

MASTER

**Psychological Factors and Goal Orientations driving Mechanics' Participation in Training Courses
Implications for the Railway Sector**

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Master Thesis

Department of Industrial Engineering & Innovation Sciences

**Psychological Factors and Goal Orientations driving
Mechanics' Participation in Training Courses:
Implications for the Railway Sector**

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Abstract

Skilled labor is critical for construction projects, and a shortage of qualified employees can severely harm the construction sector. Similarly, the Dutch railway sector is facing a shortage of technically trained employees. VolkerRail, a Dutch construction company, is experiencing challenges in hiring and retaining mechanics. To address this problem, VolkerRail established the Rail Competence Center (RCC) to develop training programs for mechanics. This master thesis aimed to investigate the motivations behind mechanics' participation in training courses, specifically Group 1 mechanics, who are expected to benefit the most from the RCC's training initiatives. Understanding these underlying reasons could help create training programs that improve the mechanics' skills and knowledge while also increasing their motivation to succeed.

This master thesis examined the factors that motivate mechanics to engage in training, with a focus on the role of psychological factors. The findings of the qualitative analysis indicated that mechanics were motivated to train to improve their knowledge and abilities, gain workplace autonomy, and keep up with industry trends. Collaboration and support among mechanics were also found to be important. To substantiate these findings, a quantitative investigation was conducted. The study employed the Self-Determination Theory by Ryan and Deci (1985) and Dweck(1999) theory of goal orientation to explain these findings.

The research found that autonomy, competence, and relatedness were essential for fostering and maintaining various motivational states to train among mechanics. When mechanics feel a sense of choice and control over their actions, feel capable and effective, and feel a sense of belonging and connection with others, they are more likely to be intrinsically motivated and experience integrated regulated to participate in training. As a result, mechanics were inspired to participate in training because they find it interesting and enjoyable on its own, and they view the training as worthwhile and significant. Additionally, a relation between mechanics' learning goal orientation and autonomous types of motivation to train was found, suggesting that mechanics driven by personal growth and development are more likely to engage in learning activities. On the contrary, a relation between the performance goal orientations and controlled types of motivation to train was found. This suggests that mechanics with a performance orientation had to be motivated by external rewards and the desire to outperform others.

Practical implications emphasize the importance of the Rail Competence Center's training programs to meet psychological needs, support learning goal orientations and encourage intrinsic motivation. By putting these suggestions into practice, the RCC can establish a learning environment for mechanics that is more efficient and motivating, improving skills, motivation, and overall performance within VolkerRail.

Preface

After seven years of studying, I am delighted to have finally finished my master's thesis. Even though it has been challenging, and following a (pre-) master's will not be on my wish list for the upcoming years, it still feels odd to be at the finish line.

This time last year I was looking for a company from abroad to write my master's thesis, and even though the interview was online, Nico van Zandwijk made me enthusiastic about writing the master's thesis at VolkerRail. VolkerRail provided me with a lot of flexibility, trust, and support. Especially I want to thank Geert, Frank, Nico and Marie-Louise. They helped me by providing feedback and because of them, the data collection was very successful, which I am also really proud of.

I am also grateful to my supervisor Leander van der Meij at the Technical University of Eindhoven, for all the meetings at Atlas 7 North and the hours dedicated to reviewing my work. Even though I struggled initially, the feedback helped me make good improvements. Aside from that, I want to thank Ad Kleingeld, my second supervisor, who was a part of my thesis journey at the very beginning.

At last, I want to thank my parents. Their support and encouragement throughout the years have been invaluable. They always believed in me, even when I doubted myself. In addition, I'd want to thank my friends, family, and other students for their encouragement, support, and occasional distraction while I studied.

Completing this master's thesis has been a journey, and I am thrilled to have finally reached the finish line. I hope my work contributes to the field and helps inform future research and practice for construction companies who are also facing challenges such as training and developing their craft men.

Management summary

The Dutch railway sector was facing a significant challenge as it struggled to meet its required intake of technically trained employees, as highlighted by Technical Valley in 2023. This shortage of skilled workers was also affecting VolkerRail, a Dutch construction company that is specialized in building and maintaining train tracks. In response to this issue, VolkerRail took proactive measures by establishing the Rail Competence Center, a dedicated department focused on fostering craftsmanship and facilitating knowledge transfer.

The primary objective of this master's thesis was to investigate the motivations of mechanics to participate in training programs offered by the Rail Competence Center. To achieve this, a qualitative investigation was conducted, involving semi-structured interviews with 15 male mechanics representing diverse backgrounds and skill sets across various divisions and disciplines. The study aimed to uncover the key factors that drive mechanics' motivation to engage in training. The findings revealed that mechanics are primarily motivated to train to enhance their knowledge and skills, seek workplace autonomy, and stay updated with industry advancements. Additionally, the importance of cooperation and teamwork among mechanics emerged as a motivator. Based on these insights, the study further delved into understanding the psychological motivations and goal orientations underlying mechanics' training efforts. These findings provide valuable insights for optimizing the training program and tailoring it to meet the specific needs and aspirations of mechanics within the industry.

According to the findings of the qualitative analysis, it was determined that the psychological needs of the mechanics were crucial for maintaining training motivation. The Self-Determination Theory by Ryan and Deci (1985) was discovered to be a framework for comprehending these findings. According to the Self-Determination Theory (SDT), autonomy, competence, and relatedness are essential for fostering and maintaining a variety of motivational states (Bureau et al., 2022; Chemolli & Gagné, 2014). Figure 1 depicts a comprehensive array of motivational states, encompassing intrinsic motivation, extrinsic motivation (including integrated regulation, identified regulation, introjected regulation, and external regulation), as well as amotivation. The initial problem diagnostic also indicated that mechanics wanted to advance their skill sets. The goal orientation theory of Dweck (1999) provides the greatest justification for this. Two fundamental dispositional goal orientations were identified: learning goal orientation and performance goal orientation (Elliott & Dweck, 1988).

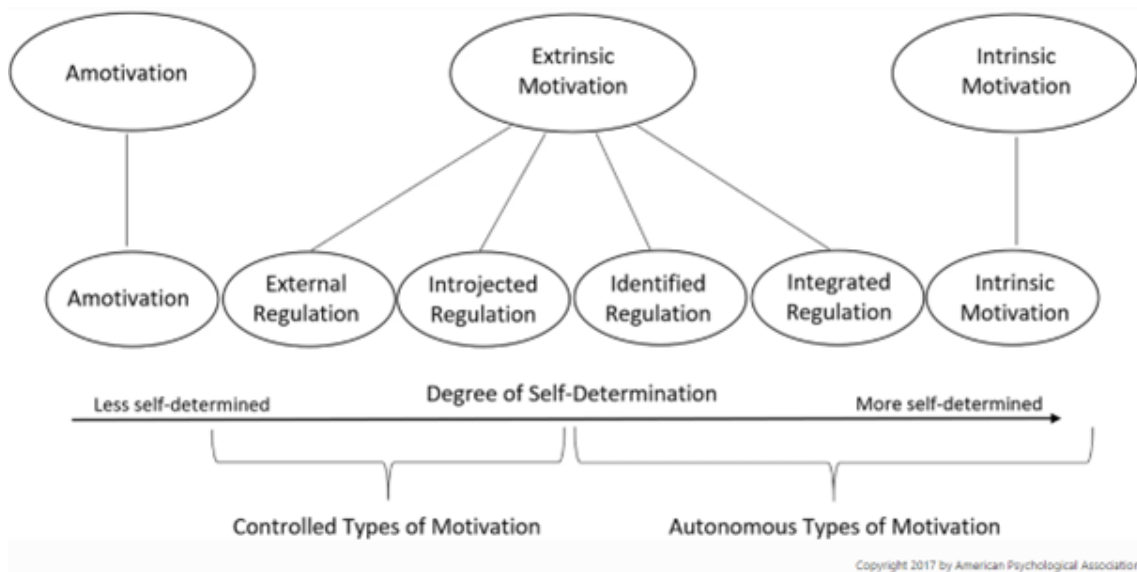


Figure 1: Representation of motivation in SDT (Howard et al., 2017)

The results of this study indicated that mechanics' intrinsic motivation to participate in training is positively influenced when they experience a sense of autonomy, competence, and relatedness. When these psychological needs are satisfied, mechanics are more likely to engage in training activities out of personal interest and value, rather than relying on external rewards or punishments. Additionally, the study revealed a relationship between psychological needs and identified regulation, suggesting that mechanics who perceive their autonomy, competence, and relatedness as fulfilled are more motivated to participate in training because they recognize the value and importance of the outcomes associated with those activities. Furthermore, in comparing the impact of various psychological needs, it was observed that mechanics' high need for competence influenced both intrinsic motivation as well as identified regulation to train the most.

