

In the creative process of idea generation, what is the influence of individual-based versus team-based external rewards on intrinsic task motivation?

Master's Thesis

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Abstract

Creativity is crucial in New Product Development. It is known that different external reward schemes have an influence on the intrinsic motivation to perform creative tasks. This research examined the influence of individual-based and team-based rewards on intrinsic task motivation, as well as financial vs. recognition rewards. It was found that there was no significant difference in intrinsic motivation of participants between any of the four reward schemes.

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Table of Contents

Chapter 1: Introduction.....	4
Sub-questions	5
1.1 Social Relevance	6
1.2 Thesis Chapter Descriptions.....	6
Chapter 2: Theoretical Framework.....	7
2.1 Creativity, innovation and its importance to firms.....	7
2.2 Intrinsic and Extrinsic Motivation.....	7
2.3 Do external rewards undermine intrinsic motivation in creative processes?	9
2.4 Creativity in teams.....	10
2.5 Team-based versus individual-based rewards.....	11
2.6 Recognition versus financial rewards.....	12
2.7 Subcategories of the Intrinsic Motivation Index	13
2.7.1 Perceived Choice.....	14
2.7.2 Perceived Competence.....	14
Chapter 3: Research Methodology	16
3.1 Experimental Design	16
3.2 Research Sample and Data Collection	18
3.3 Variables.....	19
3.4 Data analysis methods.....	19
Chapter 4: Research Outcome	21
4.1 Manipulation Check	21
4.2 Effect of individual vs. team rewards and financial vs. recognition rewards on intrinsic task motivation.....	23
4.2.1 Testing for an interaction effect.....	25
4.2.2 Creating word clouds for the different treatment conditions	26
4.3 Using individual categories of the Intrinsic Motivation Index IMI categories as dependent variables.....	26
4.3.1 Other notable outcomes.....	27
4.4 Post-hoc test using age and education level as covariates.....	28
Chapter 5: Discussion	30
5.1 Theoretical Implications.....	30
5.2 Managerial Implications.....	32
Chapter 6: Conclusion	34
6.1 Research Limitations.....	34
6.2 Recommendations for future research.....	35
References.....	36
Appendices	39

Chapter 1: Introduction

Creativity and New Product Development (NPD) go hand in hand. It is the endless creativity of individuals and teams that drives innovative change, coming up with creative ideas that grow and eventually develop into innovative products or services. These authentic products allow for progress, contributing to economic growth and development on a micro as well as macro level. Creativity is also referred to as “the seed of all innovation” (Amabile et al., 1996) and is crucial for firms to stay relevant and competitive in an ever-changing marketplace.

Research has shown that both intrinsic and extrinsic factors have an influence on the creative process and creative outcomes. More specifically, it has been found that extrinsic rewards often undermine intrinsic motivation in creative processes (Deci, Ryan & Koestner, 1999; Wiersma, 1992). However, these findings conflict with those of Eisenberger, Pierce & Cameron (1999) (among others) who found that extrinsic, performance-based rewards enhanced intrinsic motivation and improved creative performance. As such, existing literature is conflicting and offers different theoretical perspectives. This allows for more research to be done in this field to better understand the relationship between extrinsic and intrinsic factors on motivation. One such way is by investigating the effect of team rewards and individual rewards on motivation and the creative process.

People are more likely to develop high-quality creative ideas in teams than as individuals due to teams’ social nature and the synergies that are developed between team members (Taggar, 2002). Diversity in teams, mutual openness to ideas and valuable discussion and feedback on each other’s input can enhance creativity in group situations (Albrecht & Hall, 1991). There is limited research, however, on the effect of different reward schemes on the motivation and creative outcomes of such teamwork (Sarin & Mahajan, 2001; Malek, Sarin & Haon, 2020). Do individual rewards or team rewards result in higher intrinsic motivation, and does this lead to more creative outcomes? This has led to the following research question:

In the creative process of idea generation, what is the influence of individual-based versus team-based external rewards on intrinsic task motivation?

Although focused on the main research question, this research lends itself to answer a number of relevant sub-questions. Primarily, existing research has outlined the difference between the

effect of recognition and financial rewards on creative performance. Malek, Sarin & Haon (2020) found that there is a negative relationship between financial rewards and intrinsic motivation and a positive relationship between recognition rewards and intrinsic motivation. How does this translate to a setting in which individual- and team-based rewards are offered? Are team-based financial rewards more effective than individual-based financial rewards or vice versa? What about recognition rewards?

Perceived choice and perceived competence are important influencers of intrinsic motivation, and they make up two parts of the self-determination theory (this will be explained in the next chapter). Feehan & Enzle (1991) found that increasing perceived choice actually helped forego the undermining effect of extrinsic rewards. Further literature found that perceived choice plays a crucial role in the intrinsic motivation experienced by workers. Similarly, perceived competence plays an important role in determining intrinsic task motivation. Cameron et al. (2005), among others, found that recognition rewards may positively influence perceived competence. Therefore, it is valuable to investigate which reward scheme (team or individual, recognition or financial) has the most positive effect on perceived competence? What about perceived choice?

A pertinent aspect of this research for firms is whether or not they can stimulate creative performance without compromising intrinsic motivation. As aforementioned, creativity is essential for innovation and innovation is essential for a successful business. It is relevant, therefore, to question whether it is better to offer team-based external rewards or individual-based external rewards in order to get the desired creative outcomes.

Sub-questions

- What is the role of recognition and financial rewards in a setting in which individual- and team-based rewards are offered? Are team-based financial rewards more effective than individual-based financial rewards or vice versa? What about recognition rewards?
- Is it better to offer team-based external rewards or individual-based external rewards in order to most effectively achieve desired creative outcomes?
- Which reward scheme most positively affects perceived competence? What about perceived choice?

1.1 Social Relevance

Creativity is an essential component of innovation. In turn, innovation is an essential component of a business for a number of reasons: it keeps companies relevant, helps them to grow and allows for differentiation. New product development and optimizing creative processes is essential for the “renewal, survival, and success of organizations (Brown & Eisenhardt, 1995; Wind & Mahajan, 1997). Philips, for example, is a global innovation leader in health technology, being named in the Clarivate Top 100 Global Innovators for the 8th consecutive year. Philips CEO Frans van Houten acknowledges the importance of innovation in Philips’ success, describing innovation as “fuel(ling) (Philips’) ability to truly impact global health challenges” (GlobeNewswire Contributors, 2021).

Measuring the effect of extrinsic rewards on intrinsic motivation in team scenarios is of considerable value to firms. Intrinsic motivation has a positive correlation with employee creativity (Dewett, 2007), but also means employees are more engaged in their work and are more likely to claim responsibility and execute tasks (Kuvaas & Dysvik, 2009). Therefore, investigating whether or not team-based versus individual-based rewards have different effects on intrinsic motivation is of a relevant nature.

1.2 Thesis Chapter Descriptions

The following chapter will discuss existing literature in the fields of creativity, intrinsic and extrinsic motivation and the effect of reward schemes on motivation to perform creative tasks. Chapter 3 will explain the methodology of this research paper, discussing the data collection methods as well as how the data will be processed and analyzed. In chapter 4, research outcomes are examined, and results of the statistical analyses will be presented. In chapter 5 the implications of the research outcomes as well as implications are discussed. In chapter 6, the paper will be concluded and recommendations for future research will be given and limitations of the research are discussed.

Chapter 2: Theoretical Framework

2.1 Creativity, innovation and its importance to firms

Creativity is a phenomenon by which imagination and original thinking are used to develop new ideas. New ideas are crucial in New Product Development (NPD), because it is these creative ideas that are eventually developed into original and authentic products or services that deliver utility to customers and profits to firms. In order for creativity to be meaningful, creative ideas have to be implemented successfully within an organization (Woodman, Sawyer & Griffin, 1993); this is innovation. Creativity is also referred to as “the seed of all innovation” (Amabile et al., 1996) and is crucial for firms to stay relevant and competitive in an ever-changing marketplace.

The importance of innovation to companies is undisputed. Competitive advantage, that distinct feature of a company or product which allows it to outperform its competitors, is achieved through “acts of innovation” (Porter, 1990). Such acts of innovation are achieved through various processes, one of which being new product design or development (Porter, 1990). Once a competitive advantage is achieved, it is only possible to sustain it by improving and developing your products; otherwise, competitors will catch up and diminish your competitive advantage. Similarly, Hitt, Hoskisson & Kim (1997) found that innovation (both of processes and products) is of importance when achieving a competitive advantage in international markets. As such, sustained long-term performance and operation in the international marketplace is (at least partially) based on firms’ new product development (Prahalad, 1990).

In order to be competitive, companies rely on innovation. In order to innovate, companies must use creativity. It is therefore important for companies to optimize their creative development and idea generation.

2.2 Intrinsic and Extrinsic Motivation

Intrinsic motivation can be defined as the “doing of an activity for its inherent satisfactions rather than for some separable consequence” (Ryan & Deci, 2000), suggesting that the reasons for doing a certain task are not affected by external rewards, incentives or opinions. Intrinsic motivation is not the only form of motivation, but it is important. Humans naturally possess some form of intrinsic motivation through curiosity or genuine interest in performing a task, because it is crucial in social and cognitive development from the moment you are born.

Intrinsic motivation can be explained through the self-determination theory (SDT) (see Figure 1), which suggests that people are driven by their innate need to grow and achieve fulfillment (Deci & Ryan, 1985). This theory outlines three main aspects which contribute to someone's psychological growth: autonomy, competence and connection or relatedness. Autonomy describes people's need to be in control of their own behavior, wants and needs. If people feel that their action results in a direct noticeable consequence, autonomy is satisfied. Competence describes how people need to master skills and learn how to do different tasks, and connection implies that people need to belong and feel attached to others.

