'closest teams' when conducting their own surveys (Mimmi Jansson, 2020).

¹⁴ By inadmissible we mean blank answers, intervals, or other responses that did not sufficiently answer the question 'how many people work in your closest team?'

Table 5. Characteristics of sample

Variable	Categories	Sample (frequency)	Percentage
Gender	Male	108	67.5
	Female	52	32.5
Age group	Young adults: 18-34	38	23.8
	Middle aged adults: 35-54	99	61.9
	Older adults: 55+	23	14.4
Level of education	High school	31	19.4
	Bachelor's degree	58	36.3
	Master's degree	69	43.1
	PhD degree	2	1.3
Organizational division	Telia Sweden	58	36.3
	CPS	40	25.0
	Telia Global	24	15.0
	Other (incl. Group finance, Group people & brand, Legal)	38	23.8
N		160	100.0

Table 5 outlines the characteristics of our sample. Out of the 160 employees that completed our survey, 67.5% of them were men and 32.5% were women. The employees were divided into three categories; young adults (18-34), middle aged adults (35-54), and older adults (55+), adopted from a previous study by Nancy Petry (2002). We used this division of age groups because it is representative of stages in life and is easier to compare than our original ten age groups. Middle aged adults were the largest age group, consisting of 61.9% of respondents, followed by young adults with 23.8%, and lastly older adults with 14.4%. The overrepresentation of middle-aged adults may be explained by a few reasons; the group includes more ages than the other groups and a position involving innovation is usually something that employees attain after a few years in the organization (Mimmi Jansson, 2020). Level of education was categorized according to the highest degree that the respondent had completed. The education level was generally high; 43.1% of respondents with a master's degree and 36.3% with a bachelors. The respondents also indicated which organizational division they work in. The largest groups were Telia Sweden and Common Product Services (CPS); 36.3% respondents worked for Telia Sweden, and 25% for CPS.

To confirm whether or not our sample was representative for the entire population, we asked the case organization for data on the forum members but were not allowed any. We will henceforth assume that the sample is representative as our contact person contested to that (Mimmi Jansson, 2020).

Table 6. Survey variables descriptive statistics and correlations

	Mean	Median	SD	Min	Max	2	3	4	5	6	7	8	9	10	11	12	n
1. Work Motivation	3.88	4.00	0.79	1.8	5.0	0.071	-0.006	0.027	0.043	0.673**	0.589**	0.101	0.219**	-0.028	0.131	0.231**	160
2. Exploration	3.95	4.17	0.78	1.0	5.0		-0.115	0.636**	0.266**	0.181*	0.276**	-0.065	-0.138	0.102	-0.032	-0.093	160
3. Exploitation	3.82	3.83	0.76	1.3	5.0			0.682**	0.180*	0.014	0.095	-0.084	-0.001	-0.082	-0.011	-0.025	160
4. Individual Ambidexterity	14.99	15.33	4.16	4.8	25.0				0.328**	0.112	0.246**	-0.129	-0.097	0.020	-0.016	-0.105	160
5. Hygiene factors	1.74	2.00	0.94	0	3					0.093	0.541**	-0.038	-0.057	0.058	-0.001	-0.085	160
6. Motivators	4.31	5.00	1.72	0	6						0.888**	0.107	0.058	-0.057	-0.065	0.184*	160
7. Number of motivating factors	6.06	6.00	2.03	0	9							0.073	0.014	-0.021	-0.056	0.116	160
8. Gender	0.33	0.00	0.47	0	1								-0.090	0.126	0.106	0.059	160
9. Age	0.91	1.00	0.61	0	2									-0.053	-0.053	0.542**	160
10. Educational level	1.26	1.00	0.78	0	3										0.081	-0.221**	160
11. Organizational division	1.26	1.00	1.18	0	3											-0.201*	160
12. Years at Telia	12.09	9.00	9.97	0	37												160

Notes: Ordinal variables include the numbers 1-4 and 12; Category variables include the numbers 5-11; Individual ambidexterity is the interaction variables between Exploration and Exploitation; Number of motivating factors is the sum of Hygiene factors and Motivators

*p<0.1, **p<0.05; ***p<0.001 (2-tailed)

From our descriptive statistics we can observe the minimum, maximum, mean, median and standard deviation of each tested variable. Table 6 shows several significant correlations. As expected, *Exploration* and *Exploitation* both correlate highly and positively with *IA* ($\rho_{\text{explore}}=.636$; $\rho_{\text{exploit}}=.682$); as they should, considering that ambidexterity is a function of these variables. Hence, the significance between these variables does not yield us any new information. Interestingly, both *Exploration* and *Exploitation* correlate positively and significantly with *Hygiene factors* ($\rho_{\text{explore}}=.266$; $\rho_{\text{exploit}}=.180$) at the 1% and 5% -level respectively, and *Exploration* with *motivators* ($\rho=.181$) at the 5% level.

Work motivation also correlates positively with *Motivators* ($\rho=.673$) at the 1% significance level. This is due to the internal consistency between *Work motivation* and *Motivators* examined in section 3.4.6. *Work Motivation* also correlates positively with the control variables *Age* and *Years at Telia* at the 1% significance level. Furthermore, *Motivators* also correlate with *Years at Telia* ($\rho=.184$) at the 5% level.

NMF is positively correlated with *Work motivation*, *Exploration*, *IA*, *Hygiene factors* and *Motivators* at the 1% significance level. As this variable is the sum of hygiene factors and motivators, the only interesting correlation is between *NMF* and *Exploration* ($\rho=.276$), and between *NMF* and *IA* ($\rho=.246$).

4.2. Hypothesis Testing

Before conducting our multiple regression analyses, we examined the assumptions that underlie these tests. First, we confirmed that the residuals were normally distributed using a Predicted-Probability plot, as the residuals conform to the normality line (Appendix 2). Second, we examined the assumption of homoscedasticity using a scatterplot of the residuals. As the plots were evenly distributed the assumption is met (Appendix 2). Third, to examine issues of multicollinearity, we calculated variance inflation factors (VIF) in each of the regression equations. VIF values were between 1.05 and 1.72 (Appendix 2), which are below the rule of thumb of 10 (O'Brien, 2007). As such, our variables do not show problems with multicollinearity.

4.2.1. Analysis of Hypothesis 1: IA and Work Motivation

Table 7. Multiple Linear regression

Model	Work Motivation	
	1	2
Exploration	0.072 (0.377)	0.859^ (0.053)
Exploitation	0.003 (0.975)	0.851^ (0.074)
Individual Ambidexterity (exploration*exploitation)		-0.203^ (0.071)
Constant	3.580*** (0.000)	0.284 (0.880)
<i>n</i>	160	160
<i>R</i> ²	0.005	0.026

Note: P-values are indicated in the parentheses.

^p<.10; *p<.05; **p<.01; ***p<.001

Table 7 shows the multiple linear regressions performed on the dependent variable *Work motivation*. It is an abridged version of the models presented in appendix 3.2 and 3.3, including all control variables. Model 1 introduces the independent variables *Exploration* and *Exploitation*. Combined, these two did not sufficiently explain the variation in Work motivation for innovation workers ($R^2 = .005$). Additionally, none of the variables showed strong positive associations with Work motivation at significant levels ($B_{\text{Exploration}} = .072$; $B_{\text{Exploitation}} = .003$). Hence, based on our sample we find very weak main effects of Exploration and Exploitation on Work motivation, meaning that the type of work-related task seems to have little effect on Work motivation.