Two effects of learning goal orientation on the relationship between psychological needs and identified regulation to train were identified. The first effect revealed that individuals with a strong learning goal orientation and a high need for autonomy are more likely to exhibit a higher level of identified regulation to engage in training. This suggests that when they perceive training as aligned with their values and interests, they are motivated to participate. The second effect showed that mechanics with a strong learning goal orientation and a high need for relatedness are more likely to demonstrate a higher level of identified regulation to train. This implies that when they perceive training as relevant to their values and feel a sense of connection, they are motivated to participate. No additional effects of learning goal orientation on the relationship between psychological needs and motivation were found. However, direct relationships between learning goal orientation and autonomous types of motivation to learn were observed. These findings suggest that mechanics driven by a desire for personal growth and development are more inclined to engage in learning activities because they find them inherently interesting and

meaningful.

Only one effect was found regarding the performance goal orientations. Here, performance-avoidance goal orientation influenced the relationship between the need for autonomy and amotivation. This suggests that individuals who are primarily focused on avoiding failure or poor performance may be less motivated to participate in training when they perceive a lack of autonomy. However, no additional effects of performance goal orientation were identified in the relationship between psychological needs and motivation. Nonetheless, the study did find direct associations between performance goal orientation and controlled types of motivation to learn, indicating that individuals with a performance orientation may be motivated by external rewards and the desire to outperform others.

The study's results suggest several practical implications for the Rail Competence Center of VolkerRail which is developing training programs for mechanics. To effectively motivate mechanics to participate in training, the Rail Competence Center (RCC) should focus on creating meaningful training that caters for their needs. Mechanics' intrinsic motivation and identified regulation to engage in training are influenced by their need for competence, so the RCC should adopt a mechanic-centered approach that involves them in shaping their learning paths with mentors. By tailoring training experiences to align with their specific needs and interests, mechanics will feel a sense of autonomy over their learning process. While obligatory activities like recertification are necessary, striking a balance between these requirements and the mechanics' interests is crucial. Additionally, offering opportunities for teamwork and collaboration in the training program can promote a sense of support among trainees and encourage participation. Mechanics have expressed a desire to exchange information with colleagues, which highlights the importance of incorporating group work and collaboration in the learning course, rather than designing it as an individual and self-directed program.

Regarding learning goal orientation, the study revealed that mechanics exhibited a greater propensity for learning goals and personal development. Specifically, mechanics with a high learning goal orientation displayed a stronger motivation to participate in training. Based on these findings, two recommendations were proposed. Firstly, the Rail Competence Center (RCC) should prioritize competence development over competition, offering comprehensive training programs that support the skill enhancement of mechanics, and fostering a collaborative and supportive work culture. Secondly, the training should be designed to promote mechanics' learning goal orientation by providing adequate time for professional growth, facilitating their access to needed courses or training, and recognizing their successes in terms of professional development, problem-solving, and innovative ideas.

In terms of performance goal orientation, mechanics scored lower in performance-related goals and targets compared to other studies. In light of the findings, two suggestions were made regarding the performance-approach and avoidance goal orientation of mechanics. Firstly, since mechanics displayed low performance approach goal orientation, indicating less motivation for

competition, fostering a collaborative and supportive environment within the Rail Competence Center is recommended. This can be achieved by encouraging teamwork, and collaboration across disciplines, and creating opportunities for knowledge exchange and mutual support. Mentorship programs can also play a significant role in promoting a cooperative learning culture, where experienced mentors guide and support junior mechanics, facilitating skill development and relationship building. Secondly, as mechanics scored lower on performance-avoidance goal orientation, indicating a lesser concern for avoiding mistakes, the Rail Competence Center can capitalize on this by creating a supportive learning environment that encourages risk-taking, experimentation, and learning from mistakes. Mistakes should be seen as valuable opportunities for growth without fear of negative consequences.

The study also found that mechanics had higher levels of intrinsic motivation and identified regulation compared to introjected regulation and external regulation. Mechanics are more likely to engage in training out of personal interest and a sense of personal importance. Therefore, the RCC should avoid heavily focusing on extrinsic rewards (e.g. grades) and instead highlight the personal benefits and relevance of the training. Emphasizing how the training can enhance skills, knowledge, and career development will foster a sense of personal satisfaction and growth. By considering these practical implications, VolkerRail can design effective training programs that increase mechanics' motivation to participate.

The findings emphasize the importance of avoiding heavy reliance on extrinsic rewards and highlighting the personal benefits and relevance of training. By considering these recommendations, VolkerRail can design effective training programs that increase mechanics' motivation to participate and address the challenges posed by the shortage of technically trained employees in the Dutch railway sector.

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1 Company context and problem definition

Skilled labour has been increasingly crucial to the success of every construction project (Akomah, Ahinaquah, & Mustapha, 2020). A skilled craftsperson is a person in any given location who has a full and specialized understanding of a trade. These individuals often have some kind of formal training in their particular trades and have many years of experience (Chini, Brown, & Drummond, 1999). Since activities on site are heavily dependent on skilled labor (Mackenzie, Kilpatrick, & Akintoye, 2000), any shortage hurts the construction sector (Akomah et al., 2020). Organizations in the Netherlands stated that a lack of qualified employees was their main concern in 2022 (CBS, 2022). The construction sector witnessed an 8% decrease in the number of mechanics aged between 15 and 65 between 2013 and 2018 (CBS, 2019). The absence of construction workers is generally attributed to well-known factors. Here, one of these factors is the lack of training and education (Han, Park, Jin, Kim, & Seong, 2008).

The Dutch railway sector was also experiencing a shortage of technically trained employees, which was preventing the industry from meeting its required intake (Technical Valley, 2023). But what does the Dutch Railway sector look like? The Dutch railway network has more than seven thousand kilometres of track and is used for both passenger as well as freight transport (ProRail, 2022). Since the mid-1990s, rail transport and the management of rail infrastructure have been separated and are managed by separate entities. The Nederlandse Spoorwegen (NS) transports passengers over the rail network, while ProRail manages the assets. ProRail is responsible for the construction, maintenance and management of the Dutch railway network on behalf of the government. This includes all associated facilities: bridges, tunnels, level crossings, overhead wires, signals, switches and stations. ProRail also distributes the capacity on the track and is responsible for rail traffic control (NS, 2023). ProRail functions as the railway administrator. As an independent party, ProRail allocates the 7,000 kilometres of track to contractors like VolkerRail (ProRail, 2022).

VolkerRail, a Dutch construction company that builds, renovates and maintains train tracks, was also facing a shortage of mechanics at the time. VolkerRail is part of VolkerWessels, a leading international construction company with a revenue of €6.4 billion in 2020 and more than 130 subsidiaries (VolkerWessels, 2021). At the time, VolkerRail had a total of 1,020 employees including 400 mechanics. Here, there was seen a decrease in mechanics at VolkerRail of 4% between 2020 and 2022. This decrease was primarily caused by retirements and challenges in retaining mechanics. In addition, VolkerRail experienced greater difficulty hiring new mechanics in 2022 than in previous years. At the time there were still 57 mechanic positions that needed to be filled in. This shortage in mechanics also meant a shortage of people with the right specialized training and years of experience.

A previous study showed that one of the factors for this shortage can be a lack of training and education (Han et al., 2008). VolkerRail recognized the need for employee development and acknowledged the importance of mechanics having the required certifications to

perform their work. The industry has strict regulations regarding certifications, and mechanics must meet these requirements to ensure compliance and safety. Therefore, it was important to investigate what motivates mechanics to participate in training.

To counter the loss of knowledge and skills, VolkerRail introduced the Rail Competence Center (RCC). The RCC develops training programs that would allow mechanics to grow both professionally and psychologically. The success of these training programs largely depends on the motivation levels of the trainees. Different individuals have varying underlying motivations for behavior, and these motivations can produce different outcomes (Ryan & Deci, 2000). To optimize the training program, this study intended to investigate the motivations towards the training of the Group 1 mechanics.

1.1 Scope: Group 1 Mechanics

VolkerRail classifies its workforce into two distinct categories, namely “Group 1” and “Group 2”. Here, “Group 1” are the mechanics of VolkerRail. This group is the operational staff and these mechanics could work in different divisions and disciplines, and each had different tasks and associated skill sets. The mechanics of VolkerRail are the people that construct, maintain, and renovate the tracks. In most cases, the mechanics are individuals who have followed secondary vocational education. These mechanics are skilled craftsmen, which means they are proficient in their trade. In most cases, the mechanics have years of experience and specialized training in their field. “Group 2” employees are responsible for supporting functions such as work preparation, administration, and planning. Since the study was focused on mechanics, and as such, only those in “Group 1” were considered for the purpose of this study.

VolkerRail divided the construction and maintenance of tracks into two divisions. These divisions are ‘Projects’ or ‘Service Maintenance’. In the division ‘Projects’, tracks are either constructed or improved during large and medium-sized projects. ‘Service Maintenance’ maintains the tracks according to a service contract. “Group 1” mechanics could either work in one of the divisions or both.