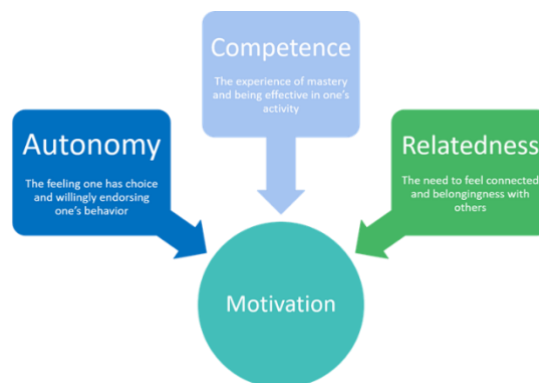


Figure 1. Self-determination theory

Extrinsic motivation, on the other hand, is when behavior is led by external factors such as rewards or punishment. It can be described as when a task is completed to achieve a separable outcome (Ryan & Deci, 2000). Research has shown that both intrinsic and extrinsic factors have an influence on motivation to perform creative processes and creative outcomes (Fairbank and Williams, 2001). Yoon, Sung & Choi (2015) found that although both extrinsic and intrinsic factors impact creativity, intrinsic rewards showed a direct positive effect on creativity whereas extrinsic rewards only showed an indirect effect on employee creativity through the commitment to completing the creative outcome. Malik, Butt & Choi (2014) also found that both extrinsic and intrinsic factors play a role in employee creativity. They suggest that the personality and nature of the employee are important in determining how effective external rewards are in creative performance.

External rewards in any form (e.g., financial, recognition, social) can therefore serve as great motivators to perform creative tasks. However, there may be underlying costs of such rewards. Condry & Chambers (1978) suggest that "rewards often distract attention from the process of

task activity to the product of getting a reward". In a creative, non-routine task as part of new product development, this may be detrimental to the actual quality of the creative idea. Furthermore, these external rewards may harm individual's willingness to persist past the point at which they are eligible for a reward. In general, early research in this domain developed the ideology that external and material rewards such as money were 'controlling' and would harm creative performance outcomes (Amabile, 1983).

2.3 Do external rewards undermine intrinsic motivation in creative processes?

It is no surprise, therefore, that it has been found that extrinsic rewards often undermine intrinsic motivation in creative processes (Deci, Ryan & Koestner, 1999; Wiersma, 1992), which has significant effects on how to reward creative processes in companies. Self-determination theory can explain this phenomenon. When people make decisions based on external factors such as reward schemes, their autonomy is affected, reducing people's perceived control of their own behavior. Therefore, people can experience extrinsic rewards as a controlling mechanism and an inhibitor of their free choice and therefore harm their creative experience (Latham, 2012). Similarly, de Stobbeleir, Ashford, & Buyens (2011) argue that extrinsic rewards harm self-belief and thus intrinsic motivation and form an obstacle to creativity.

However, more recent research has sparked a debate on whether extrinsic motivation does actually have a detrimental effect on intrinsic motivation. Eisenberger, Pierce & Cameron (1999) (among others) found that extrinsic, performance-based rewards enhanced intrinsic motivation and improved creative performance. Further research by Cameron, Banko & Pierce (2001) suggests that different external reward schemes have no significant negative effects on employee intrinsic motivation. This body of research follows the holistic idea that rewards, in whichever form, should enhance performance without necessarily undermining intrinsic motivation. If firms explicitly and specifically connect rewards to creative outcomes, then "monetary rewards reinforce, rather than undermine, intrinsic motivation and hence lead to higher creativity" (Mehta, Dahl & Zhu, 2017; Eisenberger & Rhoades, 2001). However, this thought-process has not been fully developed as it lacks a distinction in the type of external reward that is offered (financial, recognition, etc.). This opens the door to additional research in this field looking specifically at the type of reward scheme and how these rewards are offered, for example in teams or individually.

2.4 Creativity in teams

There is abundant evidence in existing research proving that creativity is a social process and that social interaction in groupwork are important stimulants of creativity (Amabile, 1988). People are more likely to develop high-quality creative ideas in teams than as individuals due to the synergies and interaction between team members (Taggar, 2002), and creative performance in a group increases exponentially as more creative people contribute (Taggar, 2001).

The sharing and communicating of ideas are important instruments in enhancing creativity (Kanter, 1988, Woodman et al., 1993). This is due to a number of reasons. Primarily, diversity in teams is thought to be a positive stimulant of creativity in a team. If people are exposed to ideas and opinions that are unfamiliar to them, they are more likely to learn and make connections between their own knowledge and the newly acquired knowledge (Perry-Smith & Shalley, 2003). This then leads to an increased array of approaches to tackle a (creative) problem. Logically, this is also the case if teams are composed of people with different functional areas and backgrounds, as they bring different approaches and expertise to the table (Andrews and Smith, 1996). Furthermore, mutual openness to ideas and valuable discussion and feedback on each other's input can enhance creativity in group situations (Albrecht & Hall, 1991).

In NPD and creative development, crowdsourcing and innovation tournaments are not uncommon. These tournaments offer three key advantages (Camacho et al., 2019): primarily, a large crowd offers new ideas that may go beyond the scope of internal firm employees or specialized contractors (Afuah and Tucci, 2012). Secondly, you increase the likelihood of developing high-quality ideas (Girotra, Terwiesch, and Ulrich 2010). Thirdly, a natural selection procedure is used to filter out less successful ideas (Terwiesch and Ulrich 2009).

It can be concluded that the role of teamwork and group dynamics are essential in the development of creative and innovative ideas, and that creativity is oftentimes a social process. In order to optimize this creative process, the existing research has to be furthered. Therefore, the role of team-based rewards versus individual-based rewards is investigated further, specifically looking at their effect on motivation to perform a creative task.

2.5 Team-based versus individual-based rewards

Compensating employees for their performances at a firm is common practice everywhere in the world. It is the hope of managers that with these performance-contingent rewards, they can stimulate the efforts of employees, in turn leading to a more efficient realization of the company's strategic goals and objectives. Reward systems are therefore key management tools (Lawler & Cohen, 1992), and may have an impact on the motivation of employees.

Team-based rewards are rewards offered for achievements made as a team rather than as individuals. For example, if as a team a new product is developed, the same reward will be offered to all members involved in the process. A number of reasons exist for offering team or group rewards as opposed to individual rewards. In recent years, tasks have become more and more interrelated between different departments of companies creating interdependencies between jobs, automatically leading to a more team-based approach and making it more difficult to separate each individual employee's contribution to a specific task. Furthermore, the emergence of technology has led to easier communication between people from all over the globe, again stimulating cooperation and interdependency on tasks. Team-based rewards may be a more accurate form of measuring and rewarding performance in interdependent tasks (Gomez-Mejia & Balkin, 1992), therefore serving as "logical complements of performance measurement that focuses on multi-employee working units" (DeMatteo, Eby & Sundstrom, 1998).

Furthermore, team-based rewards stimulate cooperation in groups (DeMatteo, Eby & Sundstrom, 1998) and positively influence the collective motivation of group members (Shamir, 1990). In contrast, offering individual-based rewards for team tasks is, although stimulating individual motivation to complete tasks, unlikely to improve the cooperation in groups. As such, NPD projects often employ team-based rewards or rewards that are connected to team outcomes to incentivize cross-functional cooperation (Kessler & Chakrabarti, 1996; Sarin & Mahajan, 2001). However, there is also evidence that suggests working in NPD teams results in neglect and does not always have positive connotations for all team members (Barczak, 1989). In this case, offering team-based rewards may incentivize cooperation and hearing all those involved in the NPD project.

Although there is evidence that extrinsic rewards undermine intrinsic motivation (see SDT), existing literature shows that team-based extrinsic rewards stimulate cooperation within the team and elevate group motivation to perform and complete a task collectively. This thought process has led to the first hypothesis:

Hypothesis 1: team-based rewards show a stronger positive correlation with intrinsic task motivation than individual rewards

2.6 Recognition versus financial rewards

Financial rewards are monetary incentives that are earned by an employee, typically following the achievement of some goal or as a result of good performance. Such a reward makes the recipient wealthier and materially better off. Such rewards are commonplace in many businesses. Recognition rewards are also awarded for good performance and helping to achieve certain goals or objectives, but come in the form of verbal support, awards (for example the innovation award) or acknowledgement for serving the firm for a certain number of years. Existing research has outlined the difference between the effect of recognition and financial rewards on creative performance and intrinsic motivation, however the results are somewhat ambiguous. Mehta, Dahl & Zhu (2017) found that monetary rewards enhance the originality in a given creative task, whereas social-recognition rewards actually limit the originality in that task. This study does not mention the effect of the different reward schemes on intrinsic motivation, however.

The effect of financial rewards on intrinsic motivation is not undisputed. Eisenberger, Pierce & Cameron (1999), among others, firmly believe that intrinsic motivation is not harmed. Furthermore, in a review of psychological and economic literature by Promberger and Marteau (2013), an undermining effect of extrinsic rewards was observed. However, Malek, Sarin & Haon (2020) actually found there to be a negative relationship between financial rewards and intrinsic motivation. Similarly, Pritchard, Campbell & Campbell (1977) support the hypothesis that contingent extrinsic financial rewards will decrease intrinsic motivation to perform a task. This may be due to the lack of choice experienced by the employee, that the financial reward essentially forces them towards a certain behavior or outcome. This connects back to SDT, in which a lack of autonomy may harm intrinsic motivation.

Furthermore, Malek, Sarin & Haon (2020) found a positive relationship between recognition rewards and intrinsic motivation. Task-related feedback as well as compliments or recognition for doing well (i.e., an award) stimulates team members and gives them knowledge on their performance and how well they are doing relative to the expectations. In such a context, it appears that intrinsic motivation is not harmed and may even be enhance.

The second hypothesis follows:

Hypothesis 2: recognition rewards show a stronger positive correlation with intrinsic task motivation than financial rewards

When an individual receives a recognition reward such as ‘employee of the month’, there is prestige, honour and pride involved. When this reward is awarded to a team, the prestige is split over all the team members, diminishing its value. This is not the case for financial rewards, because money is money regardless of whether it is awarded to an individual or to a team. This thought process has led to the following moderating hypothesis:

Hypothesis 2a: The positive relationship between recognition rewards and intrinsic motivation will be higher among individuals (vs. teams)

2.7 Subcategories of the Intrinsic Motivation Index

In this research, the Intrinsic Motivation Inventory (IMI) is chosen as a means to measure intrinsic motivation. The Intrinsic Motivation Inventory is a multidimensional measurement device aimed at determining a participant’s underlying intrinsic motivation when performing a task or completing any activity. The inventory consists of a set of 45 items on a 7-point Likert scale ranging from ‘not at all true’ to ‘very true’. This set of items was created by Richard Ryan and Edward Deci (date) and has subsequently been used in many experiments related to intrinsic motivation, self-determination theory and self-regulation. The items can be split into seven subcategories: interest/enjoyment, perceived competence, effort/importance, pressure/tension, perceived choice, value/usefulness and relatedness. Together, these subcategories make up all components of self-determination theory, thus giving a reliable analysis of the intrinsic motivation felt by the participant.