Equation 1. Predicted value Work motivation, fixing Exploitation

$$\begin{aligned} \widehat{Work\ Motivation} = & 0.284 + 0.859Exploration + 0.851Exploitation - 0.203(Exploration * Exploitation) = \\ & (0.859 - 0.203Exploitation)Exploration + (0.851Exploitation + 0.284) \end{aligned}$$

Model 2 adds the interaction effect between *Exploration* and *Exploitation*, which significantly improves the explanatory power of the model ($R^2=.026$). The interaction variable has a negative coefficient, at a significant level ($B=-.203$; $p<.01$; Model 2). The interpretation of the negative interaction effect is best illustrated by Equation 1 based on Model 2. The equation fixes *Exploitation* as a constant and shows that a one unit increase in *Exploitation* decreases the effect of *Exploration* on *Work motivation* by 0.203 units (Aiken & West, 1991). As the interaction between exploration and exploitation is two-way, the same reasoning applies if we fix *Exploration* and examine the regression of *Work motivation* predicted by *Exploitation*.

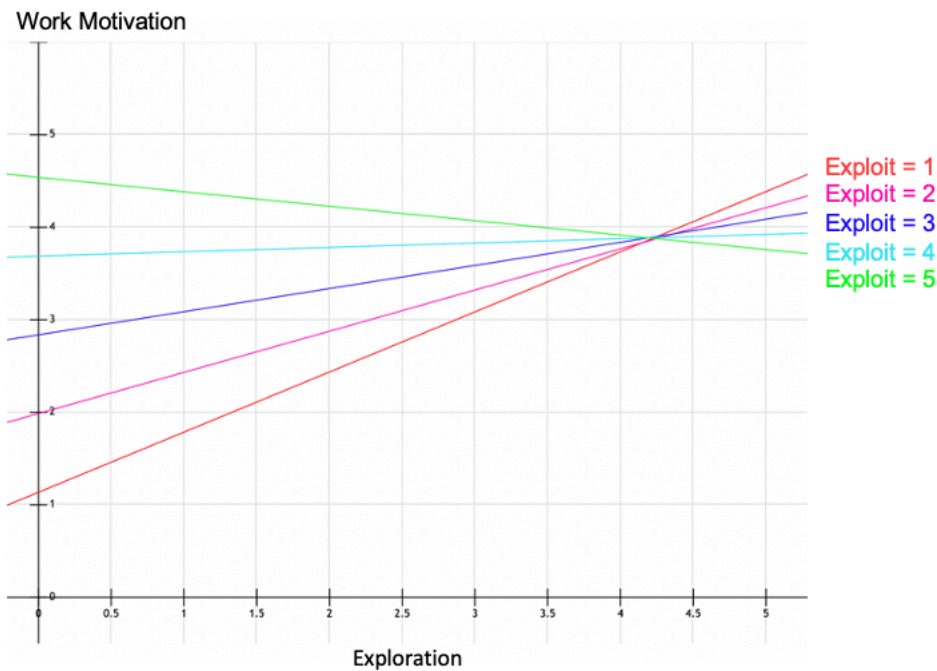


Figure 3. Interaction effect between Exploration and Exploitation

Figure 3 shows *Work motivation* as a function of *Exploration* for different fixed values of *Exploitation*, where the two IVs are defined for values $\in = \{1, 5\}$. It shows that *Work motivation* is an increasing function of *Exploration* for fixed values of *Exploitation* 4 and below. When *Exploitation* takes on a value above 4, *Work motivation* becomes a decreasing function of *Exploration*. Hence, the figure illustrates the increasing tension between *Exploration* and *Exploitation* as both increases. The intersection between all lines illustrate the turning point where IA is no longer positively associated with *Work motivation*.

The graphs also illustrate that innovation workers who specialize (i.e. engage in *either* explorative or exploitative tasks) exhibit the highest levels of work motivation. However, the innovation workers who exhibit generalist behavior (engage highly in *both* explorative and exploitative tasks) exhibit fairly high levels of work motivation. Furthermore, the workers exhibiting the lowest levels of work motivation engage *neither* in explorative- nor exploitative tasks to a high degree.

Other results from our regression model (Appendix 3.1-3.2) show that *Young adults* are consistently less motivated than *Middle aged adults* at a significant level ($B = -.344$; $p < .05$; Model 6; Appendix 3.1). Furthermore, employees at *Telia Global* are more motivated than those at *Telia Sweden* and other organizational divisions ($B = .370$; $p < .10$; Model 6; Appendix 3.1). The best model included the IVs and the interaction variable, as well as all control variables ($R^2 = .178$; Model 6, Appendix 3.4). With a value of 17.8%, our R^2 is in line with what is considered normal for models based on data from individuals, which usually have R^2 values in the 0.10 to 0.20 range (Newbold et. al, p.435).

In previous sections we conceptualized ambidextrous individuals as engaging in *both* explorative and exploitative tasks to high degrees. Because the interaction effect between *Exploration* and *Exploitation* is negative, the overall effect of these IVs on *Work motivation* only remains positive until a certain point. Therefore, our findings do not support Hypothesis 1.

H1	There is a positive relationship between Individual Ambidexterity and Work motivation, mediated by Number of motivating factors	Reject
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4.2.2. Analysis of Hypothesis 2: IA and NMF

Table 8. Multiple Linear Regression

Model	Hygiene Factors		Motivators		Number of Motivating Factors	
	1	2	3	4	5	6
Exploration	0.350*** (0.000)	0.459 (0.356)	0.408* (0.020)	3.055** (0.001)	0.758*** (0.000)	3.515** (0.001)
Exploitation	0.263** (0.005)	0.381 (0.478)	0.080 (0.652)	2.937** (0.004)	0.343^ (0.095)	3.318** (0.004)
Individual Ambidexterity (exploration*exploitation)		-0.028 (0.823)		-0.684** (0.004)		-0.712** (0.009)
Constant	-0.641 (0.236)	-1.099 (0.604)	2.398* (0.021)	-8.695* (0.028)	1.756 (0.139)	-9.794* (0.032)
<i>n</i>	160	160	160	160	160	160
<i>R</i> ²	0.115	0.116	0.034	0.084	0.092	0.131

Note: P-values are indicated in the parentheses.

^p<.10; *p<.05; **p<.01; ***p<.001

Table 8 is similar to the previous table, such that it is an abridged version of the regression models presented in Appendix 3.3 and 3.4. It shows the regression results where *NMF* is used as the dependent variable. Model 1 introduces *Exploration* and *Exploitation* as independent variables. Exploitation is strongly and positively associated with NMF at the 0.1% level (B=.758). Exploitation is weakly but positively associated with NMF at the 10% level (B=.343). Together they explain 9.2% of the variance in NMF. Hence, we find positive main effects of Exploration and Exploitation on NMF, Exploration more than Exploitation. In addition, the two IVs explain the variance in *Hygiene factors* ($R^2=.115$) to a larger extent than they do *Motivators* ($R^2=.034$).