Mechanics can work on train tracks, overhead lines, engine driving, welding, signaling, safety, systems, point heating, nonbuilding structures, and both high and low power supplies. These disciplines are needed for building, improving and maintaining the tracks. Besides that, VolkerRail has mechanics working in the workshop in Dordrecht, where the maintenance of equipment of VolkerRail and third parties was conducted.

In “Group 1”, mechanics can be categorized into four different levels, ranging from aspirant mechanic to team leader mechanic. While the nomenclature of these levels may vary across different disciplines, the underlying concept remains consistent. The tasks that a mechanic is allowed to do is highly dependent on this level. This is because the level of a mechanic is determined based on several factors such as their years of experience and certifications. The higher the mechanic level, the more a mechanic will be allowed to perform tasks that fall within

his or her discipline. An overview per mechanic level is displayed in Table 1.

Table 1: Mechanic levels

Level	Function
1	Aspirant mechanic
2	Mechanic
3	Senior mechanic
4	Technician / team leader / foreman

To become a mechanic, one must typically have some level of formal education and training. The education and training requirements vary depending on the specific division, discipline, and level of expertise a mechanic is seeking. After completing the necessary education and training, a mechanic may need to obtain certification in their field. Certification is often offered by the RailCenter or VolkerWessels Vakschool. In addition to initial certification, mechanics may need to undergo recertification to keep their professional knowledge up to date. Overall, education, training, certification, and recertification are all important components of a mechanic’s professional development.

1.2 Rail Competence Center

The need for a learning department within VolkerRail had different reasons. The first reason was the increasing scarcity in the rail sector. As stated before, a decrease in mechanics and an increase in open vacancies were seen in the past years. This scarcity was primarily caused by retirements and difficulty in finding and retaining employees. One of the factors for this shortage can be because lack of training opportunities (Han et al., 2008). VolkerRail recognized that the absence of adequate training and development could potentially drive employees to seek alternative employment opportunities, particularly if they feel that their growth potential within the organization is limited.

A second factor for the need for a learning department was the decentralized approach to educating, training, and (re)certifying employees within VolkerRail. Certain disciplines underwent internal training, while others received external training through either the RailCenter or VolkerWessels Vakschool. The RailCenter is an independent training centre where most education and certification of employees of VolkerRail took place. The centre works closely with its partners such as rail contractors and ProRail. Mechanics of VolkerRail came here for training, sharing knowledge and gaining new knowledge (Railcenter, 2022). In some cases, education and training are done at the VolkerWessels Vakschool. At VolkerWessels Vakschool, the mechanics of VolkerRail can follow post-secondary vocational education (VolkerWessels Vakschool, 2023).

VolkerRail recognized the importance of learning and developing employees within the organization. This led to the formation of a centralized learning department, namely the RCC.

The RCC is designed to provide practical-oriented training, coaching, supervision, and assessment of VolkerRail employees, as opposed to a predominantly theoretical approach. Given that the majority of VolkerRail's employees are skilled craftsmen, a practice-oriented training method is deemed more suitable for this demographic. The RCC aims to prioritize learning and practice with the support of trainers, supervisors, buddies, and mentors. Within the RCC, the basis is that craftsmanship and knowledge transfer are central.

The goal was to go live with RCC in early 2023. The department was planning on starting with the "Group 1" mechanics. At this time, the department had one head of department and two trainers working directly at the RCC. Besides, there were a couple of trainers in the organization of VolkerRail that work indirectly at the RCC, and at another department. The first goal for the RCC was to have two trainers for every discipline. For some disciplines, the RCC already had two trainers per discipline (i.e., signaling, safety, and train track). These trainers were currently working on a yearly training program. This yearly program was already a success in the discipline's safety and train track. The goal of the training program is to implement the broad concept across all disciplines. The yearly training program is designed to take place over four days, spread out throughout the year. Two of these days are mandatory, while the other two are optional, depending on the specific needs of each employee. The mandatory days will be a technical day (referred to as "vakdag") and an assessment conducted by the respective discipline trainer(s). Employees can receive an additional two training days per year, depending on their individual needs and the trainer's recommendation.

1.3 Problem definition and thesis outline

In conclusion, the goal of this master's thesis was to delve deeper into the drivers behind mechanics' participation in training courses. The emphasis was on Group 1 mechanics because they stand to gain the most from the RCC's training initiatives. This master thesis focused on the fundamental causes of mechanics participating in training. Understanding these reasons will allow the RCC to use these discoveries to create training programs that are specifically aimed at mechanics, improving their abilities and knowledge while also giving them the motivation to succeed in their positions.

This master thesis was built out of multiple chapters. The thesis starts with an initial problem diagnosis in Chapter 3. Here, the results of the interview were presented as the first insights regarding this study. Chapter 4 provides a theoretical background on the SDT, including psychological needs, motivation, and goal orientation. This theoretical background served as a foundation for the hypotheses and conceptual model of the direct and moderating effects. Chapter 5 outlines the methodology of the study, covering the procedure, participants, and analysis. The results of the linear regression are presented in Chapter 6. The master thesis ends with a discussion, theoretical contribution, practical implications, and strengths, limitations and directions for future study, and a conclusion in Chapter 7.

2 Initial problem diagnosis

The objective of this master's thesis was to investigate the motivation of mechanics to participate in training. To gain a better understanding of the mechanics' motivation to engage in training, a qualitative investigation was conducted, wherein semi-structured interviews were employed as the primary data collection tool. The interview sought to elicit the factors that motivated mechanics to participate in training. This section presents the findings of the qualitative investigation into the mechanics' motivation to engage in training.

The semi-structured interviews were conducted in Dutch and consisted of a set of interpretive questions. Interpretive questions can be described as a check on what you think you are comprehending and a chance to get more information, thoughts, and feelings to be exposed (Merriam, 1998). The prepared interview questions were therefore seen as starting points that could be expanded upon if the interviewer felt the need for more details, elaboration, or clarification (Hoffman & Nadelson, 2010). The mechanics were interviewed individually, and the mechanics were selected based on their diverse backgrounds, disciplines, and divisions.

Depending on the work environment in which the interview took place, notes were collected during each interview either electronically or on paper. For the interviews, a total of 15 male mechanics with diverse backgrounds and skill sets from various divisions and disciplines were selected. A total of 15 male mechanics were chosen for the interviews, and their demographics are presented in Table 2.

Table 2: Demographics of interviewees

		Number of interviewees
Working at VolkerRail (in years)	0-10	6
	11-20	5
	21-30	1
	31-40	2
	41-50	1
Discipline	Workingplace Dordrecht	4
	Welding	2
	Energy supply	3
	Safety	1
	Engine driver	3
	Train tracks	1
	Signaling	1

The main objective of this qualitative investigation was to collect data that would show what motivated mechanics' interest in training. This led to the creation of the questions as seen in Table 3. The findings of this investigation shed light on the factors that motivate mechanics to

participate in training, and the implications of these findings are discussed in the subsequent paragraphs.

Table 3: Interview questions

Number	Question
1.	What is your name?
2.	How long have you been employed by VolkerRail?
3.	What is your function at VolkerRail?
4.	Why are you working at VolkerRail?
5.	Have there been many (technical) developments over the years that change your work? Do you find it challenging if you have to perform tasks differently because of this?
6.	What does your team look like?
7.	To what extent do you help or seek help from your team during work?
8.	Have you attended VolkerWessels Vakschool for training?
9.	Have you attended Railcenter for training?
10.	Are you open to participating in training programs? Why (not)?
11.	What is your perception of the mandatory certificates?

The first three questions asked during the interview were related to the demographic characteristics of the interviewees, including their name, duration of employment, and current function at VolkerRail. Specifically, their current function was asked, to gain a better understanding of the various divisions, disciplines and mechanic levels within the organization. These responses were used for the input of Table 2.

Subsequently, the interviewer posed the question, “*Why are you working at VolkerRail?*”. The responses from three interviewees who had worked for more than 28 years at VolkerRail revealed that they initially joined the company while it was still under the ownership and management of NS. In 1995, NS became independent and lost ownership and management of rail infrastructure as well as its monopoly on rail transport services. As a result, track construction and maintenance were subdivided into contractors, and some of the interviewees were then transferred to VolkerRail. They believed that contractors in the industry were similar, and therefore, there was no need to seek employment elsewhere. Three other interviewees who had previously worked for other rail contractors also agreed that the firms were relatively similar. However, the main reason they chose to join VolkerRail was the increased work prospects it provided. Additionally, two interviewees had prior work experience in different sectors but expressed dissatisfaction with their jobs and therefore switched to VolkerRail. Furthermore, four interviewees joined VolkerRail directly as a result of having relatives or friends who were already working there. In addition, two interviewees obtained employment opportunities by using a variety of recruitment strategies, like online job advertisements and open-day events. One

interviewee had previously worked as a freelancer for various rail contractors before joining VolkerRail. This mechanic expressed that “*VolkerRail has a positive working environment in comparison to other contractors*”. A summary of these reasons why interviewees joined VolkerRail is presented in Table 4.