Due to the nature of the items and the ease at which they can be split into their respective subcategories, it is valuable to examine the effect of the different reward schemes outlined in sections 2.5 and 2.6 on intrinsic motivation per subcategory of the IMI. Therefore, the different subcategories of the IMI will be used as separate dependent variables. Two of these subcategories stand out, because they are directly related to self-determination theory: perceived choice and perceived competence.

2.7.1 Perceived Choice

Much of the existing literature emphasized the value of choice in positively influencing intrinsic motivation. After all, autonomy is an important aspect of self-determination theory. Feehan & Enzle (1991) found that having a choice in reward scheme stops the undermining effect of extrinsic rewards on intrinsic motivation. Furthermore, “providing choice enhanced intrinsic motivation, effort, task performance, and perceived competence, among other outcomes” (Patall, Cooper & Robinson, 2008). Therefore, having the perception of choice appears crucial to the intrinsic motivation felt by workers.

Reward type naturally plays an important role in the perceived choice of a worker or participant. Pritchard, Campbell & Campbell (1977) suggest that contingent extrinsic financial rewards will lead to a lack of choice experienced by the employee because the financial reward forces them to a certain behaviour. As such, Hypothesis 3a follows:

Hypothesis 3a: financial rewards will have a negative effect on perceived choice

2.7.2 Perceived Competence

Perceived competence, another subcategory of the IMI, is also a positive predictor of intrinsic motivation (Li, Lee & Solmon, 2005). Rewards have a positive influence on performance and motivation when the rewards “signify competence at an activity” (Cameron et al., 2001; Deci et al., 1999). This means that recognition rewards, for example, should have a positive impact on perceived competence because it communicates that someone is good at their respective activity and may reveal a superior ability or a mastery of the activity (Cameron et al., 2005). Hypothesis 3b follows:

Hypothesis 3b: recognition rewards will have a higher positive effect on perceived competence than financial rewards

Assessing the effect that team rewards (as opposed to individual rewards) have on perceived competence is a little more ambiguous. One theory follows that combining ideas may make some individuals come to the realization that their abilities and ideas are actually inferior to their teammates, which may lower their perceived competence. On the other hand, in a team the ideas are combined, synergy between team members occurs and the collective effort of multiple individuals is greater than the solo effort per individual. Due to this teamwork, each team member will have a higher perceived competence. Hypothesis 4 follows:

Hypothesis 3c: team rewards will have a higher positive effect on perceived competence than individual rewards

The nature of NPD involves teamwork and a consistent sharing of ideas. As such, getting recognized for your collaborative efforts through awards, for example, will enhance team synergies and the notion that you are achieving great things together. This thought process has led to the following moderating hypothesis, extending Hypothesis 3c:

Hypothesis 3c': The positive relationship between team rewards and perceived competence will be higher for recognition rewards as opposed to financial rewards

Chapter 3: Research Methodology

In this chapter, the experimental design of this paper will be explained. Next, the research sample as well as data collection and data analysis will be discussed.

3.1 Experimental Design

In order to test whether team-based rewards impact motivation of creative tasks more/less than individual rewards, an online survey will be conducted. A survey is used as data collection method because it is relatively simple to administer and the data that is collected is consistent, which facilitates statistical analysis. Furthermore, a large number of respondents can be targeted in a relatively short period of time as the survey will be distributed online.

This research will be set up as 2x2 experimental design, with the independent variables being team-based vs. individual rewards and financial vs. recognition rewards and the dependent variables capturing dimensions of intrinsic motivation, as seen in Figure 2.

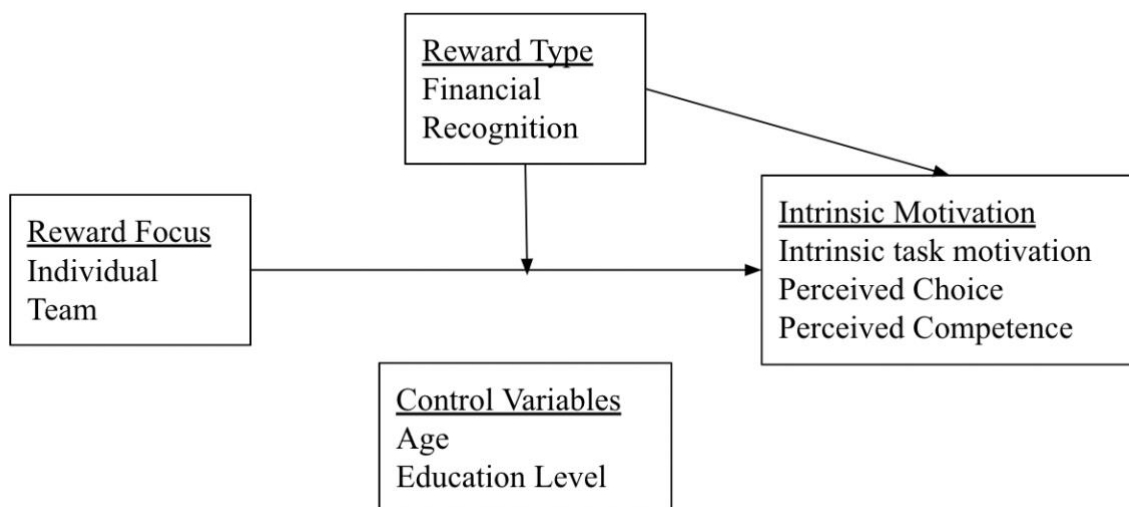


Figure 2. Experimental design

The survey will be set up as a between-subjects design, by which respondents are randomly assigned to one of four conditions.

In scenario 1, the respondents are offered team-based financial rewards

In scenario 2 they are offered team-based recognition rewards

In scenario 3 they are offered individual financial rewards

In scenario 4 they are offered individual recognition rewards

Setting up the experiment as a between-subjects design has a number of advantages. Primarily, response/carryover bias will be minimized as respondents are presented with less scenarios than if the full experiment were to be carried out as a within-subject design. Furthermore, presenting each respondent with fewer scenarios will be faster and easier for respondents. However, more respondents are necessary to achieve a sufficient sample size and it is harder to randomize the samples.

Below, the four parts of the survey are discussed.¹

Part I

The first part of the survey consists of a short scenario sketching a NPD situation. The situation is as follows: the participant is told that they work in the marketing department of a large electronic gadget company, which designs and manufactures a variety of products such as smart devices, voice-controlled personal assistants, and robots that perform repetitive tasks. They are asked to brainstorm an idea for a new product that can be brought to market as soon as possible.

Respondents are then randomly assigned to one of four reward conditions (individual recognition, individual financial, team recognition or team financial rewards), which are briefly explained in the scenario. Respondents are asked to read over the scenario carefully, after which they are asked to come up with a brief creative solution to the sketched problem.

Part II

The second part of the survey is aimed at determining the intrinsic motivation of participants upon reading the scenario with their respective reward scheme. In order to achieve this, the Intrinsic Motivation Inventory (IMI) is used as a means of measuring intrinsic motivation. The nature of the IMI was explained in chapter 2.7 of this paper.

Many of the items in the inventory overlap and are similar in nature. Therefore, it is chosen to choose 3 items per subcategory. Shorter versions of the inventory have been found to be reliable and participants should not be burdened with answering all 45 monotonous items. Furthermore,

¹ The full survey that was distributed to participants can be found in Appendix 1.

the subcategory 'Relatedness' has been left out of this research, as it is not relevant to the framed scenario and this research.²

The items in the survey have been modified to more accurately suit the scenario framed in Part I of the survey.³

Part III

The third part of the survey is a manipulation check to make sure the respondents registered the condition they were assigned, essentially testing whether or not the manipulation was successful and whether the results of the survey can be used for analysis.

Part IV

The last part of the survey is created to obtain background information about the respondents' demographics. The questions establish the gender, age, occupation and completed education level. The purpose of these questions is to better understand the demographics of the sample and this will also allow for more specific analyses in the results section.

3.2 Research Sample and Data Collection

The target audience of this research was marketing and business students. In the near future, these students are likely to be involved in new product development or other creative tasks within organizations that hold relevance to marketing activities. As such, they are a suitable target group.

The survey was distributed online using non-probability sampling. The respondents were primarily selected through judgmental sampling, by which they were judged to result in a useful and representative sample (namely business and marketing students). Furthermore, some respondents were asked to forward the survey to other business students they knew (such as in other Master group chats), therefore snowball sampling was a second sampling method.

In the end, the research sample consisted of 258 respondents, of which 15 were due to people viewing the survey but failing to respond to all questions. As such, these non-responses were

² A full account of all 45 items as found in the original IMI can be found in Appendix 2.

³ The items used in the survey can be found in Appendix 3.

removed from the dataset, resulting in a sample of 243 respondents. Of these 243 respondents, 63% was male, 33.3% was female and the remaining respondents indicated 'Non-binary' or 'Prefer not to say'. Furthermore, 65.4% of respondents indicated that they were students, with the remaining 34.6% having a range of occupations (mainly in business positions) including project managers, data analyst and marketing. The average age was ..., which is in line with most respondents indicating they are students and 34.6% of respondents indicating that they already hold working positions. Finally, the majority of respondents (53.1%) holds a Bachelor's degree and 28.8% of respondents holds a Master's degree. 11.1% hold a high school degree, and the remaining respondents hold a PhD degree, a degree from some college or less than a high school degree.⁴

3.3 Variables

As explained in chapter 3.1, this research uses the Intrinsic Motivation Inventory as a means of measuring intrinsic motivation. To do so, 18 Likert scales were used, three per category of the IMI for six categories in total (the Relatedness category was left out as it is not relevant to this research). Each Likert scale was measured on 7 points, ranging from strongly disagree (value 1) to strongly agree (value 7). As such, it can be used as a continuous dependent variable in ANOVA analysis.