Equation 2. Predicted value NMF, fixing Exploitation

$$\begin{aligned} \widehat{\text{Number of motivating factors}} = & \\ & -9.794 + 3.515\text{Exploration} + 3.318\text{Exploitation} - 0.712(\text{Exploration} * \text{Exploitation}) \\ & (3.515 - 0.712\text{Exploitation})\text{Exploration} + (3.318\text{Exploitation} - 9.794) \end{aligned}$$

Model 2 adds the interaction effect between *Exploration* and *Exploitation*, which significantly improves the explanatory power of the model ($R^2=.131$). The interaction variable shows a negative interaction between Exploration and Exploitation at the 1%-level (B=-.712). Equation 2 fixes Exploitation as a constant and shows that a one unit increase in Exploitation decreases the effect of Exploration on NMF by 0.712 units

(Aiken & West, 1991). As the interaction between Exploration and Exploitation is two-way, the same reasoning applies if Exploration was the fixed constant and we examine the regression of NMF predicted by Exploitation.

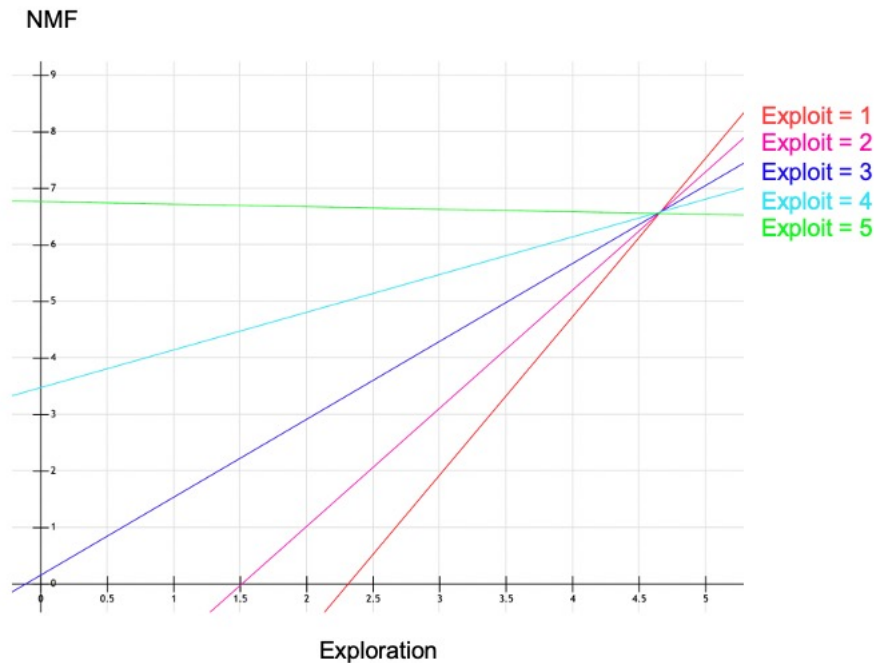


Figure 4. Interaction effect between Exploration and Exploitation

Figure 4 shows *NMF* as a function of *Exploration*, for different fixed values of *Exploitation*, where the two IVs are defined for values $\in = \{1, 5\}$ and the DV is defined for values $\in = \{0, 9\}$. Increasing Exploitation will have a severe negative impact on how much each unit increase in Exploration will increase NMF (the slope of the graph decreases). Similar to previous findings (Figure 3), NMF becomes an increasing function of Exploration for fixed values of Exploitation 4 and below. When Exploitation equals 5, NMF becomes a decreasing function. The intersection between all lines illustrate the turning point where IA is no longer positively associated with NMF. The strong negative interaction effect is illustrated through the large differences in the slopes between the lines. Furthermore, the innovation workers with the largest NMF are specialized in either explorative or exploitative tasks. However, even workers that exhibit generalist behavior (high degrees of both explorative- and exploitative tasks) also exhibit large NMF in comparison to the specialists.

Other results from the regression models (Appendix 3.3-3.4) found no significant results between control variables and *NMF*. The best model generating the highest explanatory value included the IVs and interaction variable, as well as all control variables ($R^2 = .175$; Model 6, Appendix 3.4). However, in this case the explanatory power of the model might have only increased due to the increase in number of variables, considering that no control variable was significant.

In sum, we reject Hypothesis 2 on the grounds that *Exploration* and *Exploitation* do not increase *NMF* among innovation workers indefinitely, which contradicts our hypothesis. The interaction variable is highly negative and causes *NMF* to decrease when *Exploration* and *Exploitation* reach an upper limit. This means that innovation workers who are attempting to both explore and exploit at high levels will have a lower *NMF* than those who attempt to specialize (high on either explore or exploit).

H2	There is a positive relationship between Individual ambidexterity and Number of motivating factors.	Reject
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4.2.3. Analysis of Hypothesis 3: *NMF* and Work Motivation

The table presented in Appendix 3.5 shows the regression models using *Work motivation* as the DV, and *Hygiene factors* and *Motivators* as IVs. The sum of the two IVs creates *NMF* (section 3.4). Our findings show that *Young adults* are consistently less motivated than *Middle aged adults* at the 0.1% significance-level ($B = -.426$, $p < .001$, Model 6). Furthermore, *Telia Global* and *Other* organizational divisions consistently show higher levels of motivation than *Telia Sweden* ($B_{\text{Telia Global}} = .347$, $p < .05$, Model 6; $B_{\text{Other}} = .371$, $p < .01$, Model 6).

Model 1 illustrates that the IVs explain variation in *Work Motivation* to a large extent ($R^2 = 45.5\%$). *Motivators* are strongly positively related to motivation ($B = .308$, $p < .001$, Model 6). However, *Hygiene factors* shows no association with *Work motivation*. But, due to the measurement errors we discussed in section 3.4.6, we know that our measurements for *Work motivation* and *Motivators* are internally consistent, thus invalidating this regression model. Therefore, the reason why *NMF* accounts for almost fifty percent of the variation in *Work motivation* is caused by the internal consistency of our measurements. Despite the strong positive association and significance that we find, we cannot support Hypothesis 3.

H3	There is a positive relationship between Number of motivating factors and Motivation	Rejected
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4.2.4. Results Interpretation

We were not able to accept Hypothesis 1 and 2 on the grounds that *Exploration* and *Exploitation* do not increase *Work motivation* and *NMF* indefinitely. This is because the negative interaction effect between these two variables overrides the positive main effects. Our research results do not concur with previous research who found a positive

interaction effect between exploration and exploitation (He & Wong, 2004; Schultz et al., 2013; Schnellbacher et al., 2019).

One reason might be that we measured ambidexterity on the individual level, while He & Wong's (2004) study was conducted on the organizational level. Schnellbacher et al. (2019) emphasizes the challenges that behaving ambidextrously are especially heightened for individuals; as individuals cannot perform both types of tasks simultaneously but have to switch between the two, which can cause frictions. Therefore, our findings suggest that it may be harder for individuals to consistently behave ambidextrously in comparison to entities consisting of multiple individuals, i.e. teams and organizations that can draw on the activities of multiple ambidextrous individuals.

Another reason why our research results do not still concur with previous research conducted at the individual level (Schultz et al., 2013; Schnellbacher et al., 2019), might be because of how performance was measured. Schultz et al. measure R&D workers' performance in terms of publication citations, while Schnellbacher et al. measured team and department performance. In contrast, this study considered an alternative performance measure, Work motivation, which evidently has an impact on the interaction effect between Exploration and Exploitation.