Table 4: Question 4

Question 4: Why working at VolkerRail?	Number of interviewees
Originated from NS	3
Other contractor	3
Other sector	2
Family/Friends	4
Open days	2
Self-employed	1

Question five was asked to get a better understanding of technological developments in the sector and how the mechanics adapted to these changes. This question left potential for follow-up inquiries, such as whether any training programs were available for these technological developments. Here, all the interviewees claimed that technical innovations within the company were scarce, and if any innovation was introduced, it was implemented at a slow pace. Therefore, technical innovations were generally not very challenging. One of the welders who participated in the interviews claimed that “*the only modifications I experienced were related to automation, which made my work easier*”.

Question six focused on the characteristics of the interviewees’ teams. This question was primarily intended to prepare the respondents for a follow-up question (question 7), which questioned respondents if they requested or offered assistance to their colleagues. The four interviewees who worked at the Dordrecht location stated that they sought help from colleagues that previously carried out the same maintenance tasks. According to one interviewee, “*We assist each other a lot. Many ask colleagues questions, especially since people have to maintain several machines, and this is not always their specialization. For example, when people maintain a crane machine, I sometimes receive questions. And vice versa, when I maintain locomotives, I also consult with mechanics who mainly work on locomotives*”. For the other disciplines, interviewees stated that the mechanics with more experience assisted those with little or no experience. Almost all interviewees claimed that they helped one another as they were always working with several mechanics simultaneously.

As this study was concerned with the mechanics’ motivation to pursue training, it was intriguing to find out whether they had previously attended training courses at Railcenter (question 8) or VolkerWessels Vakschool (question 9). Table 5 summarizes whether the interviewees had attended one or more training sessions, certifications, or educational programs

at Railcenter and VolkerWessels Vakschool. Most mechanics visited the RailCenter to become (re)certified. This is necessary to be able to carry out the work. Two interviewees also did their education at the RailCenter. Some interviewees attended the VolkerWessels Vakschool for a secondary vocational education degree or safety training. The mechanic that was enrolled in a secondary vocational education stated: *“In addition to my job, I go to school. This implies that over the course of a year, I will work four days a week and go to school one day a week”*.

Table 5: Question 8 and 9

Question 8 and 9: Have you attended ... for training, (re)certification, and education?	Number of interviewees	
	Yes	No
Railcenter	13	2
VolkerWessels Vakschool	3	12

The purpose of question ten was to gather information about the underlying motivations that drive mechanics to participate in training. Specifically, the question was: *“Are you willing to follow training? Why (not)?”* Analysis revealed that 14 out of 15 interviewees were willing to participate in training. The interviewees gave several justifications for wanting to participate in training. Among the reasons cited, eight mechanics stated that obtaining the requisite certificates was crucial to their ability to carry out their work. Ten interviewees responded that they wanted to enhance their current abilities and knowledge; one of them said that *“It is nice to refresh your current knowledge”*. Another interviewee expressed a desire to improve in his field, he stated that *“rules change over time so I want to be up-to-date”*. Even five interviewees wanted to learn new skills unrelated to their current job. Only one out of 15 interviewees expressed a lack of interest in training, he stated: *“I will be retiring in five years and I find it difficult to keep up the pace of training at this age”*. A total overview of reasons for undertaking training is shown in Table 6.

Table 6: Question 10

Question 10: Are you willing to follow training? Why (not)?	Number of interviewees
Yes, because I want to be able to carry out the work	8
Yes, because I want to be better in what I do	10
Yes, because I want to learn new things outside my own discipline	5
Yes, because if VolkerRail wants me to follow it, I think it is important	1
No, because I will be retiring soon	1

The final question sought to clarify why people participate in training programs in more detail. Here, the mechanics’ thoughts regarding their experiences with prior training were asked. The question was as follows: *“What is your perception of the mandatory certificates?”* Analysis

revealed that all interviewees were motivated to complete this training to receive certificates because maintaining workplace safety standards is crucial. Moreover, all interviewees were fully aware that without the necessary certificates, they were simply unable to execute certain tasks. Once more, the desire for autonomy in the workplace was identified as a driving force behind mechanics enrolling in training forces. Nevertheless, even though every interviewee agrees with the value of getting the required qualifications, the interviewees expressed some reservations about the training programs. One participant stated: *“It is always good that working safely is a top priority and therefore have these mandatory certificates, but sometimes the training programs themselves could be protracted and overly simplistic in their approach”*.

The qualitative analysis conducted in this study revealed compelling insights into the motivations of mechanics to engage in training activities. The findings demonstrate that mechanics are driven to train for various reasons, including their desire to enhance their knowledge and skills, their aspiration for autonomy within the workplace, and their need to stay updated with the latest industry developments. The importance of teamwork and mutual support among mechanics was also highlighted as a significant factor.

When comparing these findings with previous studies, a noteworthy observation was the influence of psychological needs on mechanics’ motivation. Specifically, the need for autonomy, competence, and relatedness emerged as crucial elements in motivating mechanics to participate in training programs. In this particular context, mechanics displayed a pronounced need for autonomy, indicating a strong desire to have control over their work and decision-making processes. Additionally, the need for competence was evident, reflecting their motivation to feel capable and effective in their professional roles.

Given these psychological needs, it became evident that addressing them would play a pivotal role in motivating mechanics to engage in training initiatives. By fostering an environment that fulfils their need for autonomy and competence, organizations can effectively encourage mechanics to pursue professional development opportunities. Moreover, the importance of relatedness, as evidenced by the significance of teamwork and assistance, should be acknowledged and promoted to create a supportive work atmosphere that further motivates mechanics to participate in training.

In summary, the results of this qualitative analysis shed light on the motivations of mechanics to train, highlighting their desire to improve knowledge and skills, seek autonomy, and stay updated in their field. The study underscores the crucial role of psychological needs, including autonomy and competence, in driving their motivation. Building upon these qualitative findings, the next chapter will delve deeper into the implications and significance of these motivational factors.

3 Literature review

The results of the qualitative analysis revealed that mechanics are motivated to train because they want to advance their knowledge and abilities, have a desire for workplace autonomy, and want to keep up with industry trends. Additionally, the outcomes underscore the significance of collaboration and support among mechanics. Based on this analysis, it was seen that psychological factors of the mechanics played an important role in the motivation to engage in training. Upon reviewing relevant literature, the Self-Determination Theory by Ryan and Deci (1985) was found to be a framework for understanding these findings. According to the Self-Determination Theory (SDT), autonomy, competence, and relatedness are crucial in promoting and sustaining various forms of motivation (Bureau et al., 2022; Chemolli & Gagné, 2014). In the interview, it was seen that most of the mechanics had a strong need for autonomy and competence, and therefore were willing to participate in training. Additionally, the initial problem diagnosis also revealed a desire for mechanics to grow in their skills. This can be best explained by Dweck (1999) theory of goal orientation. Goal orientation is defined as the underlying goal for individuals to approach activities to develop and demonstrate their abilities. In conclusion, the theoretical framework for this study was centred around the relation between psychological needs, motivation to train, and goal orientation among mechanics.

3.1 Psychological needs

SDT introduced the idea of psychological needs to explain why people are motivated autonomously, motivated by controlled reasons, or have autonomous or controlled goals (Guay, 2022). In the present study, it is argued that extrinsic motivation, intrinsic motivation, and amotivation depend on the strength of three psychological needs (Deci & Ryan, 2000). Three basic human needs are commonly recognized. The first need is autonomy, which involves the desire to feel independent, free, and in control of one's own life (Gagné & Deci, 2005; Deci & Ryan, 2000). The second need is competence, which refers to an individual's desire to feel capable and skilled (Deci & Ryan, 2000). Finally, the need for relatedness involves the desire to feel a sense of belonging to a group and other people (Deci & Ryan, 2000; Baumeister & Leary, 2017).

Autonomy refers to being self-initiating and feeling as though one is acting according to one's sense of self (Deci, 1998). Individuals who can satisfy this fundamental need in a particular circumstance feel relieved and autonomous from external pressure (Krapp, 2005). The broad idea is that individuals with a strong need for autonomy have a desire to perceive themselves as the ultimate agents of their actions, rather than being influenced by external factors (Ryan, 1982; Decharms & Carpenter, 1968). Pursuing an ideal level of autonomy is a crucial prerequisite for satisfying the need for competence. This is because mastery of work can only be realized when it has been resolved without the support and precise instructions of others (Krapp, 2005).

The need for competence is defined as the desire to feel effective, the ability to make an impact on one's environment, and the capacity to achieve desired objectives (Deci, 1998). This fundamental need is directly tied to the intrinsic fulfilment that comes from using developing one's potential, and the main accompanying effect is the sense of efficacy (Bandura, 1997; White, 1959). The total number of successfully managed interactions led to a growth in competence that happens automatically and, in theory, was unrelated to intentionally established intents to study or achieve a higher level of ability (Krapp, 2005).