In order to transform the 18 Likert scales into a continuous variable that could be used in the ANOVA analysis, simply the average of the 18 scales was taken and used as an overall intrinsic motivation variable. This will hold a value between 1 and 7.

For hypothesis 3, in which it is tested whether there is a difference between categories of the IMI, the average of the three scales belonging to that category are taken. For example, questions 1, 7 and 13 of the survey correspond to the first subcategory of the IMI (interest/enjoyment).

3.4 Data analysis methods

In this research paper, both quantitative and qualitative research methods are used. To analyze the quantitative data, statistical analyses are executed using SPSS software. To clearly illustrate the analysis method used to test each hypothesis, these are summarized in Table 1.

⁴ A full overview of the descriptive statistics of the sample can be found in Appendix 4.

Table 1. Hypotheses and statistical tests

	Hypothesis	Statistical test
-	manipulation check	One sample t-test
1	team-based rewards show a stronger positive correlation with intrinsic task motivation than individual rewards	One-way ANOVA
2	recognition rewards show a stronger positive correlation with intrinsic task motivation than financial rewards	One-way ANOVA
2a	the positive relationship between recognition rewards and intrinsic motivation will be higher among individuals (vs. teams)	Two-way ANOVA interaction effect
3a	financial rewards will have a negative effect on perceived choice	One-way ANOVA
3b	recognition rewards will have a higher positive effect on perceived competence than financial rewards	One-way ANOVA
3c	team rewards will have a higher positive effect on perceived competence than individual rewards	One-way ANOVA
3c'	the positive relationship between team rewards and perceived competence will be higher for recognition rewards as opposed to financial rewards	Two-way ANOVA interaction effect

For all statistical analyses, a significance level of 5% will be used. This implies a critical value of 0.05.

Qualitative Data

In Part I of the survey, respondents are asked to come up with a creative idea. This is qualitative data and therefore statistical analyses cannot be used to analyze this data. Therefore, these ideas will be combined into four word clouds (one for every condition) as exploratory research. Subsequently, the length, quality and nature of the ideas in the different word clouds will be compared.

Chapter 4: Research Outcome

In order to most clearly present the research outcomes, this section is split into three subsections. These three subsections are as follows:

4.1 Manipulation check

4.2 Effect of individual vs. team rewards and financial vs. recognition rewards on intrinsic task motivation

4.3 Using individual categories of the Intrinsic Motivation Index IMI categories as dependent variables

4.4 Post-hoc test using age and education level as covariates

In this chapter, merely the results are presented. The implications of these results will be discussed in the next chapter.

4.1 Manipulation Check

Firstly, it was tested whether the manipulation was effective. After filling in the questions targeting respondents' intrinsic motivation, two questions were asked regarding the scenario that was presented to them in the first part of the survey. These questions are labelled question 19 and question 20. Respondents had to indicate whether the firm in the scenario they read offered team rewards (strongly disagree – strongly agree) and financial rewards (strongly disagree – strongly agree). If respondents were able to indicate correctly which reward scheme was presented to them in their scenario, it confirmed that they internally registered the reward, and the manipulation was effective. Table 2 shows the mean responses for each condition, including the expected value (EV) of their response (people with condition individual – financial were expected to put strongly disagree for Q19 and strongly agree for Q20).

Table 2. Mean response to manipulation check questions (Q19 and Q20)

Reward Scheme	Mean response*			
	Individual – financial	Individual – recognition	Team – financial	Team – recognition
<i>Question</i>				
<i>Q19: This firm offered team rewards</i>	1.754 (EV = 1)	1.541 (EV = 1)	4.133 (EV = 5)	4.082 (EV = 5)
<i>Q:20 This firm offered financial rewards</i>	4.590 (EV = 5)	1.770 (EV = 1)	4.450 (EV = 5)	1.934 (EV = 1)

*respondents were presented with a 5-point Likert scale ranging from strongly disagree to strongly agree, where value 1 is attached to strongly disagree and value 5 is attached to strongly agree

The mean value of the responses suggests that for each scenario, the majority of respondents accurately recalled which treatment condition they were given. For example, for the individual-financial reward treatment, the best response would have been strongly disagree for question 19 (value of 1) and strongly agree for question 20 (value of 5). The mean response of the 61 respondents assigned to this condition suggests that the most respondents were aware of the condition they were assigned to indicated by the mean value of 1.754 for the first question and 4.590 for the second question. These means are similar across all four treatment conditions. This would suggest that respondents interpreted their treatment condition correctly and the results of the survey are valid.

In order to confirm that the manipulation was effective, one-sample t-tests were carried out for both question 19 and 20 in each treatment condition. In this test, the mean values from the Likert scale were compared to a mean value of 3 (the value attached to neither agree nor disagree in the Likert scale). The result of the one-sample t-tests indicate that the means for each question for each treatment condition are significantly different from 3 at a significance level of 5%, as shown in Table 3.

Table 3. Statistical analysis for manipulation check

Treatment condition		Mean	t-statistic	Degrees of freedom	p-value
Individual-financial	Q19	1.754	-8.258	60	<0.000
	Q20	4.590	16.809	60	<0.000
Individual-recognition	Q19	1.541	-12.591	60	<0.000
	Q20	1.770	-8.841	60	<0.000
Team-financial	Q19	4.133	8.700	59	<0.000
	Q20	4.450	11.413	59	<0.000
Team recognition	Q19	4.082	6.877	60	<0.000
	Q20	1.934	-6.805	60	<0.000

This implies that respondents correctly recalled the treatment condition to which they were assigned, which is crucial for the research purposes of this paper. As such, the analysis of intrinsic motivation in different reward schemes can go forward.

4.2 Effect of individual vs. team rewards and financial vs. recognition rewards on intrinsic task motivation

The hypotheses that will be tested in this subsection are Hypothesis 1 and Hypothesis 2. Hypothesis 1 states that team-based rewards show a stronger positive correlation with intrinsic task motivation than individual rewards. To establish a statistical difference in intrinsic motivation between individual-based rewards and team-based rewards, a one-way ANOVA was carried out⁵.

Before the results of this one-way ANOVA are discussed, the assumptions of ANOVA (see Table 4) were tested in order to check if the data is suitable.

⁵ The average intrinsic motivation for each reward type can be found in Appendix 5.

Table 4. Assumptions of ANOVA

Assumption	Application to this research	Met?
Dependent variables are interval or ratio level	Intrinsic motivation measured as an interval scale	Yes
Independent variables are two or more categorical, independent groups	Type of reward scheme (individual vs. team & financial vs. recognition) are categorical and independent	Yes
Independent observations in each group (no people participating in both groups)	Every participant assigned separate reward schemes	Yes
No significant outliers in the data	Likert scales measured from 1-7, no significant outliers	Yes
Dependent variables are normally distributed	Although the Shapiro-Wilk test for normality showed a significance <0.05, the histogram and Q-Q plot suggest the data is approximately normally distributed. Furthermore, ANOVA is considered to be a fairly robust test ⁶ .	Yes
Homogeneity of variances (Levene's test)	For each ANOVA test, there was no Levene statistic with significance <0.05 ⁷	Yes

As all assumptions of ANOVA have been met, the one-way ANOVA analysis can go forward. The grouping factor was the reward type (individual-based vs. team-based) and the dependent variable was intrinsic motivation. Intrinsic motivation was measured using 18 factors of the Intrinsic Motivation Index, using 7-point Likert scales ranging from strongly disagree to strongly agree. The result of the one-way ANOVA shows a statistically insignificant result at the 5% significance level with $F(1, 241) = 0.602$ and $p = 0.432^8$. As such, the means of the two groups are not significantly different, and Hypothesis 1 is rejected.

Hypothesis 2 states that recognition rewards show a stronger positive correlation with intrinsic task motivation than financial rewards. To establish a statistical difference in intrinsic motivation between financial rewards and recognition rewards, a one-way ANOVA was carried out. The grouping factor was the reward type (financial vs. recognition) and the dependent variable was intrinsic motivation. The result of the one-way ANOVA shows a statistically insignificant result at the 5% significance level with $F(1, 241) = 0.023$ and $p =$

⁶ Histogram and Q-Q plot can be found in Appendix 6.

⁷ All Levene test statistics can be found in Appendix 6.

⁸ ANOVA output for Hypotheses 1, 2, 3a, 3b and 3c can be found in Appendix 7.

0.881. The means of the two groups are not significantly different, and Hypothesis 2 is also rejected.

4.2.1 Testing for an interaction effect

In this subsection, it is tested whether or not there is an interaction effect between the two independent variables individual/team and financial/recognition. Hypothesis 2a states that the positive relationship between recognition rewards and intrinsic motivation will be higher among individuals (vs. teams). A two-way ANOVA was run, using individual/team rewards and recognition/financial rewards as factors and average intrinsic motivation as the dependent variable. The result of the two-way ANOVA shows a statistically insignificant interaction effect at the 5% significance level with $F(1, 241) = 0.093$ and $p = 0.761$. The interaction effect can be seen in Figure 3, which suggests that individuals are more motivated by recognition rewards, and individuals on teams are more motivated by financial rewards.