Furthermore, our research findings suggest that there is a large tension between exploration and exploitation, especially in H2. Tushman and O'Reilly (1996) add that unless these tensions are managed well, the individual who pursues both exploration and exploitation may end up worse off. Therefore, our research findings may even suggest that our sample of innovation workers are ill-equipped at managing the tensions between exploration and exploitation, which is why we have found a negative interaction effect.

However, despite rejecting H1 and H2, our research findings do show that IA is positively associated with Work motivation and NMF to a certain level. Both Figure 2 and 3 illustrate that a simultaneous increase in exploration and exploitation increases the respective DVs up to a certain point $\sim \{4, 4\}$ and $\{4.5, 4\}$ ¹⁵ respectively, which is represented by the intersection in the figures. However, because our conceptualization of IA follows the reasoning of He and Wong (2004), where we assume that individuals become more ambidextrous the more they explore *and* exploit, our hypotheses had to be rejected. But as He & Wong do not specify a threshold level for *how much* an individual needs to explore and exploit to be regarded as ambidextrous, and the intersection-values of, e.g. $\sim \{4, 4\}$, do not mean anything in practice, we could have accepted our hypotheses with an alternative definition of IA. For example, that individuals are ambidextrous when they score 4 and above for exploitation *and* exploration.

¹⁵ {exploration, exploitation}

Our models with the interaction effect (Figure 2 and 3) show that specialist individuals {1, 5} have higher Work motivation and NMF than other individuals. But as our model contained a large sample of individuals with high IA scores (n=21) and very few specialist individuals (n=2) we remain skeptical regarding the robustness of our results pertaining to individuals who do not exhibit any ambidexterity. This may be due to a sample bias, as innovation workers may already inherently be more ambidextrous in comparison to employees who engage in other operational activities.

Lastly, our research findings show that Young adults are consistently less motivated than Middle aged adults, and older adults by extension. This effect becomes less robust when considering that the sample of young adults was a lot smaller than middle aged adults (table 5). We also see that the NMF correlates positively and significantly with Years at Telia, showing that those who work longer at Telia are motivated by more factors. This suggests that Work motivation directly correlates with how long an employee has stayed at the organization, as there is no significant relationship between Work motivation and Age according to our findings (table 6). Of course, this may be the product of *survival bias*: employees who are more motivated by their work at Telia are prone to stay at Telia longer, while others less motivated have quit since long. In contrast, employees who have worked at Telia for fewer years have not been subject to that kind of natural selection yet, hence show a larger variation in work motivation (Tushman & O'Reilly, 1996).

5. Discussion

5.1. Theoretical Implications

The aim of this study was to investigate the relationship between IA and work motivation to explore the significance that IA might have in firms pursuing to create a more innovative environment. This was done using the following research question:

To what extent is there a relationship between individual ambidexterity and work motivation for innovation workers in large firms?

To iterate our research findings, there is a relationship between IA and Work motivation for innovation workers in large firms. However, the relationship is only positive up to a certain point, before it becomes negative. We were not able to establish NMF as a mediator in this relationship but found that IA does have a similar relationship with NMF as it has to Work motivation.

The concept of IA encompasses the notion that high levels of both exploration and exploitation are needed in order to be highly ambidextrous but does not specify a threshold level where an individual can be regarded as ambidextrous (He & Wong, 2004; Cao et al., 2009). The concept generally implies that more is better, but various researchers contest that there is an inherent tension between exploration and exploitation, making it difficult to maintain both at the same level (March, 1991; Tushman & O'Reilly, 1996), not the least for individuals who cannot engage with both at the same time (Schnellbacher et al., 2019). Our research findings support this, as we have found a negative interaction effect between exploration and exploitation.

Furthermore, our findings suggest that it may not even be the most beneficial in terms of work motivation to be highly ambidextrous. As such, employees might be better off specializing rather than improving their ability to act ambidextrously. This supports researchers in favour of *structural ambidexterity* (Duncan, 1978; Tushman & O'Reilly, 1996). But even though our evidence supports specialization through structural ambidexterity, this may be detrimental to the organization's ability to adapt. Dividing specialized employees into fixed specialized teams will only make an organization's structure more rigid and subject to inertia, which would be extremely costly to dismantle if an organization exists in a fast-changing environment that needs to adapt. This could also lead to a *success trap* (Ahuja & Lampert, 2001), where specialized teams become stuck in their own successes. In turn, this may even become detrimental to cross-functional collaboration, as separate teams fixate on what they are successful at rather than seeking to collaborate with others (Mom et al., 2009; Schnellbacher et al., 2019).

According to Tushman and O'Reilly (1996) an individual needs to manage the tension between exploration and exploitation accordingly, or else they could end up worse off as the interaction effect becomes negative. Schnellbacher et al. (2019) found that IA can be induced with both structural *and* contextual means but found a stronger and significant association between IA and organizational context. One of the core principles of *contextual ambidexterity* is that all individuals within an entity can explore and exploit (Gibson & Birkinshaw, 2004). Therefore, organizations should examine their performance management and social support systems and evaluate how they can help their employees manage the tensions of behaving ambidextrously. This might be especially important for organizations who previously relied on structural ambidexterity.

Thus, our findings support Birkinshaw & Gibson's (2004) theory that there is a complementary effect between structural and contextual ambidexterity (section 2.1.1). But for reasons above, our opinion is that contextual ambidexterity presents a more sustainable way for firms to sustain and increase their innovation rates, as contextual ambidexterity addresses all employees within an organization.

5.2. Practical implications

As we found that IA and work motivation do not have a straightforward linear relationship, it becomes extremely important for organizations to help individuals manage exploration and exploitation to receive the full benefit of ambidextrous workers. Otherwise, the tensions between exploring and exploiting at the same time may become a disadvantage for an individual, as work motivation deteriorates. We suggest that organizations take a contextual approach, examining their performance management and social support systems in order to help employees manage these tensions; e.g. changing what innovation workers are evaluated on depending on the task they are asked to perform; or giving employees freedom of initiative at lower levels and ensuring fairness and trust in decision-making processes (Birkinshaw & Gibson, 2004; Ghosal & Bartlett, 1994).

It is also up to the organization and managers to allow employees to act ambidextrously. As explorative innovation work is colored by ambiguity and uncertainty, it can often take a long time to develop or find something that your organization values. When this type of work carries on for long periods, and innovation workers do not receive recognition or any ‘wins’ during the process, motivation from work itself (intrinsic motivation) can easily decrease. In this instance, managers should allow workers to take on exploitative tasks to boost morale and work motivation, and as such allow workers to work ambidextrously through temporal separation (Lavie et al., 2010).

Furthermore, to work consistently and avoid being deterred by the nature of innovative work, it may be beneficial to be able to be motivated in other ways. According to our findings, since ambidextrous individuals are motivated by a higher NMF (to a certain extent), they would in theory be able to avoid this decrease in motivation since they can be motivated by other non-intrinsic factors as well. From our findings we see that there is a possibility for managers to leverage the fact that ambidextrous individuals can be motivated in several ways, in comparison to non-ambidextrous individuals. Thus, hiring ambidextrous individuals may be in the interest of firms, as they can be motivated in several ways and are able to switch roles more easily. Also, the result of higher work motivation in ambidextrous individuals may also be beneficial to organizations who use work motivation as a performance measure, e.g. in a balanced scorecard.