Finally, relatedness refers to the need to feel accepted by and linked to significant people. Feeling like you belong to a real or virtual group of people who have similar interests was an essential factor. One of the most well-known and frequently discussed aspects of human nature is the fact that people have a strong need for social interaction. Meeting this need for relatedness is a requirement for well-being as well as for physical and mental health (Krapp, 2005). Although the need for relatedness was not explicitly cited as a driving factor during this interview, it was still interesting to explore because of the well-known SDT theory.

3.2 Autonomous vs. controlled motivation

The SDT provides a multidimensional model of motivation that distinguish between controlled and autonomous (Deci & Ryan, 2012). With autonomous motivation, an individual might feel self-directed, as opposed to controlled motivation, where they might feel pressured to behave a certain way and, as a result, encounter little to no autonomy (Gagné et al., 2015). Previous research acknowledges SDT as a model for successfully measuring the motivation of an organization's personnel (Ankli & Palliam, 2012). Therefore, this theory was relevant for investigating the motivation to participate in the training of mechanics. The SDT has different types of regulations that fall along a continuum of relative autonomy (i.e., self-determination) (Ryan & Deci, 2000). This means that for instance, if someone is working on something for a reward, they may later, assuming the external pressure is not too great, get interested in it. Alternatively, a person who has come to associate value with an activity may for example lose that association under the influence of a controlling mentor and end up being subject to external regulation. Even though there are foreseeable causes for switching between orientations, there is no required order (Chemolli & Gagné, 2014). SDT proposes six categories of behavioral regulations, represented in Figure 2 (Howard, Gagné, & Morin, 2020).

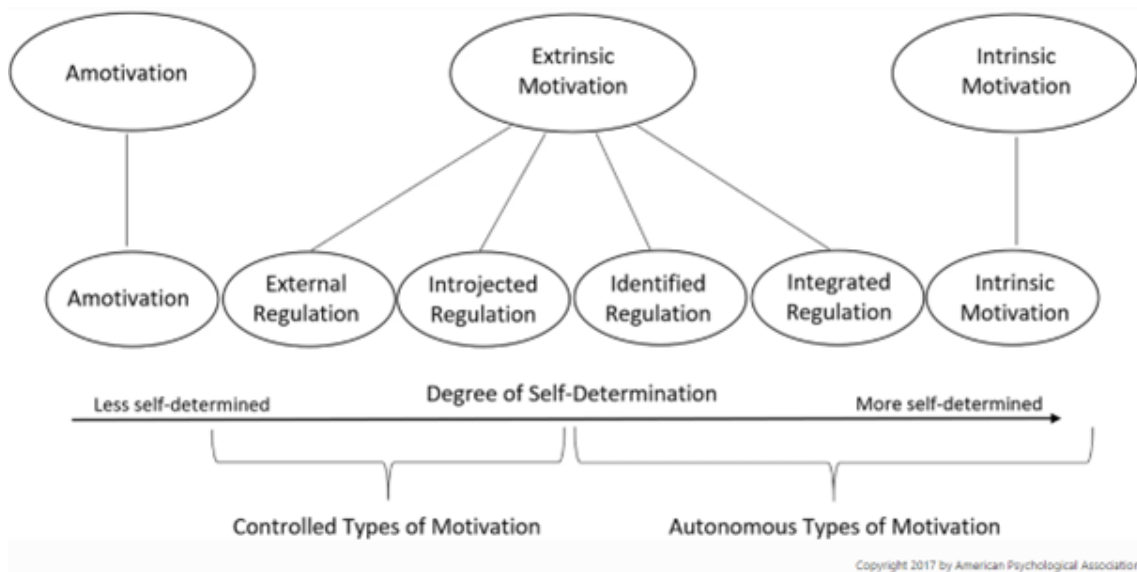


Figure 2: Representation of motivation in SDT (Howard et al., 2017)

Intrinsic motivation is described as fully self-determined motivation. A person who is intrinsically motivated enjoys the behavior or finds it fascinating and pleasant in and of itself. External reinforcement was not necessary for intrinsic motivation, and it might even reduce it (Deci, Koestner, & Ryan, 1999). Optimal outcomes in terms of employee well-being, attitudes, and behavior should result from promoting and maintaining intrinsic motivation (Van den Broeck, Carpini, & Diefendorff, 2019).

Extrinsic motivation is described as acting for instrumental purposes. Research had shown that extrinsic motivation has various distinct types because it could vary in the degree to which it was autonomous versus controlled. Extrinsic motivation is needed for activities that lack appeal. As a result, their initial implementation relies on the sense of a relationship between the action and the desired outcome, such as implicit approval or material rewards (Gagné et al., 2015). Four regulations are categorized as extrinsic motivational types, with varying degrees of internalization and self-determination (Howard et al., 2020). The degree of internalization refers to the extent to which an individual experiences an extrinsically motivated behavior as personally important, relevant, or valuable. In other words, it describes the level to which an external factor (such as a reward) is transformed into an internal sense of purpose or value (Connell & Ryan, 1984).

Integrated regulation is the fullest type of internalization and enabled extrinsic motivation to be fully autonomous or volitional. Here, people are fully aware that their behavior is a reflection of who they are (Gagné & Deci, 2005). Despite being theorized, this kind of motivation is rarely studied because it strongly overlaps with neighboring motives (i.e., intrinsic motivation, identified regulation) (Howard et al., 2020).

The second most deeply internalized type of extrinsic incentive is *identified regulation*. Identified regulation involves acknowledging the usefulness of the inherent instrumental value of

the behavior. Individuals that exhibit identified regulation perceive the action as meaningful and important. They actively and willingly engage in the action, without reliance on coercive external or internal factors. While being separate from intrinsic motivation, identified regulation is an autonomous type of motivation. Whereas intrinsic motivation is related to behaviors that are valued in and of themselves, identified regulation is associated with activities that are anticipated to result in valued outcomes (Howard et al., 2020). Identified regulation has frequently been found to be an even better predictor of positive outcome than intrinsic motivation (Ng et al., 2012). Given the more internalized nature of the rewards being pursued, behavior driven by identified regulation is more likely to be maintained over a longer period than less autonomous regulations (Deci, Koestner, & Ryan, 2001).

Introjected regulation describes actions motivated by either the experience of a positive self-image and self-focused feelings (e.g., pride), or by the avoidance of a negative self-image and self-focused feelings (e.g., guilt, shame). Introjected regulations refer to self-applying rewards and punishments oneself (Howard et al., 2020). As a result, introjected regulation is thought of as a sort of extrinsic motivation that has been partially internalized (Deci & Ryan, 2000). Although self-administered, this sort of regulation depended on potential outcomes, therefore it was unlikely to persist when detached from the result (Koestner, Losier, Vallerand, & Carducci, 1996).

The motivation through instrumental reward or punishment is considered to be *externally regulated* in SDT, meaning that it is started and sustained by factors unrelated to the person (Gagné et al., 2015). External regulation is the least internalized form of extrinsic regulation (Howard et al., 2020). This is the classic type of extrinsic controlled motivation. In most previous studies, when extrinsic motivation and intrinsic motivation were compared, external regulation was the form of extrinsic motivation that was taken into account (Gagné et al., 2015). Rewards and punishments can be monetary (e.g., bonuses, getting fired) or social (e.g., approval, criticism) in nature. People who adhere to this kind of regulation do not find the action fascinating or entertaining; instead, they are just interested in obtaining the associated rewards or avoiding the associated punishments (Howard et al., 2020). Even though this kind of regulation did result in the target behavior, previous studies indicated that it was likely to short-term and less sustained engagement in the behavior (Deci et al., 1999). Other study evidence suggested that it also hurts well-being (Deci & Ryan, 2000; Gagné & Deci, 2005). A meta-analysis revealed that external regulation was positively related to depression, and anxiety, and negatively related to vitality and quality of life (Ng et al., 2012).

Lastly, *amotivation* is described as a complete lack of intention to engage in the target behavior rather than holding either intrinsic or extrinsic forms of motivation (Deci & Ryan, 2000). Amotivation is consistently linked to poor performance and well-being (Howard et al., 2020).

3.3 Goal orientation

What were the expected theories that can explain the mechanics' motivation to train as well? Based on the initial problem diagnosis, it was seen that mechanics were interested in demonstrating their abilities. Thus, identifying employee dispositions could also be relevant regarding the study of psychological needs and motivation to train the mechanics. An essential attribute related to this employee disposition, where various incentives and motivating factors were at play, was the goal orientation of the employee (Elliott & Dweck, 1988).

People have different goals when approaching situations. According to a study, people tend to approach activities with two underlying goals: developing and demonstrating their abilities. The pursuit of these objectives influences behavior and performance. It is important to recognize that much of the study on goal orientation considers it a trait variable that remains largely constant over time and across performance situations (Button, Mathieu, & Zajac, 1996). However, several studies (e.g. Elliot and Church, 1997; Mangos and Steele-Johnson, 2001; VandeWalle, Cron, and Slocum Jr, 2001) have suggested that while people may have a dispositional goal orientation that serves as their default orientation, they can also develop different temporary or state goal orientations (Breland & Donovan, 2005). Two fundamental dispositional goal orientations were identified in light of this insight: learning goal orientation and performance goal orientation (Dweck, 2013).