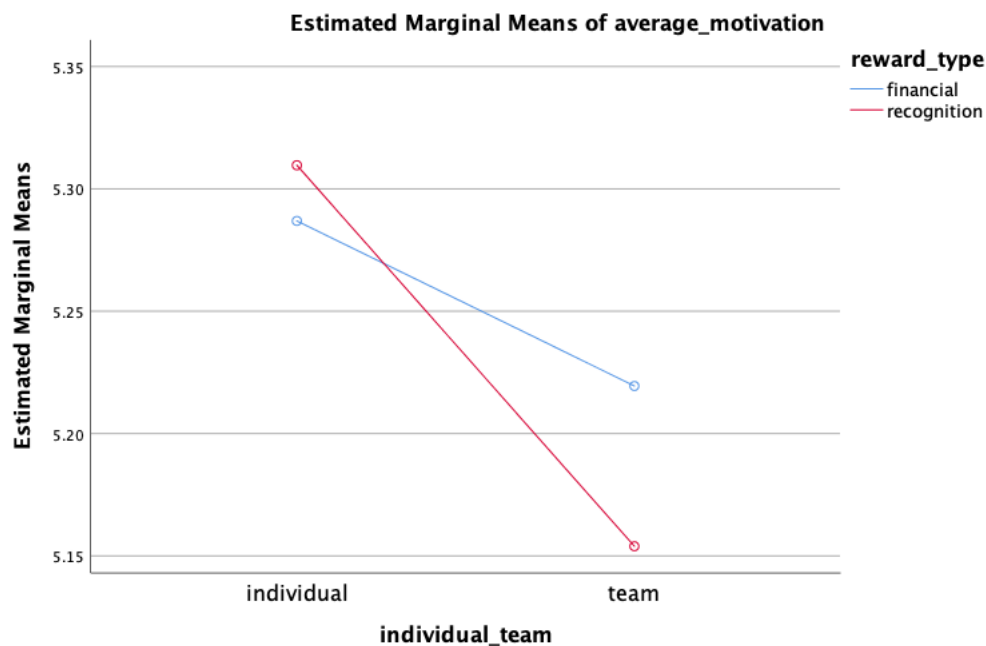


Figure 3. Interaction effect between individual/team and financial/recognition

As the results of the interaction effect in the two-way ANOVA are not significant, Hypothesis 2a is rejected. However, the interaction shown in Figure 3 does support the hypothesis that recognition rewards do indeed lead to higher motivation among individuals compared to individuals on teams.

4.2.2 Creating word clouds for the different treatment conditions

Participants were asked to read a scenario, and then come up with a brief creative idea in response to that scenario. As such, a large number of creative ideas were collected. Although these are not relevant to statistical analysis, there is still value in looking at them and discovering any differences in ideas between the four treatment conditions. Therefore, all the ideas were grouped by treatment condition (individual-financial, individual-recognition, team-financial and team-recognition) and put into word clouds⁹.

After comparing each of the four treatment conditions, no clear differences can be found in word clouds. All conditions have 1-2 responses that say that they could not come up with an idea despite trying. Furthermore, there is no evidence for one condition writing longer or more detailed answers compared to another. Overall, it is noticeable that a considerable number of ideas are to do with cleaning and cooking. A reason for this could be the repetitive nature of such tasks, and that these come to mind easily when thinking of a robot or smart device that could make your life easier.

4.3 Using individual categories of the Intrinsic Motivation Index IMI categories as dependent variables

An interesting aspect of this research is to examine if there is an effect of different reward schemes on the different subcategories of the Intrinsic Motivation Inventory. Using more specific measures of intrinsic motivation (per category of the IMI) could have a different effect on intrinsic motivation as compared to the insignificant results from chapter 4.2. In this section, Hypotheses 3a, 3b and 3c will be tested.

Hypothesis 3a states that financial rewards will show a weaker positive correlation on perceived choice than recognition rewards. To establish a statistical difference in intrinsic motivation between financial rewards and recognition rewards, a one-way ANOVA was carried out. The grouping factor was the reward type (financial vs. recognition) and the dependent variable was perceived choice. The result of the one-way ANOVA shows a statistically insignificant result at the 5% significance level with $F(1, 241) = 0.614$ and $p = 0.434$. Therefore, the means of the two groups are not significantly different, and Hypothesis 3a is rejected.

⁹ The four word clouds can be found in Appendix 8.

Besides perceived choice, perceived competence is another category of the IMI which makes up an essential part of the self-determination theory. Again, it was assumed that the reward type (recognition vs. financial) would have an effect on the perceived competence of participants. Hypothesis 3b states that recognition rewards will have a higher positive effect on perceived competence than financial rewards. To establish a statistical difference in intrinsic motivation between financial rewards and recognition rewards, a one-way ANOVA was carried out. The grouping factor was the reward type (financial vs. recognition) and the dependent variable perceived competence. The result of the one-way ANOVA shows a statistically insignificant result at the 5% significance level with $F(1, 241) = 0.058$ and $p = 0.810$. Therefore, the means of the two groups are not significantly different, and Hypothesis 3b is rejected.

Finally, Hypothesis 3c states that team rewards will have a higher positive effect on perceived competence than individual rewards. Again, a one-way ANOVA was run, using reward type (individual vs. team) as the grouping factor and perceived competence was once more the dependent variable. The result of the one-way ANOVA shows a statistically insignificant result at the 5% significance level with $F(1, 241) = 0.172$ and $p = 0.679$. As such the means of the two groups are not significantly different, and Hypothesis 3c is rejected.

Although highly insignificant, the interaction between individual/team and financial/recognition rewards with perceived competence as dependent variable leads to an interesting outcome. Recognition rewards show lower perceived competence among individuals compared to financial rewards, yet higher perceived competence for individuals in teams compared to financial rewards. However, due to a significance level of $p = 0.705$ this interaction is (although interesting) highly insignificant. Therefore, Hypothesis 3c' is rejected.

4.3.1 Other notable outcomes

Hypotheses 3a, 3b and 3c were determined as hypotheses because in the process of reviewing literature and doing research on the topic, perceived choice and perceived competence were the most prominent in existing literature, as well as being two of three overarching themes of self-determination theory. However, one-way ANOVAs were run on all six categories of the IMI that were used in this research, and notable outcomes of this will be discussed here.

When comparing recognition rewards and financial rewards, the results of all one-way ANOVAs (for categories interest/enjoyment, effort/importance, pressure/tension and value/usefulness) were all highly insignificant meaning there was practically no difference between the two reward types.

However, when comparing team rewards and individual rewards, the results became less insignificant. This led to one category being significant at the 5% level. The category effort/importance showed a statistical difference between team and individual rewards at the 5% significance level, with $F(1, 241) = 4.420$ and $p = 0.037$. As such, the means of the two groups are significantly different. However, by observing the means of each category, it can be seen that the average effort/importance of those participants who anticipated receiving individual rewards is higher (5.175) than that of those participants who anticipate receiving team rewards (4.780). Therefore, participants who were assigned individual rewards on average showed a higher effort/importance rating than participants who were assigned team rewards¹⁰.

4.4 Post-hoc test using age and education level as covariates

As each participants' age was recorded in the survey, post-hoc one-way ANOVAs were run in order to test if age as a covariate influences the relationship between the different reward schemes and intrinsic motivation. Primarily, it was tested on individual vs. team rewards. The outcome of the one-way ANOVA with age as a covariate had an F-value of 0.812 resulting in a significance of 0.368, which means that there are no statistically significant differences in intrinsic motivation between the two groups when adjusted for age. This is supported by the means of the two groups before and after adjusting for age: an average intrinsic motivation of 5.331 for individual rewards before adjusting for age compared to a mean of 5.322 after adjusting for age. Similarly, for team rewards the average intrinsic motivation was 5.191 before and 5.200 after adjusting for age.

Next, it was tested if age had an influence on financial vs. recognition rewards. The outcome of the one-way ANOVA with age as a covariate had an F-value of 0.174 resulting in a significance of 0.677, which means that there are no statistically significant differences in intrinsic motivation between the two groups when adjusted for age. This is supported by the

¹⁰ All ANOVA output regarding the remaining categories of the IMI can be found in Appendix 9.

slim difference in means of the two groups before and after adjusting for age: an average intrinsic motivation of 5.267 for individual rewards before adjusting for age compared to a mean of 5.232 after adjusting for age. Similarly, for team rewards the average intrinsic motivation was 5.256 before and 5.289 after adjusting for age.

For the covariate education level, similar results were found. The p-values for both individual vs. team rewards and financial vs. recognition rewards were not significant and the difference between average motivation before and after the education level adjustment was minimal.¹¹

An overview of the most significant outcomes of the research is presented in Table 5.

Table 5. Hypotheses and outcomes of research

	Hypothesis	Test and outcome of test	Reject hypothesis?
1	team-based rewards show a stronger positive correlation with intrinsic task motivation than individual rewards	One-way ANOVA: insignificant	Reject
2	recognition rewards show a stronger positive correlation with intrinsic task motivation than financial rewards	One-way ANOVA: insignificant	Reject
2a	The positive relationship between recognition rewards and intrinsic motivation will be higher among individuals (vs. teams)	Two-way ANOVA interaction: insignificant	Reject
3a	financial rewards will have a negative effect on perceived choice	One-way ANOVA: insignificant	Reject
3b	recognition rewards will have a higher positive effect on perceived competence than financial rewards	One-way ANOVA: insignificant	Reject
3c	team rewards will have a higher positive effect on perceived competence than individual rewards	One-way ANOVA: insignificant	Reject
3c'	the positive relationship between team rewards and perceived competence will be higher for recognition rewards as opposed to financial rewards	Two-way ANOVA interaction: insignificant	Reject

¹¹ All ANCOVA output regarding age and education level can be found in Appendix 10.

Chapter 5: Discussion

In this chapter, the initial research question around which this research is centered will be answered. Furthermore, hypotheses will be accepted or refuted and managerial and theoretical implications of this research will be discussed. The initial research question is:

In the creative process of idea generation, what is the influence of individual-based versus team-based external rewards on intrinsic task motivation?

5.1 Theoretical Implications

The importance of creativity in New Product Development is undisputed. Firms thrive when they can market innovative products, the fruits of creative thinking from individuals and teams within the organization. The influence of extrinsic and intrinsic motivators on performance, more specifically creative performance, has been widely researched. Malik, Butt & Choi (2014), among others, found that both extrinsic and intrinsic factors play a role in employee creativity. As such, extrinsic rewards can serve as great motivators to enhance performance and allow employees to reach more favorable creative outcomes.