5.3. Future Research and Limitations

This study has several limitations. First, we rejected H3 on the grounds that our measurements of Work motivation and Motivators were internally consistent. If anyone were to replicate this study using different measures of these variables, they would meet the same problem. Second, a major concern regarding the publication of the survey on the organization's intranet is self-selection bias, meaning that those who have chosen to participate in the study vary significantly from those who have chosen not to (Smith, 2016). This has affected the generalizability and transferability of our study, as the findings may not transfer and apply to the entire population of innovation workers.

Third, the interaction variable for exploration and exploitation was consistently negative, using both Work motivation and NMF as dependent variables. We inferred that the interaction was negative, due to individuals' inability to manage tensions between exploration and exploitation (Tushman & O'Reilly, 1996). However, this study did not investigate this aspect in depth, rather it discussed the possibilities of using structural versus contextual means to help individuals manage these tensions. Therefore, we suggest that future research examines how individuals can manage the tensions between exploration and exploitation, under what conditions, and what mechanisms organizations can adopt to help individuals develop these skills. Specifically, by using Gibson & Birkinshaw's (2004) framework of performance management and social support, to compare different organizations.

Lastly, Amabile & Kramer (2007) state that if an employee's skills are valued by the organization, they themselves will feel more valued and in turn become more motivated. Given that organizations value exploration and exploitation cyclically, according to Strebel (1998),¹⁶ there is a possibility to introduce a new moderating factor: how valued either explorative or exploitative activities are by the organization. This could possibly materialize into how much resources an organization invests in a project dedicated to product development (exploitation project) or finding new business areas (exploration project), or how prioritized the projects are. Based on the work conducted for this study, we should expect work motivation to depreciate for e.g. explorative activities when it becomes less prioritized by the organization, which can be counteracted by allowing the employee to switch and work with exploitation for a while, thus allowing the employee to work ambidextrously.

¹⁶ This refers to *Strebel's cycle of competitive behavior*, a model that illustrates how organizational focus shifts from innovation (exploration) to efficiency (exploitation) in cycles to gain competitive advantage

6. Conclusion

Firms need to be able to both *exploit* existing products to enable incremental innovation and *explore* new opportunities for radical innovation in order to survive on the market (Andriopoulos & Lewis, 2010; March, 1991). However, balancing these two activities does not come without its challenges. An inherent tension exists between exploration and exploitation and may even be amplified for individuals who aim to become ambidextrous (Schnellbacher et al, 2019). Because organizational ambidexterity manifests itself in the specific actions of individuals throughout the organization (Birkinshaw & Gibson, 2004), an interest for examining ambidexterity on the individual level has emerged. Recent studies have attempted to address this gap by shifting the focus towards the micro-level, examining *individual ambidexterity* (Mom et al., 2007; 2009; Bonesso et al., 2014; Good & Michel, 2013; Gurtner & Reinhart, 2016). Yet, studies on individual ambidexterity still remain underexplored. With our study, we aim to contribute to this area of research by exploring the effect that individual ambidexterity has on work motivation and what factors best motivate ambidextrous individuals. We conducted this study by examining innovation workers at a large case organization that deeply values their innovation capabilities.

This thesis helps to broaden and nuance research about ambidexterity on the individual level, concluding that IA has a positive effect on work motivation in innovation workers to a certain extent. Thus, it becomes extremely important for innovative firms to manage tensions between the two sides of ambidexterity, exploration and exploitation, so that they become mutually reinforcing rather than self-reinforcing. The challenge of handling the tensions between the two activities can be deterring and cause organizations to play it safe and solely rely on what they already are successful at, leading to success traps, and in the long term, their extinction. Future research on this topic would highly benefit large organizations seeking to sustain innovation and managing the workers that make this happen.

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Personal Interview

- Mari-Chelo Jansson; Head of Technology Innovation at Telia Sweden. 2020. Interview. 18 February.

8. Appendix

8.1. Survey

8.1.1. Questionnaire - Published on Qualtrics

Hi there!

We are two students from the Stockholm School of Economics, who are currently writing our Bachelor's Thesis in Management, in collaboration with Telia. During the past six months, we examined Telia's innovation process in a live case project. We became really interested in innovation management at Telia, and decided to continue this work in our thesis.

The survey examines innovation at Telia from an employee point of view, and aims to generate practical implications that will be helpful for the organization.

Your answers will not be identifiable as data will be completely anonymized. The survey is voluntary, but we need as many answers as possible, so we would really appreciate your help! The survey will take around 5 minutes to complete.

Thank you for your time and in helping us in our research! If you have any questions or comments, please feel free to contact us at 24242@student.hhs.se (Claire) or 24202@student.hhs.se (Isabella).

Best wishes,
Claire Holm Chow and Isabella Hong

Q1: To what extent have you during the past twelve months, engaged in work related to activities that can be characterized as follows? (matrix)

- Searching for new possibilities with respect to products/services, processes or markets
- Evaluating different options with respect to products/services, processes or markets
- Focusing on strong renewal of products/services or processes
- Activities of which the associated yields or costs are currently unclear
- Activities requiring significant adaptability of you
- Activities requiring you to learn new skills or knowledge

Q2: To what extent have you during the past twelve months, engaged in work related to activities that can be characterized as follows?

- Activities in which you have a lot of experience
- Activities which you carry out as if they were routine

- Activities which serve existing (internal) customers with existing services/products
- Activities of which it is clear to you how to conduct them
- Activities primarily focused on achieving short-term goals
- Activities which you can properly conduct using your present knowledge

Q3: Please choose the option that fits your opinion best.

- How important is wage level for you to do a good job?
- How important are reward systems for you to do a good job?
- How important was 'meeting new people' as a motive when applying for the job?

Q4: How satisfied are you with this aspect of your job?

- The freedom to use my own judgement
- The chance to do different things from time to time
- The chance for advancement on this job
- The praise I get for doing a good job
- The feeling of accomplishment I get from the job
- The possibility of learning new skills so I develop and grow as a person

Q5: Please choose the option that fits your opinion best.

- Do you feel that you are motivated by executive management?
- Do you feel that you are motivated by your line manager?
- Do you feel that you are motivated by your co-workers?
- Do you feel that you are motivated by performing your job? (i.e. the job itself)?

Q6: Which gender do you identify with? (Multiple choice)

- Man
- Woman
- Other

Q7: What is your age

- 18-24
- 25-29
- 30-34
- 35-39
- 40-44
- 45-49
- 50-54
- 55-59
- 60-64
- 65+

Q8: How many people work in your closest team*? (Including yourself)

*By closest team, we mean the team you work with on a daily basis, e.g. those you work with on current projects or assignments. (Open question)

Q9: How long have you worked at Telia, in total? (slider)

Number of years: 0-40

Q10: What is your highest completed level of education?

- High school diploma
- Bachelor's degree
- Master's degree
- PhD degree

Q11: What organizational function do you work for? Choose the one that fits best.