Learning goal orientation is a preference for enhancing one's competence through the acquisition of new abilities and mastering new situations (Dweck, 2013). People with a learning goal orientation look for difficult assignments that provide them with the chance to advance their skills. Errors are viewed as a normal, educational aspect of the process. An increase in self-efficacy is the result (Bandura, 1986). Those that have a learning goal orientation concentrate on how to do activities successfully to increase their competence, learn new skills and gain experience (Brett & VandeWalle, 1999; VandeWalle, Brown, Cron, & Slocum Jr, 1999).

A preference to show and justify one's ability by eliciting positive opinions and avoiding unfavorable opinions from others is described as performance goal orientation (Dweck, 2013). People with a performance goal orientation concentrate on the outcome, worry about failing and focus on the consequences of their bad performance, especially the disapproval of others (Seijts, Latham, Tasa, & Latham, 2004). The desire is to impress others (Brett & VandeWalle, 1999; VandeWalle et al., 1999). Here, two performance goal orientations were identified: performance-approach orientation and performance-avoidance orientation (McClelland, 1951; Atkinson, 1964). People with a strong performance-approach goal orientation try to distinguish themselves from others to get the respect of their superiors. In contrast, those who have a performance-avoidance goal orientation take actions action receiving unfavorable feedback (Elliot & Harackiewicz, 1996; Elliot & Church, 1997).

3.4 Relation between psychological needs and motivation

Psychological needs are crucial in determining an individual's motivation and behavior. This relation is complex and multifaceted (Deci & Ryan, 2000). Therefore, it is important to examine the impact of psychological needs on intrinsic motivation, extrinsic motivation, and amotivation separately, to gain a more clear and more precise understanding of how they influence behavior.

3.4.1 Relation between psychological needs and intrinsic motivation

Individuals are more likely to experience intrinsic motivation when basic psychological needs like autonomy, competence, and relatedness are met (Deci & Ryan, 2000). Several empirical studies have found that learners with high autonomy become more strongly motivated and that autonomy results in better, more effective work, particularly in general education and learning (Dickinson, 1995). According to a study on intrinsic motivation, conditions like "autonomy" enhanced intrinsic motivation. This meant that when individuals feel a sense of autonomy in their actions, they are more likely to choose tasks they are interested in and find meaningful, leading to greater intrinsic motivation (Deci & Ryan, 2013). Other studies supported the positive effect of autonomy on intrinsic motivation (Goudas, Biddle, & Underwood, 1995; Dysvik, Kuvaas, & Gagné, 2013).

Besides the need for autonomy, the previous research also found a positive effect of competence on employee motivation. Here, when individuals feel competent, they are more confident in their abilities and are more likely to take on challenges that are both engaging and rewarding, leading to greater intrinsic motivation (Parashakti, Fahlevi, Ekhsan, & Hadinata, 2020; Goudas et al., 1995).

For the last psychological need, earlier studies had demonstrated a relation between the need for relatedness and intrinsic motivation (Dysvik et al., 2013). Here, there was a potentially interesting discovery regarding the predictive role of fulfilling the need for relatedness. Despite being initially considered less important than the other needs, research has shown that fulfilling the need for relatedness is just as important to intrinsic motivation as the other two needs. When individuals feel connected and supported by others, they are more likely to engage in activities that are meaningful and fulfilling, leading to greater intrinsic motivation (Dysvik et al., 2013).

During this study, the relationship between psychological needs and intrinsic motivation to participate in training was expected to be similar to the relationship between psychological needs and intrinsic motivation in general. For example, when mechanics feel the need for autonomy in their work, they are more likely to choose to participate in training that aligns with their personal goals and interest in work, leading to greater intrinsic motivation regarding training. When mechanics feel competent in their work, they are more likely to engage in challenges and tasks that are rewarding and fulfilling, leading to greater intrinsic motivation to train. When mechanics feel a sense of relatedness and connections to their colleagues, they are more likely to find meaning and value in their work, leading to greater intrinsic motivation to

train. In short, it was expected when psychological needs such as autonomy, competence, and relatedness are fulfilled within their work, individuals are more likely to experience intrinsic motivation to participate and engage in training (*Hypothesis 1*).

3.4.2 Relation between psychological needs and autonomous extrinsic motivation

The relationship between psychological needs and extrinsic motivation is complex and depends on the nature of extrinsic motivation and how it is experienced by the individual. According to SDT, the satisfaction of psychological needs is considered a key factor in promoting intrinsic motivation, while extrinsic motivation is driven by external factors such as rewards or pressure. However, in some cases, psychological needs can enhance extrinsic motivation, such as when personal values and goals are aligned with rewards (Ryan & Deci, 2020). Therefore, it was important to consider the interplay between psychological needs and extrinsic motivation to train.

As stated before, when the need for autonomy is satisfied, individuals are more likely to experience intrinsic motivation, or motivation that arises from within, rather than being externally imposed. However, the need for autonomy can also have an impact on extrinsic motivation. Previous research found an effect of the need for autonomy on autonomous extrinsic motivation (i.e., identified regulation and integrated regulation). Autonomous extrinsic motivation refers to motivation that arises from external factors but is still experienced as self-endorsed and aligned with personal values and goals. Therefore, the finding that the need for autonomy affects autonomous extrinsic motivation suggests that individuals with a stronger need for autonomy are more likely to engage in activities that are perceived as self-endorsed and aligned with their personal goals, values, and identity. This, in turn, may promote autonomous extrinsic motivation (Ryan & Deci, 2020; Teixeira, Carraga, Markland, Silva, & Ryan, 2012). This was also observed in earlier studies in a learning setting, where students showed an autonomous extrinsic desire to learn when their need for autonomy was met (Müller & Louw, 2004). Another study supported these findings, here it is shown that to internalize extrinsic motivation (i.e., integrated regulation, identified regulation), it is crucial that the need for autonomy is satisfied for internalization (Deci & Moller, 2005).

Besides a high need for autonomy, studies have shown that individuals with a high need for competence can be externally motivated (Ryan & Deci, 2020). Research has indicated that individuals with a strong need for competence may be more likely to internalize extrinsic motivation. This means that when individuals feel competent and effective in their actions, they are more likely to identify with the behavior and integrate it into their self-concept, leading to a greater sense of autonomous intrinsic motivation (i.e. introjected regulation, external regulation) (Deci & Moller, 2005). This was also seen in earlier research conducted in a learning environment, where, when students' need for competence was satisfied, they demonstrated autonomy and extrinsic motivation to learn.

At last, the relationship between the need for relatedness and extrinsic motivation has been studied in the field of motivation. The relationship between the need for relatedness and extrinsic motivation is also not straightforward and may depend on the type of extrinsic motivator. A high need for relatedness can enhance the impact of extrinsic motivation, particularly when the extrinsic motivators have been well-internalized and have become autonomous (i.e., introjected regulation, external regulation) (Deci & Moller, 2005; Ryan & Deci, 2020). Studies have shown that individuals with a high need for relatedness are more likely to be motivated by factors that involve social connection, such as recognition, feedback, and a sense of belonging (Dysvik et al., 2013). This was also observed in earlier research done in a learning environment, where students showed autonomous extrinsic incentives to learn when their demand for relatedness was met (Müller & Louw, 2004).

In this study, it was also expected that the relationship between psychological needs and extrinsic motivation to participate in training would resemble the relationship between psychological needs and intrinsic motivation in general. Two scales measure autonomous extrinsic motivation; integrated regulation and identified regulation. However, based on scale validation, previous studies failed to recognize integrated regulation as a distinct type of motivation (e.g. Gagné et al., 2015; Vallerand et al., 1992). Based on this evidence, integrated regulation was not measured during this study. Therefore, it was hypothesized that a mechanic with strong psychological needs will likely be regulated through identified regulations to follow training (*Hypothesis 2*).

3.4.3 Relation between psychological needs and controlled extrinsic motivation

On the contrary, previous studies had not yet shown a stable relation between psychological needs and controlled extrinsic motivation (i.e., introjected regulation, external regulation). The more the social context is perceived to be supportive of the needs for autonomy, competence, and/or relatedness, the less noticeable external incentives are (Deci & Ryan, 2000). Previous research concluded that support for all three psychological needs minimizes external motivation (Deci, Eghrari, Patrick, & Leone, 1994; Grolnick, Ryan, & Deci, 1991), while other research did not find a relation between the psychological needs and controlled extrinsic motivation at all (Müller & Louw, 2004; Milyavskaya & Koestner, 2011).

Since previous research had not yet shown a stable relationship between psychological needs and controlled extrinsic motivation (i.e., introjected regulation, external regulation) (Teixeira et al., 2012), it was expected that there is no relation between these constructs. Therefore, there were no hypotheses formulated between psychological needs and controlled extrinsic motivation.