In the creative process, the influence of social interaction and teamwork is important. Sharing and communicating ideas are key instruments in enhancing creativity (Kanter, 1988, Woodman et al., 1993). Therefore, the influence of team-based versus individual-based rewards was researched. Team-based rewards oftentimes stimulate cooperation in groups (DeMatteo, Eby & Sundstrom, 1998), and may have a positive influence on the collective motivation of group members (Shamir, 1990). Therefore, it was hypothesized that team-based rewards show a stronger positive correlation with intrinsic task motivation than individual rewards. It was found that there is no significant difference in the intrinsic task motivation felt by those who anticipate receiving individual rewards and those who anticipate receiving team rewards, which means that Hypothesis 1 is rejected. In fact, the two groups showed very similar intrinsic task motivation, which led to a very low F-statistic and a high p-value. Further exploratory research comparing word clouds of the two groups' creative ideas did not lead to any visible key differences. These results conflict with existing literature. However, it has to be considered that in this research, the participants never felt any social interaction because they simply read that they would get the rewards as a team. In real-life situations, it may be more likely that team rewards do indeed lead to higher intrinsic task motivation.

A second part of this research set out to assess the effect of such external financial rewards on intrinsic task motivation and compare it to the effect of recognition rewards on intrinsic task motivation. Early research in the field suggested that (financial) external rewards would be controlling and actually undermine the intrinsic motivation of employees (Amabile, 1983). Conflicting points of view followed, with one body of research arguing that external rewards such as financial rewards actually enhanced intrinsic motivation (Eisenberger, Pierce & Cameron, 1999) and another suggesting that external rewards do indeed undermine intrinsic motivation and thus harm performance (Deci, Ryan & Koestner, 1999; Wiersma, 1992).

This research commenced with a one-way ANOVA exploring whether there is a significant difference in employees' intrinsic motivation when they anticipated receiving financial rewards as opposed to when they anticipate receiving recognition rewards. It was hypothesized that recognition rewards show a stronger positive correlation with intrinsic task motivation than financial rewards. It was found that there is no significant difference in the intrinsic task motivation felt by the two different groups, which means that Hypothesis 2 is rejected. In fact, the two groups showed very similar intrinsic task motivation, which led to a very low F-statistic and a high p-value. Further exploratory research comparing word clouds of the two groups' creative ideas did not lead to any visible key differences. These results conflict with existing literature, for example that of Malek, Sarin & Haon (2020) who found a negative relationship between financial rewards and intrinsic task motivation. However, the fact that this research was executed using an online survey, where participants did not actually receive tangible recognition or financial rewards, could be the main reason for the similarity between these two groups. As such, the research would have to be carried out again as a field experiment or through observing real-life NPD teams with different reward schemes.

An interesting outcome of this research was the interaction between the two independent variables individual/team rewards and recognition/financial rewards. Although the interaction was insignificant overall and Hypothesis 2a was rejected, the outcome suggests that individuals are more motivated by recognition rewards, whereas individuals on teams are more motivated by financial rewards. This in itself is a highly interesting but not entirely surprising outcome. It can be explained by the notion that someone will get all the praise when receiving a recognition reward as an individual, whereas the value of this reward is diminished when it is awarded to a team because multiple individuals will get the praise. Contrarily, a financial reward maintains the same value, whether you receive it as an individual or as an individual in

a team. The outcome of this interaction underlines the need for a field experiment because this could provide a significant, more reliable confirmation of the interaction.

The final part of this research tested whether the four different reward schemes would have an effect on the individual categories of the Intrinsic Motivation Inventory. It was hypothesized that financial rewards will have a negative effect on perceived choice, that recognition rewards will have a higher positive effect on perceived competence than financial rewards and that team rewards will have a higher positive effect on perceived competence than individual rewards. Once more, none of the reward schemes were significantly different from each other, which means that Hypotheses 3a, 3b and 3c are rejected. Similar to Hypothesis 1 and 2, it has to be noted that if this research would be held in experimental form that the outcome may have been entirely different.

One significant result is noted, however. The category effort/importance showed a statistical difference between team and individual rewards, where the group anticipating receiving individual rewards showed a higher intrinsic task motivation. This outcome is somewhat surprising, as existing literature and common sense would suggest that teamwork and team rewards would lead to a higher motivation to complete a task.

It is worth mentioning that this research measured the anticipation of rewards in the first stage of an NPD project, without actually handing out the rewards. Therefore, comments about the effect of rewards on motivation in later stages of product development cannot be made.

5.2 Managerial Implications

Due to the lack of significance in the results of this research, it is hard to give concise managerial implications. Despite the outcomes of this research, reward schemes will continue to play an important role in the motivation of employees. However, what can be learned is that although there is no significant difference in intrinsic motivation between different reward schemes, the intrinsic task motivation for involvement in NPD idea generation is high across all four conditions. The average motivation is higher than 5 (on a scale of 1-7, see appendix 5) for each reward scheme, suggesting that individuals are on average highly motivated to get involved in and work on NPD projects.

Therefore, it is recommended that firms actually shift their focus away from rewards during the initial stages of product development. Instead, they should focus on the nature, importance and contribution of the task itself during initial recruitment. More resources can be allocated to filtering through different ideas for new products, to processes which enhance the efficiency of employees and to essential analyses such as market analysis and opportunity identification.

Of course, the outcome of this research does not mean that reward schemes are unimportant. However, the importance of different types of rewards may increase in later stages of product development as products get closer to being marketed.

Chapter 6: Conclusion

This research set out to assess the influence of different reward schemes (namely financial, recognition, team and individual rewards) on the intrinsic motivation to perform creative tasks. Furthermore, the effect of these reward schemes on different categories of the Intrinsic Motivation Index were also investigated. Overall, it was found that there is no significant difference in intrinsic motivation between the different reward schemes. However, one significant result was found: participants who anticipate receiving individual rewards on average showed a significantly higher effort/importance than participants who anticipated receiving team rewards. As such, it is recommended that managers focus on other aspects of product development in its early stages such as market analysis.

6.1 Research Limitations

Like all research papers, this research also has its limitations. Primarily, the different conditions (ie. the different reward schemes) may not have been differentiated enough. Although the participants did register which reward they were to receive (as the manipulation check was successful), the reward scheme may not have been emphasized enough in the explanation of the scenario. This may be a reason for the results being largely the same across all four reward groups. Therefore, some more attention must be paid to this, such as explaining in more detail the type of reward or stating monetary values to those who anticipated receiving financial rewards. Additionally, survey form was perhaps not the best format for this type of research. Ideally, real-life NPD teams earning different types of rewards would have been studied and compared. However, this is not entirely realistic due to time and resource constraints. Similarly, an actual, real-life experiment could be held in which participants actually received tangible rewards (such as small financial compensation or a small trophy). This would, most likely, improve the reliability of the results and would lead to potential different outcomes, with significant differences in intrinsic motivation of participants who receive different rewards.

Another limitation of this research is the nature of the survey format. It appears that participants are less motivated to fill in surveys, especially when there are 18 Likert scales that have to be answered, all similar in nature. This may lead to less concentration and less accurate answers from participants. Furthermore, some participants did not fully understand the task of coming up with a creative idea, rather they understood it as though they had to come up with ways to

make the business more profitable. These misunderstandings can be prevented when running a real-life experiment.

6.2 Recommendations for future research

There is considerable potential to develop this research, both in this field and outside of it. Primarily, doing this in an actual experimental form would offer more reliable and quite possible different results. This experiment would consist of offering participants tangible rewards, instead of having them read a scenario like in this research.

In doing so, it could also be investigated if there is an effect of process vs. outcome rewards. Sarin & Mahajan (2001) found that in long and complex projects, “process-based rewards have a negative effect and outcome-based rewards have a positive effect on performance”. Process-based rewards are related to the conduct and methods of the creative process and achieving desired outcomes, for example by showing good teamwork or achieving certain steps in a process (Deschamps & Nayak, 1995). This could be a realistic and valuable addition to the four existing reward schemes.

Finally, it would be valuable to extend this research beyond the scope of creativity and new product development. In doing so, different types of jobs, businesses and professional fields can be examined. It would be interesting to see whether in some fields, certain reward schemes are more effective and lead to higher intrinsic motivation among employees.

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Appendices

Appendix 1. Full survey

Part I – NPD Scenario

Participants are randomly presented with 1 of the 4 following scenarios:

Scenario 1:

You work in the marketing department of a large electronic gadget company. This company designs and manufactures a variety of products such as smart devices, voice-controlled personal assistants, and robots that perform repetitive tasks. Your CEO is looking for the next big idea. You are asked to brainstorm ideas for new products that can be brought to market as soon as possible.

If the eventual launch of your product is successful, you as an **individual** will receive a **financial bonus** based on the product's success. The better the sales of the product, the higher the financial reward.

Please provide a brief idea for a product for your company.

Scenario 2:

You work in the marketing department of a large electronic gadget company. This company designs and manufactures a variety of products such as smart devices, voice-controlled personal assistants, and robots that perform repetitive tasks. Your CEO is looking for the next big idea. You are asked to brainstorm ideas for new products that can be brought to market as soon as possible.

If the eventual launch of your product is successful, you as an **individual** will receive the company's **prestigious annual innovation award**. This award is highly regarded by people in the industry and is an important symbol of recognition.

Please provide a brief idea for a product for your company.

Scenario 3:

You work in the marketing department of a large electronic gadget company. This company designs and manufactures a variety of products such as smart devices, voice-controlled personal assistants, and robots that perform repetitive tasks. Your CEO is looking for the next big idea. You are asked to brainstorm ideas for new products that can be brought to market as soon as possible.

If the eventual launch of your team's product is successful, each **member of your team** will receive a **financial bonus** based on the product's success. The better the sales of the product, the higher the financial reward.

Please provide a brief idea for a product for your company.

Scenario 4:

You work in the marketing department of a large electronic gadget company. This company designs and manufactures a variety of products such as smart devices, voice-controlled personal assistants, and robots that perform repetitive tasks. Your CEO is looking for the next big idea. You are asked to brainstorm ideas for new products that can be brought to market as soon as possible.

If the eventual launch of your team's product is successful, **your team** will receive the company's **prestigious annual innovation award**. This award is highly regarded by people in the industry and is an important symbol of recognition.

Please provide a brief idea for a product for your company.