- Sales Sweden (Telia Sweden)
- Marketing Sweden (Telia Sweden)
- BU Individuals (Telia Sweden)
- BU B2C (Telia Sweden)
- BU Enterprise (Telia Sweden)
- Digital Analytics (Telia Sweden)
- Customer Service & Delivery (Telia Sweden)
- Other (Telia Sweden)
- Network Systems & Delivery (CPS)
- Telia IT (CPS)
- Analytics & Pricing (CPS)
- PA Connectivity (CPS)
- PA Communication (CPS)
- PA Media & Entertainment (CPS)
- PA IT Services (CPS)
- Security (CPS)
- Other (CPS)
- DivisionX (Telia Global)
- Business Innovation (Telia Global)
- Global Business (Telia Global)
- Telia Carrier (Telia Global)
- Other (Telia Global)
- Group Finance
- Group People & Brand
- Legal
- Other

8.1.2. Questionnaire – Published format (Innovation Portal)

Appendix 8.1.2 illustrates what was posted on the case company's intranet during the data collection phase.

SURVEY FOR BACHELOR THESIS ABOUT TELIA'S INNOVATION PROCESS

Hi there!

We are two students from the Stockholm School of Economics, who are currently writing our Bachelor's Thesis in Management, in collaboration with Telia. During the past six months, we examined Telia's innovation process in a live case project. We became really interested in innovation management at Telia, and decided to continue this work in our thesis.


The survey examines innovation at Telia from an employee point of view, and aims to generate practical implications that will be helpful for the organization.

Your answers will not be identifiable as data will be completely anonymized. The survey is voluntary, but we need as many answers as possible, so we would really appreciate your help! The Survey will take around 5 minutes to complete:

[Start survey here](#)

Thank you for your time and in helping us in our research! If you have any questions or comments, please feel free to contact us [Claire](#) or [Isabella](#).

Best wishes,
Claire Holm Chow and Isabella Hong



8.1.3. Questionnaire modification from original questions

Appendix 8.1.3 shows the modification made to the multiple-indicators scales measuring Exploration, Exploitation and Work motivation.

Question	Original source	Published Survey
Q1 - all-purpose question	To what extent <i>did you, last year</i> , engaged in work related to activities that can be characterized as follows?	To what extent <i>have you during the past twelve months</i> , engaged in work related to activities that can be characterized as follows?
Q1	Evaluating <i>diverse</i> options with respect to products/services, processes or markets	Evaluating <i>different</i> options with respect to products/services, processes or markets
Q1	Activities not (yet) clearly existing company policy	<i>omitted</i>
Q2 - all-purpose question	To what extent <i>did you, last year</i> , engaged in work related to activities that can be characterized as follows?	To what extent <i>have you during the past twelve months</i> , engaged in work related to activities that can be characterized as follows?
Q2	Activities which you carry out as if <i>it</i> were routine	Activities which you carry out as if <i>they</i> were routine
Q2	Activities which clearly fit into existing company policy	<i>omitted</i>
Q5	Do you feel motivated by management?	Do you feel motivated by <i>executive</i> management?

8.1.4. Motivators

Appendix 8.1.4 shows how each indicator corresponds to Herzberg's (1968) motivators.

How satisfied am I with this aspect of my job?

- The freedom to use my own judgement (responsibility)
- The chance to do different things from time to time (work itself/variety)
- The change for advancement on this job (advancement)
- The praise I get for doing a good job (recognition)
- The feeling of accomplishment I get from the job (Achievement)
- The possibility of learning new skills so I develop and grow as a person (possibility of growth)

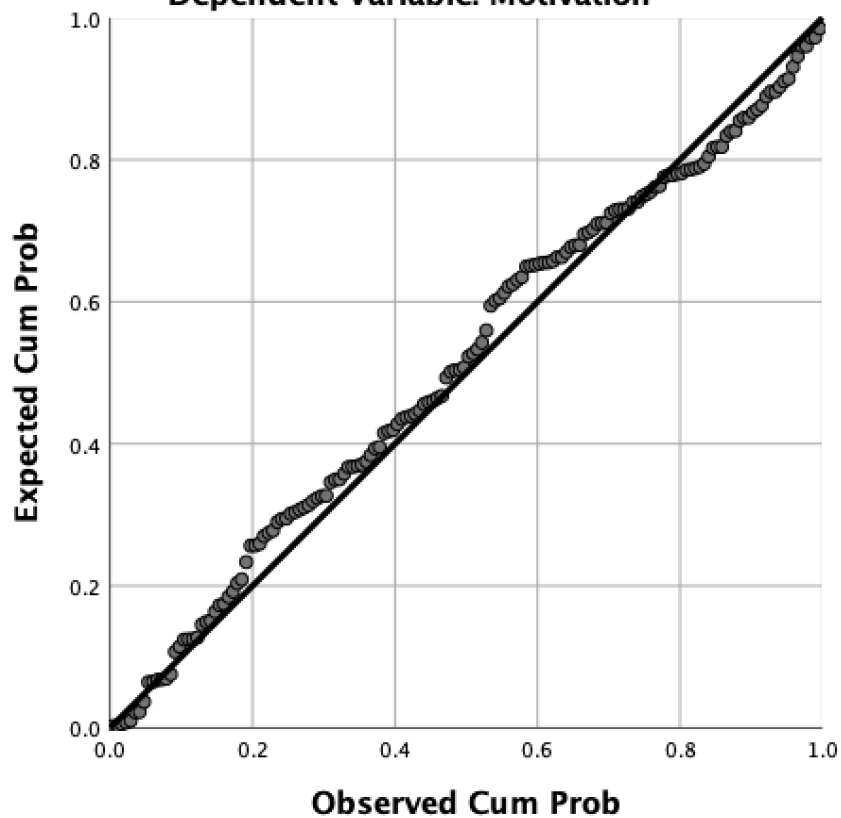
8.2. Multiple regression model Assumption

Appendix 8.2 illustrates the various tests conducted to verify that the sample data was satisfying the model assumptions of multiple linear regression.