3.4.4 Relation between psychological needs and amotivation

Although there was considerable debate about amotivation's place in motivation studies (Chatzisarantis, Hagger, Biddle, Smith, & Wang, 2003), it was included in this study because it represents a distinct form of motivation that is characterized by the lack of it. Additionally, one interviewee expressed disinterest in pursuing training, making it relevant to study in a larger population. By measuring amotivation, this study could gain a more comprehensive understanding of how psychological needs influence motivation.

There is an inverse relationship between psychological needs and amotivation. When the psychological needs of people are not satisfied, they may feel a lack of motivation or even amotivation. This may lead to disinterest, disengagement, and a lack of effort in pursuing goals or engaging in activities. Therefore, fulfilling an individual's basic psychological needs helps reduce amotivation (Deci & Ryan, 2013; Jackson-Kersey & Spray, 2016).

The need for autonomy is closely related to amotivation. When this need is not met, an individual may feel like they have no say or control over what they do and therefore lack the desire to engage in that activity. These feelings of helplessness, lack of control, and disengagement can ultimately result in amotivation (Jackson-Kersey & Spray, 2016). Other research supports that a lack of motivation may be the result of the frustration of the need for autonomy (Deci & Ryan, 2013).

When the need for competence is not met, it can lead to feelings of inadequacy, incompetence, and disengagement, which can result in amotivation. An individual may feel like they are unable to perform well or that their efforts will not be successful, resulting in a lack of motivation to engage in the activity. Therefore, it is important to recognize and support an individual's need for competence to prevent amotivation (Deci & Ryan, 2013; Jackson-Kersey & Spray, 2016).

An individual, who lacks fulfilment of their need for relatedness, may feel disconnected from others or experience a sense of not belonging, resulting in a lack of motivation to engage in an activity. When an individual's need for relatedness is not fulfilled, it can lead to feelings of disconnection and isolation, which can result in amotivation (Deci & Ryan, 2013; Jackson-Kersey & Spray, 2016).

The relationship between psychological needs and amotivation in general is similar to the relationship between psychological needs and amotivation to engage in training. Both exhibit signs of amotivation as a result of unmet basic psychological needs. In the case of general amotivation, the failure to meet psychological needs can result in a lack of motivation and disinterest in engaging in activities. Similarly, when individuals are not motivated to engage in training, it can be due to the failure to meet their psychological needs in their work (Jackson-Kersey & Spray, 2016). Based on the context of a previous study, the hypothesis was that failure to meet a mechanics' psychological needs would be linked to amotivation to engage in training (*Hypothesis 3*).

3.5 The moderating role of goal orientation

The potential that goal orientation might moderate the relationship between psychological needs with motivation to train is an under-studied area. While previous work had mainly concentrated on the primary effects (e.g. Janke, Nitsche, and Dickhäuser, 2015; Elliot and Church, 1997), this study examined how dispositional goal orientations act as a moderating factor that shapes the impact of psychological needs on motivation. The moderating role of goal orientation was relevant because it might help to explain why the effects of psychological needs on motivation to train may vary from person to person. By examining how these goal orientations moderate, this study could gain a more nuanced understanding of the underlying mechanisms that drove a mechanic's motivation to train. In this context, goal orientation was examined as a trait.

3.5.1 The moderating role of learning goal orientation

First, the direct relation between the psychological needs of the SDT and learning goal orientation was investigated. Previous studies found that psychological needs are important factors that influence learning goal orientation. People who feel satisfied with their psychological needs are more likely to have a state learning goal orientation (Janke et al., 2015).

Second, the relationship between learning goal orientation and motivation was explored. Prior research frequently discovered a connection between learning goal orientations as a trait and intrinsic motivation. In these studies, students with a learning goal orientation are more likely to be intrinsically motivated, which means they engage in activities for the pleasure and satisfaction of the activities themselves, rather than for external incentives or pressures. They concentrate on enhancing their skills, developing their knowledge, and advancing their abilities (Elliot & Church, 1997; Elliot & Harackiewicz, 1996).

The possibility that learning goal orientation as a trait could moderate the link between psychological needs and motivation to train had at this point not received study attention. Nevertheless, research had shown a moderating role of learning goal orientation regarding other relations. For example, research revealed a moderating role of learning orientation between the relation of the need for autonomy and creativity (Zhang, Zhang, Gu, & Tse, 2022). Moreover, for workers who had a stronger learning goal orientation, the impacts of intrinsic motivation on radical and incremental creativity were more positive (Malik, Choi, & Butt, 2019).

Although not yet explored in research, investigating the moderating role of learning goal orientation is important as it may influence the relationship between psychological needs and intrinsic motivation to engage in training, which is essential for learning and skill development. Therefore, it was hypothesized that when mechanics had a learning goal orientation, it would affect the relationship between their psychological needs and their intrinsic motivation to train (*Hypothesis 4*).

3.5.2 The moderating role of performance goal orientation

Previous research has yet to investigate the relationship between psychological needs and performance approach and performance-avoidance goal orientations. However, studies have found that having a performance goal orientation leads to low intrinsic motivation. When someone has a performance goal orientation, they may prioritize proving their skill or avoiding failure over the enjoyment or value of the activity itself, leading to decreased intrinsic motivation (Gao, Podlog, & Harrison, 2012; Agbuga & Xiang, 2008).

Other studies have shown that individuals with a performance goal orientation tend to be more extrinsically motivated, meaning they are driven by external rewards such as recognition or praise. They focus on achieving good results or outperforming others, rather than on learning and improving (Gonzalez, Greenwood, & WenHsu, 2001).

Moreover, research has shown that performance-avoidance goal orientation is positively related to amotivation. In this study, it made sense that performance-avoidance goal orientation as a trait was a positive predictor of amotivation when taking into account the potential for certain students to lack interest in participating in an activity class (Gao et al., 2012).

At the time, the potential that performance goal orientation and performance-avoidance goal orientation as a trait moderated the relationship between psychological needs and motivation to train was not explored in research. However, previous research had demonstrated the moderating effect of performance goal orientation on other relationships. The research found that in the presence of a performance-approach orientation, lower competence beliefs predict a decline in extrinsic motivation (Spinath & Steinmayr, 2012).

Previous studies have found some direct effects of performance goal orientation on extrinsic motivation. Therefore, it was expected that there is only a relation between psychological needs and controlled extrinsic motivation to train for certain levels of performance goal orientation. Based on this, it was anticipated that a mechanic's performance goal orientation would moderate the relationship between their psychological needs and their controlled extrinsic motivation to train (*Hypothesis 5*). Similarly, it was expected that a mechanic's performance goal orientation would moderate the relationship between psychological needs and intrinsic motivation (*Hypothesis 6*) and that a mechanic's performance-avoidance goal orientation would moderate the relationship between psychological needs and amotivation (*Hypothesis 7*).

3.6 Hypotheses and conceptual model

The study proposed three initial hypotheses, stating that each psychological need contributes uniquely to intrinsic motivation, identified regulation, and amotivation, regardless of the fulfillment of other needs. Additionally, the role of goal orientation in the relationship between needs and motivation had not been explored in previous studies. I expected that learning goal orientation would moderate the relationship between psychological needs and autonomous motivation, while performance goal orientation would moderate the relationship between

psychological needs and controlled motivation. Lastly, it was expected that performance-avoidance goal orientation would moderate the relationship between psychological needs and amotivation. In summary, the study aimed to investigate the relations between training motivation, psychological needs, and mechanics' goal orientation. Based on the above theoretical framework, the following hypotheses were formed:

Table 7: Hypotheses overview

Hypothesis	Description
H1	Mechanics' psychological needs (i.e., the need for autonomy, need for competence, need for relatedness) are positively related to intrinsic motivation to train
H2	Mechanics' psychological needs (i.e., the need for autonomy, need for competence, need for relatedness) are positively related to identified regulation to train
H3	Mechanics' psychological needs (i.e., the need for autonomy, need for competence) are negatively related to amotivation to train
H4	For high levels of learning goal orientation, mechanics' psychological needs (i.e., the need for autonomy, need for competence, need for relatedness) are more strongly related to autonomous motivation (i.e. intrinsic motivation, identified regulation) than for low levels of learning goal orientation
H5	For high levels of performance goal orientation, mechanics' psychological needs (i.e., the need for autonomy, need for competence, need for relatedness) are more strongly related to controlled motivation (i.e., introjected regulation, external regulation) than for low levels of performance goal orientation
H6	For low levels of performance goal orientation, mechanics' psychological needs (i.e., the need for autonomy, need for competence, need for relatedness) are more strongly related to intrinsic motivation than for high levels of performance goal orientation
H7	For high levels of performance-avoidance goal orientation, mechanics' psychological needs (i.e., the need for autonomy, need for competence, need for relatedness) are more strongly related to amotivation than for low levels of performance-avoidance goal orientation