Part II – IMI items

Table 6. List of questions in survey

Question #	Question	Category of IMI	Measurement
1	Coming up with a creative idea was a fun activity to do.	Interest/Enjoyment	7-point Likert scale
2	I think my idea is quite good, compared to others.	Perceived Competence	7-point Likert scale
3	I put a lot of effort into this activity.	Effort/Importance	7-point Likert scale
4	I did not feel nervous at all while reading the scenario and coming up with a creative idea.	Pressure/Tension	7-point Likert scale
5	I felt like it was my own choice to do this task.	Perceived Choice	7-point Likert scale
6	I believe that my creative idea could hold some value for society.	Value/Usefulness	7-point Likert scale
7	This activity held my attention well.	Interest/Enjoyment	7-point Likert scale
8	I am satisfied the idea I came up with.	Perceived Competence	7-point Likert scale
9	I tried very hard to come up with a good idea.	Effort/Importance	7-point Likert scale
10	I was very relaxed while coming up with a creative idea.	Pressure/Tension	7-point Likert scale
11	I feel like I had a choice in doing this activity.	Perceived Choice	7-point Likert scale
12	I believe that my creative idea could hold some value for myself.	Value/Usefulness	7-point Likert scale
13	I would describe this activity as very interesting.	Interest/Enjoyment	7-point Likert scale
14	Overall, I would say I am pretty skilled at this activity.	Perceived Competence	7-point Likert scale
15	It was important to me to do well at this task.	Effort/Importance	7-point Likert scale
16	I did not feel pressured to perform while coming up with a creative idea.	Pressure/Tension	7-point Likert scale
17	I did this activity because I wanted to.	Perceived Choice	7-point Likert scale
18	I think that doing this activity was useful.	Value/Usefulness	7-point Likert scale

Part III – Manipulation Check

Table 7. Manipulation check questions in survey

Question #	Question	Measurement
19	This company gives team-based rewards	5-point Likert scale
20	This company gives financial rewards	5-point Likert scale

Part IV – Background Information

Table 8. Background information questions in survey

Question #	Question	Question Type	Options
21	What is your gender?	Multiple Choice	<ul style="list-style-type: none">• Male• Female• Non-binary/third gender
22	What is your age?	Open entry of value	-
23	What is your main occupation?	Multiple Choice	<ul style="list-style-type: none">• Student• Other, namely:
24	Please select your highest attained education level.	Multiple Choice	<ul style="list-style-type: none">• Less than high school• High school• Some college• Bachelor degree• Master degree• PhD degree

Appendix 2. Intrinsic Motivation Inventory

Interest/Enjoyment

I enjoyed doing this activity very much

This activity was fun to do.

I thought this was a boring activity. (R)

This activity did not hold my attention at all. (R)

I would describe this activity as very interesting.

I thought this activity was quite enjoyable.

While I was doing this activity, I was thinking about how much I enjoyed it.

Perceived Competence

I think I am pretty good at this activity.

I think I did pretty well at this activity, compared to other students.

After working at this activity for awhile, I felt pretty competent.

I am satisfied with my performance at this task.

I was pretty skilled at this activity.

This was an activity that I couldn't do very well. (R)

Effort/Importance

I put a lot of effort into this.

I didn't try very hard to do well at this activity. (R)

I tried very hard on this activity.

It was important to me to do well at this task.

I didn't put much energy into this. (R)

Pressure/Tension

I did not feel nervous at all while doing this. (R)

I felt very tense while doing this activity.

I was very relaxed in doing these. (R)

I was anxious while working on this task.

I felt pressured while doing these.

Perceived Choice

I believe I had some choice about doing this activity.

I felt like it was not my own choice to do this task. (R)

I didn't really have a choice about doing this task. (R)

I felt like I had to do this. (R)

I did this activity because I had no choice. (R)

I did this activity because I wanted to.

I did this activity because I had to. (R)

Value/Usefulness

I believe this activity could be of some value to me.

I think that doing this activity is useful for _____

I think this is important to do because it can _____

I would be willing to do this again because it has some value to me.

I think doing this activity could help me to _____

I believe doing this activity could be beneficial to me.

I think this is an important activity.

Relatedness

I felt really distant to this person. (R)

I really doubt that this person and I would ever be friends. (R)

I felt like I could really trust this person.

I'd like a chance to interact with this person more often.

I'd really prefer not to interact with this person in the future. (R)

I don't feel like I could really trust this person. (R)

It is likely that this person and I could become friends if we interacted a lot.

I feel close to this person.

Appendix 3. Items of the IMI used in this research

Interest/Enjoyment

Coming up with a creative idea was a fun activity to do.

This activity held my attention well.

I would describe this activity as very interesting.

Perceived Competence

I think my idea is quite good, compared to others.

I am satisfied the idea I came up with.

Overall, I would say I am pretty skilled at this activity.

Effort/Importance

I put a lot of effort into this activity.

I tried very hard to come up with a good idea.
 It was important to me to do well at this task.

Pressure/Tension

I did not feel nervous at all while reading the scenario and coming up with a creative idea.
 I was very relaxed while coming up with a creative idea.
 I did not feel pressured to perform while coming up with a creative idea.

Perceived Choice

I felt like it was my own choice to do this task.
 I feel like I had a choice in doing this activity.
 I did this activity because I wanted to.

Value/Usefulness

I believe that my creative idea could hold some value for society.
 I believe that my creative idea could hold some value for myself.
 I think that doing this activity was useful.

Appendix 4. Descriptive statistics of the sample

Table 9. What is your gender?

	Frequency	Percent	Cumulative Percent
Male	153	63.0	63.0
Female	81	33.3	96.3
Non-binary/third gender	2	0.8	97.1
Prefer not to say	7	2.9	100.0
Total	243	100.0	

Table 10. What is your highest attained education level?

	Frequency	Percent	Cumulative Percent
Less than high school	1	0.4	0.4
High school graduate	27	11.1	11.5
Some college	13	5.3	16.9
Bachelor's degree	129	53.1	70.0
Master's degree	70	28.8	98.8
PhD degree	3	1.2	100.0
Total	243	100.0	

Table 11. What is your main occupation?

	Frequency	Percent	Cumulative Percent
Student	159	65.4	65.4
Other, namely	84	34.6	100.0
Total	243	100.0	

Table 12. Other occupations

	Frequency	Percent	Cumulative Percent
Accountant	1	1.19	1.19
Advertising/marketing	8	9.52	10.71
Artist	1	1.19	11.90
Call center	1	1.19	13.09
Consultancy	2	2.38	15.47
Data analyst	4	4.76	20.23
Doctor	1	1.19	21.42
Engineering	5	5.95	27.37
Full-time employee	19	22.62	49.99
IT	7	8.35	58.34
Management	18	21.43	79.77
Part-time employee	3	3.57	83.34
Psychologist	1	1.19	84.53
Sales	3	3.57	88.10
Secretary	1	1.19	89.29
Self- employed/independent contractor	2	2.38	91.67
Software Development	2	2.38	94.05
Teacher	2	2.38	96.43
Unemployed	3	3.57	100.0
Total	84	100.0	

Appendix 5. Average intrinsic motivation for each reward type

Table 13. Average intrinsic motivation per reward type

Reward Type	Mean	Standard Deviation
Individual-financial	5.287	1.284
Individual-recognition	5.310	0.958
Team-financial	5.220	1.053
Team-recognition	5.154	1.187