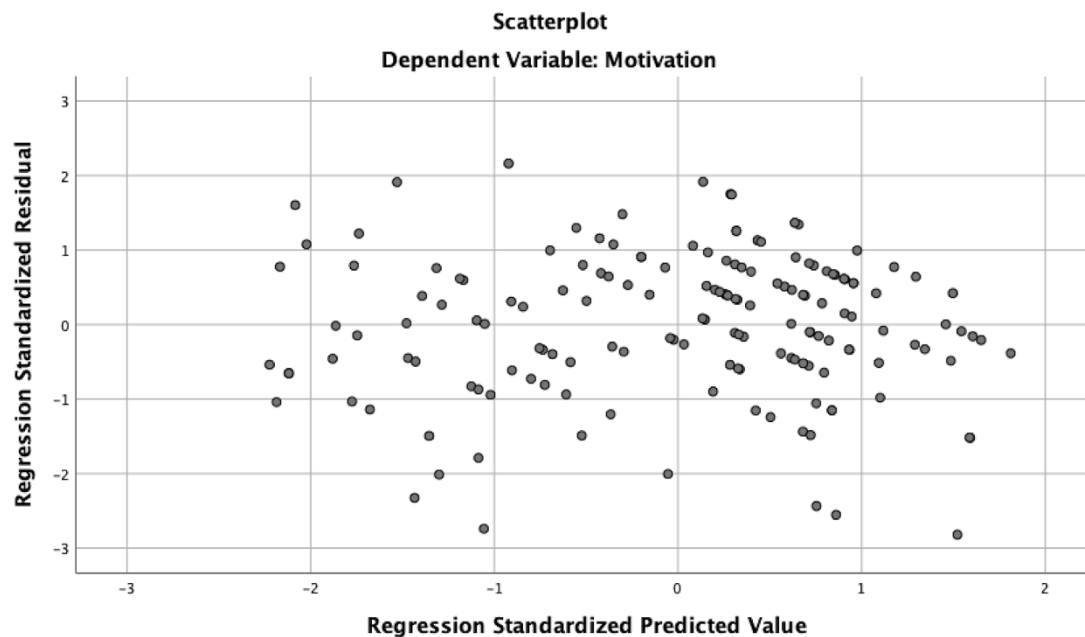
8.2.1. P-P Plot

Normal P-P Plot of Regression Standardized Residual

Dependent Variable: Motivation



8.2.2. Scatter Plot - Homoscedasticity



8.2.3. VIF-values for the regression models of each hypothesis

Regression H1 (IA - Work motivation) - VIF

Coefficients^a

Model	Unstandardized Coefficients		Standardized Coefficients	t	Sig.	Collinearity Statistics	
	B	Std. Error	Beta			Tolerance	VIF
1 (Constant)	3.124	.516		6.060	.000		
Exploration	.113	.082	.111	1.389	.167	.892	1.121
Exploitation	.039	.082	.037	.472	.637	.922	1.084
Men	-.179	.134	-.106	-1.330	.185	.905	1.105
Young adults (18-34)	-.344	.164	-.185	-2.100	.037	.738	1.355
Older Adults (55+)	.072	.197	.032	.364	.717	.753	1.328
High School	-.028	.175	-.014	-.157	.875	.748	1.337
Bachelor degree	.198	.140	.121	1.415	.159	.788	1.269
PhD degree	-.157	.567	-.022	-.278	.782	.904	1.107
CPS	-.112	.159	-.061	-.702	.484	.756	1.322
Telia Global	.370	.188	.167	1.974	.050	.798	1.253
Other	.289	.167	.155	1.733	.085	.712	1.405
Years at Telia	.015	.008	.194	1.976	.050	.594	1.684

a. Dependent Variable: Motivation

Regression H2 (IA- NMF)

Coefficients^a

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.	Collinearity Statistics	
		B	Std. Error	Beta			Tolerance	VIF
1	(Constant)	.493	1.325		.372	.710		
	Exploration	.884	.210	.339	4.212	.000	.892	1.121
	Exploitation	.442	.211	.166	2.098	.038	.922	1.084
	Men	-.457	.345	-.106	-1.325	.187	.905	1.105
	Young adults (18-34)	.436	.421	.092	1.037	.302	.738	1.355
	Older Adults (55+)	.543	.505	.094	1.075	.284	.753	1.328
	High School	-.045	.450	-.009	-.101	.920	.748	1.337
	Bachelor degree	.219	.360	.052	.607	.545	.788	1.269
	PhD degree	1.539	1.456	.084	1.057	.292	.904	1.107
	CPS	.265	.408	.057	.649	.518	.756	1.322
	Telia Global	.321	.482	.057	.666	.506	.798	1.253
	Other	-.300	.428	-.063	-.700	.485	.712	1.405
	Years at Telia	.032	.020	.156	1.582	.116	.594	1.684

a. Dependent Variable: Hygiene + Motivators

Regression H3 (NMF-Work motivation)

Coefficients^a

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.	Collinearity Statistics	
		B	Std. Error	Beta			Tolerance	VIF
1	(Constant)	2.444	.188		13.031	.000		
	Hygiene factors	.003	.047	.004	.074	.941	.947	1.056
	Motivators	.308	.026	.668	11.900	.000	.934	1.071
	Men	-.049	.096	-.029	-.509	.611	.908	1.101
	Young adults (18-34)	-.426	.117	-.229	-3.628	.000	.737	1.357
	Older Adults (55+)	-.021	.137	-.009	-.154	.878	.797	1.255
	High School	-.072	.126	-.036	-.576	.566	.745	1.341
	Bachelor degree	.169	.100	.103	1.696	.092	.799	1.251
	PhD degree	-.426	.402	-.060	-1.059	.291	.920	1.087
	CPS	-.084	.114	-.046	-.734	.464	.747	1.338
	Telia Global	.347	.133	.157	2.607	.010	.815	1.227
	Other	.371	.119	.200	3.116	.002	.714	1.401
	Years at Telia	.006	.006	.073	1.031	.304	.583	1.715

a. Dependent Variable: Motivation

8.3. Regression Results

8.3.1. Hypothesis 1: Main effect

Table 9. Multiple Linear Regression

Model	Work Motivation					
	1	2	3	4	5	6
Exploration	0.072 (0.377)	0.081 (0.325)	0.107 (0.197)	0.120 (0.153)	0.109 (0.189)	0.113 (0.167)
Exploitation	0.003 (0.975)	0.013 (0.876)	0.020 (0.807)	0.016 (0.845)	0.035 (0.675)	0.039 (0.637)
Male Dummy		-0.181 (0.181)	-0.219 (0.100)	-0.246 [^] (0.072)	-0.220 (0.102)	-0.179 (0.185)
Age (0=Middle aged adults)						
			-0.383** (0.011)	-0.423** (0.006)	-0.476** (0.002)	-0.344* (0.037)
			0.227 (0.225)	0.224 (0.242)	0.193 (0.308)	0.072 (0.717)
Education (0=Master's degree)						
				0.063 (0.714)	0.068 (0.690)	-0.028 (0.875)
				0.188 (0.190)	0.199 (0.162)	0.198 (0.159)
				-0.040 (0.944)	-0.171 (0.766)	-0.157 (0.782)
Organizational division (0=Telia Sweden)						
					-0.162 (0.308)	-0.112 (0.484)
					0.332[^] (0.080)	0.370[^] (0.050)
					0.215 (0.191)	0.289 [^] (0.085)
						0.015 [^] (0.050)
Years at Telia						
Constant	3.580*** (0.000)	3.630*** (0.000)	3.583*** (0.000)	3.495*** (0.000)	3.403*** (0.000)	3.124*** (0.000)
Observations	160	160	160	160	160	160
R squared	0.005	0.016	0.077	0.088	0.135	0.157

Notes: P-values are indicated in the parentheses. Relevant findings are written in bold letters.

[^]p<.1; *p<.05; **p<.01; ***p<.001

8.3.2. Hypothesis 1: Interaction effect

Table 10. Multiple Linear Regression

Model	Work Motivation					
	1	2	3	4	5	6
Exploration	0.859 [^] (0.053)	0.804 [^] (0.071)	0.885* (0.042)	0.941* (0.033)	1.020* (0.021)	0.934* (0.034)
Exploitation	0.851 [^] (0.074)	0.793 [^] (0.098)	0.862 [^] (0.066)	0.905 [^] (0.056)	1.014* (0.032)	0.920 [^] (0.051)
Individual Ambidexterity (exploration*exploitation)	-0.203[^] (0.071)	-0.0187[^] (0.098)	-0.202[^] (0.068)	-0.213[^] (0.057)	-0.236* (0.035)	-0.213[^] (0.058)
Male dummy		-0.0153 (0.259)	-0.188 (0.158)	-0.214 (0.117)	-0.181 (0.177)	-0.148 (0.270)
Age (0=Middle aged)						
			-0.404** (0.007)	-0.447** (0.004)	-0.508** (0.001)	-0.388* (0.019)
Young Adults						
Older Adults			0.206 (0.268)	0.210 (0.269)	0.173 (0.354)	0.068 (0.727)
Education (0=Master's)						
				0.032 (0.854)	0.038 (0.820)	-0.043 (0.804)
High school						
Bachelor's				0.199 (0.163)	0.215 (0.127)	0.213 (0.128)
PhD				-0.033 (0.954)	-0.209 (0.712)	-0.194 (0.731)
Organizational division (0=Telia Sweden)						
					-0.156 (0.320)	-0.112 (0.477)
CPS						
Telia Global					0.316[^] (0.092)	0.352[^] (0.061)
Other					0.272 (0.100)	0.331* (0.049)
Year at Telia						0.014 [^] (0.082)
Constant	0.284 (0.880)	0.586 (0.757)	0.316 (0.864)	0.045 (0.981)	-0.419 (0.823)	-0.287 (0.877)
Observations	160	160	160	160	160	160
R squared	0.026	0.034	0.097	0.110	0.161	0.178

Notes: P-values are indicated in the parentheses. Relevant findings are written in bold letters.

[^]p<.1; *p<.05; **p<.01; ***p<.001

8.3.3. Hypothesis 2: Main effect

Table 11. Multiple Linear Regression

Model	Number of motivating factors					
	1	2	3	4	5	6
	0.758*** (0.000)	0.779*** (0.000)	0.876*** (0.000)	0.882*** (0.000)	0.874*** (0.000)	0.884*** (0.000)
Exploration						
Exploitation	0.343^ (0.095)	0.369^ (0.073)	0.374^ (0.069)	0.388^ (0.063)	0.434* (0.042)	0.442* (0.038)
Male Dummy		-0.450 (0.175)	-0.507 (0.129)	-0.506 (0.139)	-0.543 (0.115)	-0.457 (0.187)
Age (0=Middle aged adults)						
			0.143 (0.701)	0.108 (0.778)	0.164 (0.671)	0.436 (0.302)
			0.755 (0.108)	0.741 (0.125)	0.792 (0.103)	0.543 (0.284)
Education (0=Master's degree)						
				0.201 (0.643)	0.151 (0.729)	-0.045 (0.920)
				0.276 (0.444)	0.220 (0.544)	0.219 (0.545)
				1.072 (0.455)	1.512 (0.303)	1.539 (0.292)
Organizational division (0=Telia Sweden)						
					0.161 (0.692)	0.265 (0.518)
					0.243 (0.615)	0.321 (0.506)
					-0.451 (0.284)	-0.300 (0.485)
						0.032 (0.116)
Years at Telia						
Constant	1.756 (0.139)	1.880 (0.113)	1.409 (0.249)	1.153 (0.357)	1.067 (0.406)	0.493 (0.710)
Observations	160	160	160	160	160	160
R squared	0.092	0.103	0.118	0.124	0.138	0.153

Notes: P-values are indicated in the parentheses. Relevant findings are written in bold letters.

^p < .1; *p < .05; **p < .01; ***p < .001

8.3.4. Hypothesis 2: Interaction effect

Table 12. Multiple Linear Regression

Model	Number of motivating factors					
	1	2	3	4	5	6
Exploration	3.515** (0.001)	3.390** (0.002)	3.385** (0.002)	3.459** (0.002)	3.239** (0.004)	3.069** (0.007)
Exploitation	3.318** (0.004)	3.3186** (0.006)	3.098** (0.008)	3.175** (0.008)	2.975* (0.014)	2.790* (0.021)
Individual Ambidexterity (exploration*exploitation)	-0.712** (0.009)	-0.676* (0.014)	-0.654* (0.018)	-0.668* (0.017)	-0.612* (0.032)	-0.566* (0.049)
Male dummy		-0.348 (0.289)	-0.406 (0.220)	-0.406 (0.232)	-0.441 (0.198)	-.0376 (0.276)
Age (0=Middle aged)						
			0.074 (0.840)	0.030 (0.936)	0.082 (0.831)	0.319 (0.449)
			0.687 (0.139)	0.697 (0.142)	0.742 (0.122)	0.534 (0.287)
Education (0=Master's)						
				0.101 (0.813)	0.074 (0.864)	-0.087 (0.845)
				0.310 (0.383)	0.293 (0.465)	0.258 (0.471)
				1.094 (0.438)	1.412 (0.331)	1.443 (0.319)
Organizational division (0=Telia Sweden)						
					0.176 (0.661)	0.263 (0.517)
					0.201 (0.673)	0.271 (0.572)
					-0.304 (0.470)	-0.187 (0.663)
						0.027 (0.180)
Year at Telia						
Constant	-9.794* (0.032)	-9.109* (0.048)	-9.164* (0.047)	-9.670* (0.039)	-8.856^ (0.065)	-8.595^ (0.073)
Observations	160	160	160	160	160	160
R squared	0.131	0.137	0.150	0.157	0.165	0.175

Notes: P-values are indicated in the parentheses. Relevant findings are written in bold letters.

^p < .1; *p < .05; **p < .01; ***p < .001

8.3.5. Hypothesis 3: Main effect

Table 13. Multiple Linear Regression

Model	Work Motivation					
	1	2	3	4	5	6
Hygiene	-0.016 (0.743)	-0.015 (0.762)	-0.003 (0.951)	-0.010 (0.841)	0.002 (0.963)	0.003 (0.941)
Motivators	0.312*** (0.000)	0.311*** (0.000)	0.306*** (0.000)	0.309*** (0.000)	0.312*** (0.000)	0.308*** (0.000)
Male Dummy		-0.048 (0.633)	-0.072 (0.464)	-0.095 (0.339)	-0.063 (0.506)	-0.049 (0.611)
Age (0=Middle aged adults)						
			-0.379** (0.001)	-0.416*** (0.000)	-0.475*** (0.000)	-0.426*** (0.000)
Young adult (=1)			0.045 (0.736)	0.056 (0.680)	0.024 (0.851)	-0.021 (0.878)
Old adults (=2)						
Education (0=Master's degree)						
				-0.056 (0.662)	-0.038 (0.756)	-0.072 (0.566)
Education (HS =1)				0.153 (0.145)	0.169^ (0.091)	0.169^ (0.092)
Education (Bsc = 2)				-0.198 (0.634)	-0.432 (0.284)	-0.426 (0.291)
Education (PhD = 3)						
Organizational division (0=Telia Sweden)						
					-0.102 (0.371)	-0.084 (0.464)
Common product services (CPS=1)					0.333* (0.013)	0.347* (0.010)
Telia Global (TG=2)					0.345** (0.004)	0.371** (0.002)
Other (O= 3)						
Years at Telia						0.006 (0.304)
Constant	2.558*** (0.000)	2.595*** (0.000)	2.691*** (0.000)	2.673*** (0.000)	2.522*** (0.000)	2.444*** (0.000)
Observations	160	160	160	160	160	160
R squared	0.454	0.455	0.498	0.510	0.565	0.568

Notes: P-values are indicated in the parentheses. Relevant findings are written in bold letters.

^p < .1; *p < .05; **p < .01; ***p < .001