Appendix 6. Assumptions of ANOVA

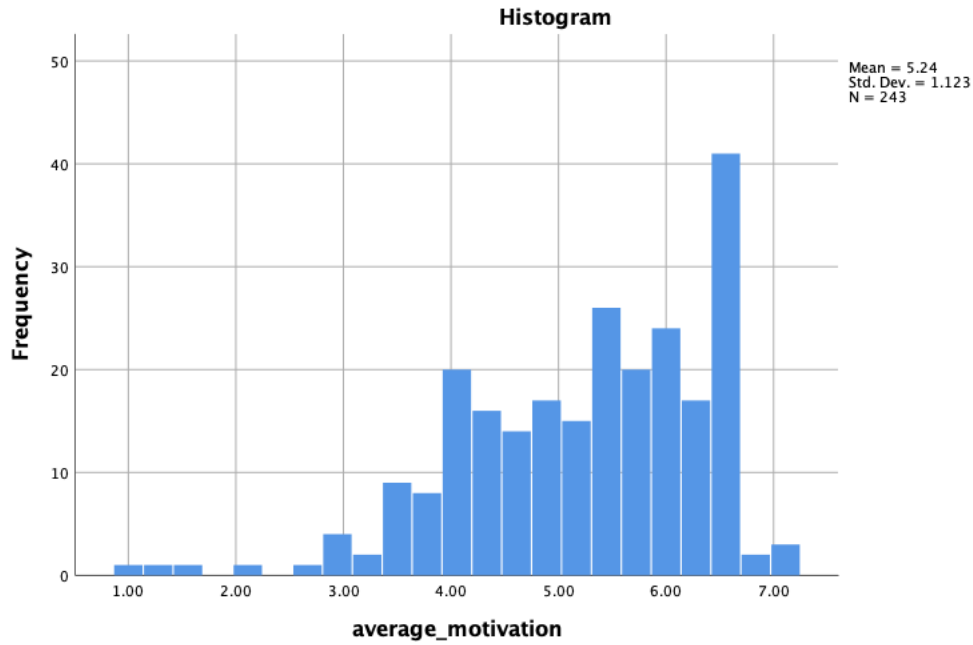


Figure 4. Histogram of distribution average intrinsic motivation

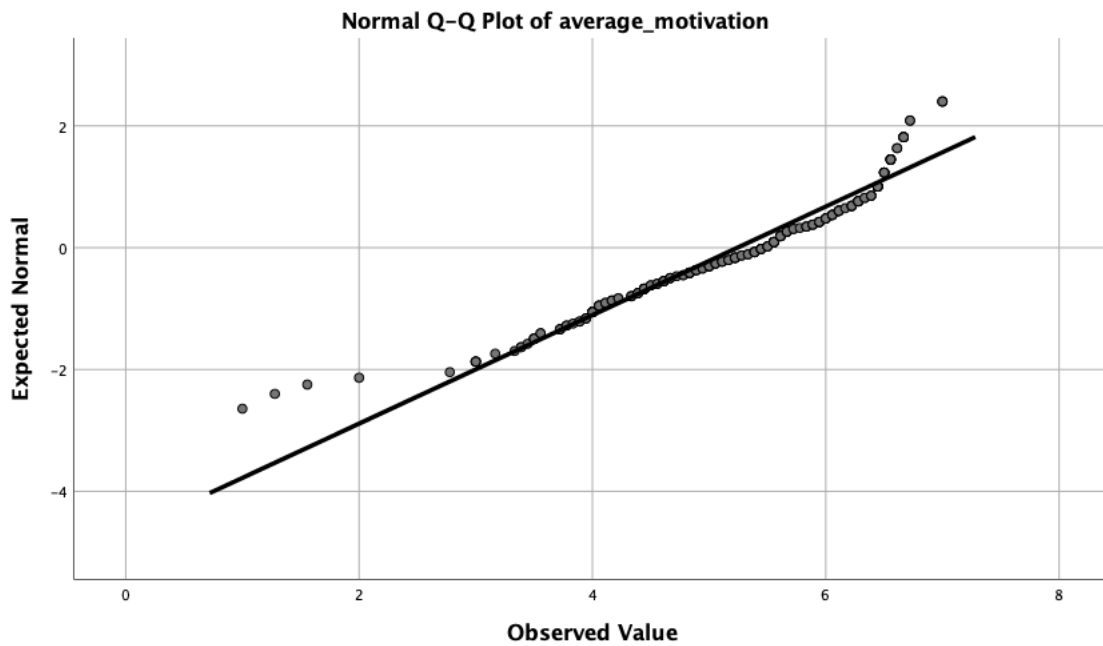


Figure 5. Q-Q plot of average intrinsic motivation

Table 14. Levene's Test Statistics

Dependent Variable		F-statistic	Significance
Average Motivation	Individual/Team	0.116	0.733
	Financial/Recognition	1.965	0.162
Interest/Enjoyment	Individual/Team	0.274	0.601
	Financial/Recognition	2.325	0.129
Perceived Competence	Individual/Team	0.858	0.355
	Financial/Recognition	2.620	0.107
Effort/Importance	Individual/Team	1.803	0.181
	Financial/Recognition	1.012	0.316

Pressure/Tension	Individual/Team	2.231	0.137
	Financial/Recognition	0.730	0.394
Perceived Choice	Individual/Team	0.299	0.585
	Financial/Recognition	0.594	0.442
Value/Usefulness	Individual/Team	<0.000	0.990
	Financial/Recognition	1.117	0.292

Appendix 7. ANOVA output

Table 15. ANOVA output

Hypothesis	Degrees of Freedom	Significance	F-statistic
1	1	0.602	0.438
2	1	0.881	0.023
3a	1	0.434	0.614
3b	1	0.810	0.058
3c	1	0.679	0.172
Interaction effect	1	0.794	0.069

Appendix 8. Word clouds

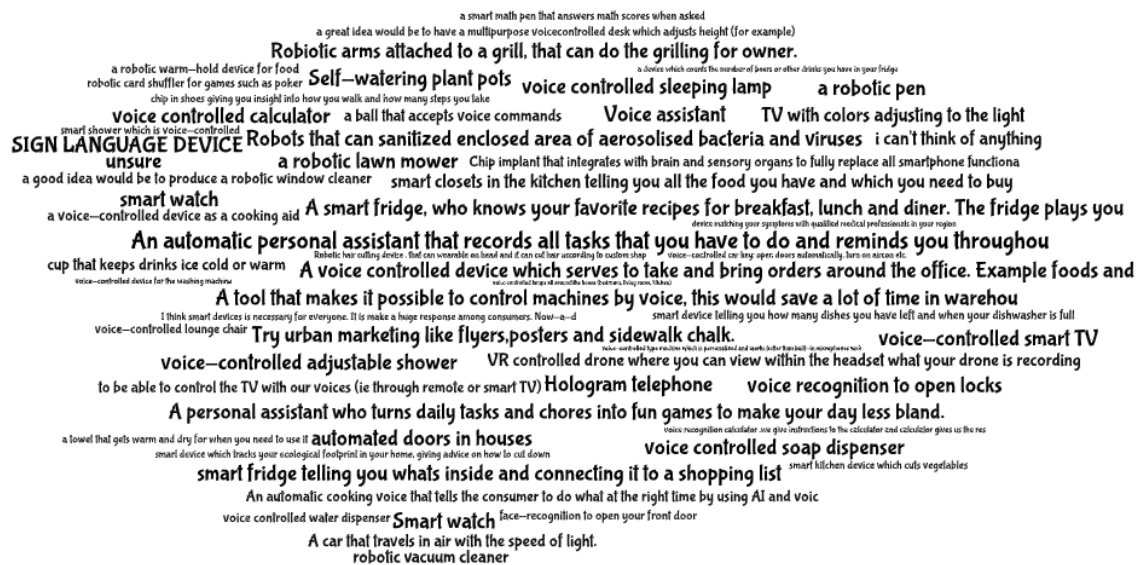


Figure 6. Word cloud for team-recognition condition



Figure 7. Word cloud for team-financial condition

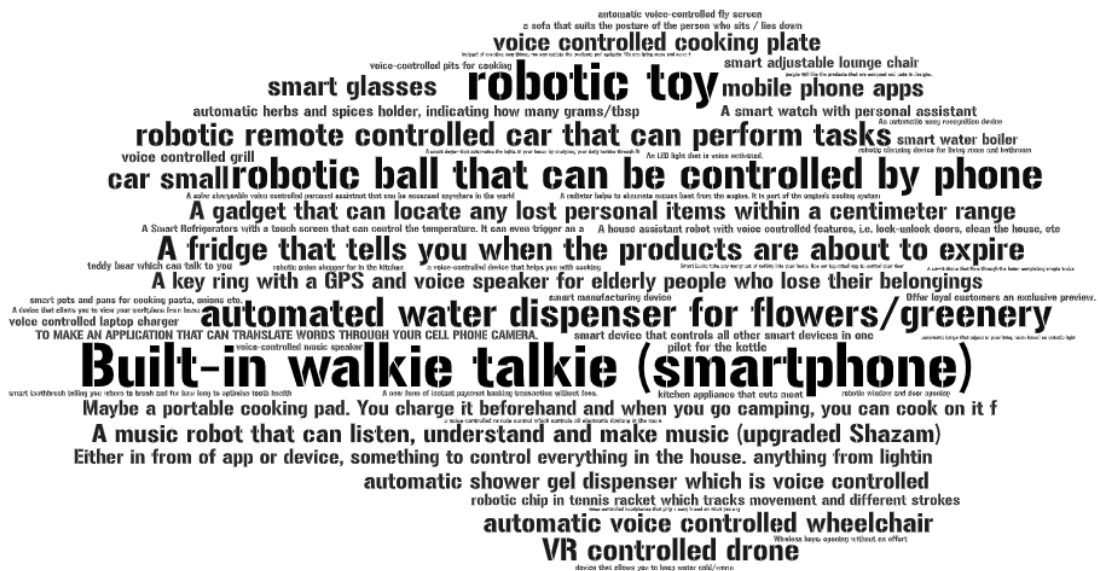


Figure 8. Word cloud for individual recognition condition

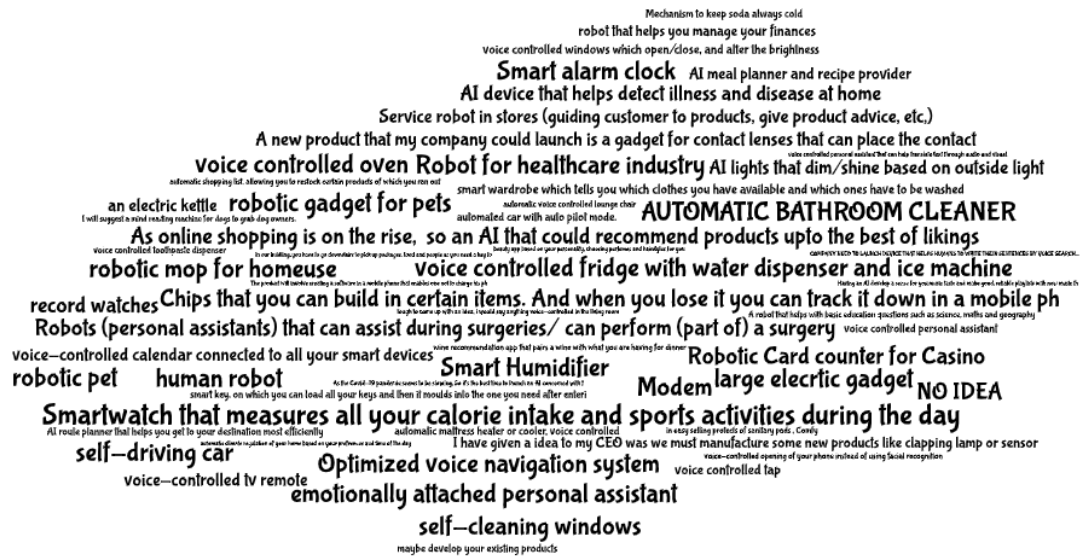


Figure 9. Word cloud for individual financial condition

Appendix 9. ANOVA output for chapter 4.3

Table 16. ANOVA output for chapter 4.3

	IMI category	F-statistic	Significance
Interest/Enjoyment	Individual/Team	0.642	0.424
	Financial/Recognition	0.006	0.938
Effort/Importance	Individual/Team	4.420	0.037
	Financial/Recognition	0.053	0.818
Pressure/Tension	Individual/Team	0.809	0.369
	Financial/Recognition	0.750	0.387
Value/Usefulness	Individual/Team	1.245	0.266
	Financial/Recognition	0.035	0.852

Appendix 10. ANCOVA output for chapter 4.4

Table 17. ANCOVA output for age as a covariate

Reward Scheme	F-statistic	Significance	Mean motivation before adjusting for age	Mean motivation after adjusting for age
Individual			5.331	5.332
	Team	0.642	0.424	5.191
Recognition			5.256	5.289
	Financial	0.174	0.677	5.266

Table 18. ANCOVA output for education level as a covariate

Reward Scheme	F-statistic	Significance	Mean motivation before adjusting for age	Mean motivation after adjusting for age
Individual			5.331	5.328
Team	0.896	0.345	5.191	5.194
Recognition			5.256	5.253
Financial	0.012	0.913	5.266	5.269