Based on the hypotheses above, the conceptual model was as follows:

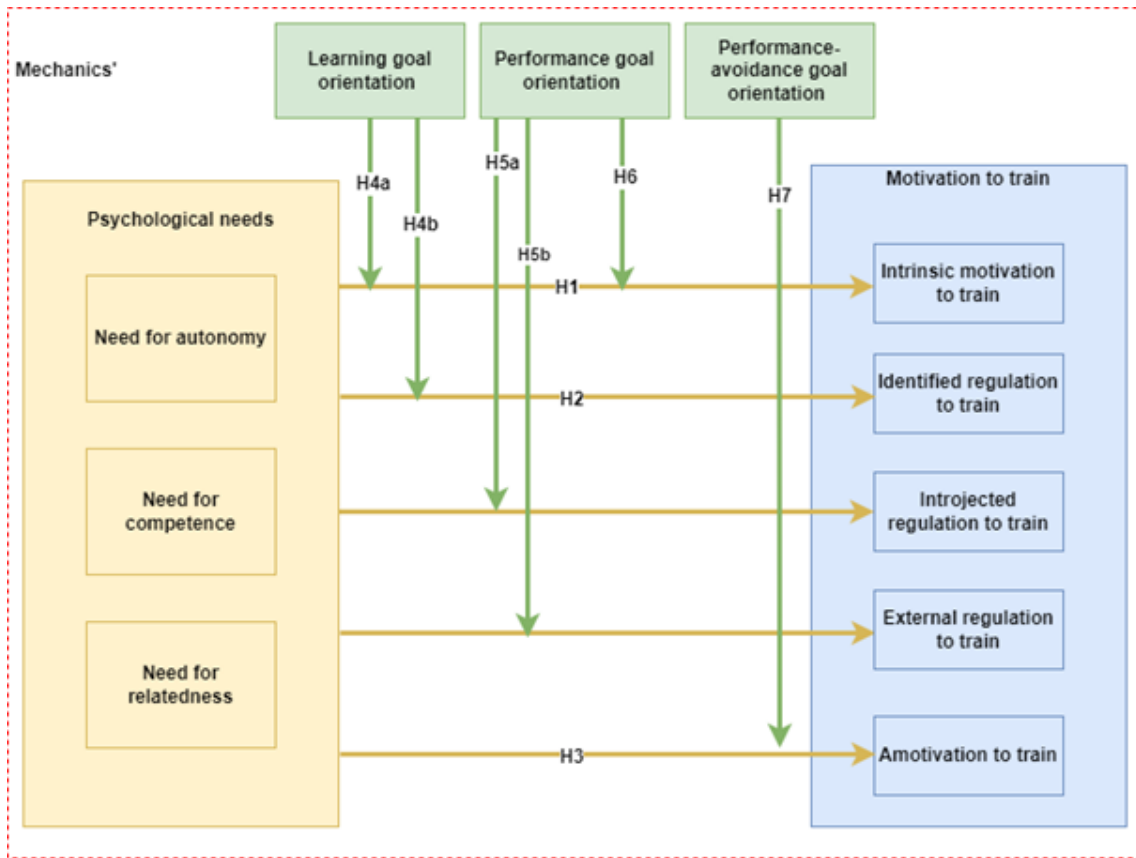


Figure 3: Conceptual model based on hypotheses

4 Methods

4.1 Procedure and participants

The data collected in this study involved the use of a paper-based questionnaire distributed during annual technical days attended by all mechanics in a classroom setting. During these days, mechanics share information, discuss the previous year, and share expectations for the upcoming year. Here, the paper questionnaires were distributed among the mechanics. This kind of distribution was chosen because the mechanics were easily reached in comparison to distributing the questionnaire electronically. Aside from that, administering surveys in classrooms usually required the use of paper surveys (Porter, 2004).

Data analysis was conducted on 260 observations for further study, which included data cleaning to ensure data quality by eliminating inconsistencies. Demographics were examined, and participants not in Group 1 mechanics were removed, which were a total of 59 employees. The identification of missing data was then performed, and appropriate methods were determined to handle missing data. Given the missing completely at random (MCAR) nature of the missing data and the minimal loss of statistical power, the complete case analysis approach was adopted for handling missing data (Li, 2013). In total, 15 observations containing missing data were removed from the dataset. Finally, it was discovered that five participants provided identical responses, which suggested haste and carelessness, and therefore were excluded from further analysis. Table 8 provides an overview of the data analysis.

Table 8: Data cleaning

	Number
Total	260
Group 2	59
Group 1: Missing data	15
Group 1: Filling in the same	5
Total after cleaning	181

The participants involved in the study were a total of 181 mechanics employed at VolkerRail, representing a diverse array of disciplinary backgrounds. The data procured from the participants was utilized to examine questions of VolkerRail and to investigate the relationship between psychological needs, motivation, and dispositional goal orientation. To get nuanced insights into the demographic composition of the participants, an analysis of their characteristics was carried out, generating comprehensive demographic statistics.

Table 9 provides information about the demographic statistics of the 181 participants involved in this study. The participants' ages, which ranged from 19 to 65, were 44 on average with a standard deviation of 13.3. Moreover, a vast majority of the participants were male (97%).

Additionally, it was noted that a considerable proportion of the participants (65%) possessed a secondary vocational education, which highlights their technical knowledge and skills. Furthermore, the participants' working at VolkerRail ranged from 0 to 44 years, which underscores the diversity of experience levels within the sample. The discipline in which the participants were active was nicely distributed, where train tracks (22%), signaling (22%) and train engines (17%) formed the largest group of participants. Finally, it was noteworthy that most participants were ranked in Level 4 (44%), this meant that most participants were technicians, team leaders or foremen, which means that they are allowed to perform all the tasks that fall within his or her discipline. However, despite their level of expertise, it was important for these participants to undergo recertification to ensure their knowledge remained current and up to date. Some respondents were not at a mechanic level because it did not apply to their discipline (4%).

Table 9: Demographics of the participants

		Number	Percentage
	Participants	181	100%
Age	<30	36	20%
	31-40	34	19%
	41-50	40	22%
	51-60	50	28%
	>61	17	9%
	Missing	4	2%
Gender	Male	175	97%
	Female	1	1%
	Prefer not to say	3	2%
Education level	Primary school	10	6%
	Pre-vocational secondary education	39	22%
	Senior general secondary education	3	2%
	Pre-university secondary education	1	1%
	Secondary vocational education	118	65%
	Higher professional education	8	4%
	University	1	1%
	Missing	1	1%
Employed by VolkerRail	<1	33	18%
	2-5	39	22%
	6-10	20	11%
	11-15	19	10%
	16-20	24	13%
	21-25	17	9%
	26-30	9	5%
	>30	17	9%
	Missing	3	2%
Discipline	Train tracks	40	22%
	Energy supply & overhead lines	16	9%
	Welding	15	8%
	Measurement train track	3	2%
	Train engine	31	17%
	Signaling	39	22%
	Systems	12	7%
	Safety	5	3%
	Power supply	2	1%
	Workplace	6	3%
	Point heating & Water	11	6%
	Mechanic level	Level 1: Aspirant mechanic	23
Level 2: Mechanic		38	21%
Level 3: Senior mechanic		33	18%
Level 4: Technician		80	44%
Not applicable		7	4%

4.2 Measures

The questionnaire contained 60 questions and was administered in the Dutch language. The language used in the questionnaire was appropriate for mechanics. The questionnaire was designed to elicit information for this study. Specifically, the questionnaire encompassed eight items that pertained to the participant's demographic information, 43 items that addresses the study hypotheses, and nine items that were commissioned by VolkerRail. A detailed copy of the questionnaire can be found in Appendix A, which provides a comprehensive overview of the types of questions asked and the response options available to the participants.

General questions

The first eight questions were regarding the demographics of the participants. These questions can be used to classify the data even though they had no clear meaning in the study at this point. Besides that, they could be useful to identify outliers and pick the desirable individuals, which were in this case the group 1 mechanics. Here, the following information was asked: age, gender, education level, employment at VolkerRail, which division and discipline the participant was active in, and the mechanic level. Aside from that, questions regarding the RCC were asked. Here, the head of the department was interested in additional information not measured in the variable constructs. For example, statements like "I like to be trained based on practical examples" were asked. Questions 9 to 17 in the questionnaire are asked regarding the RCC.

Constructs

To investigate the study hypotheses, a set of survey items were selected based on existing literature. A total of 43 items were utilized, with each item constructed based on relevant theoretical constructs. The constructs were measured using existing scales. The related questions of the constructs are displayed in Table 10. Besides that, the Cronbach alpha is shown in Table 10. Cronbach's alpha quantifies the internal consistency of a test or scale, which is represented as a number between 0 and 1. Internal consistency refers to how closely all of the test items assess the same construct and is thus related to how closely the test items are related to one another (Tavakol & Dennick, 2011). For the explorative study, a Cronbach alpha of at least 0.6 is an acceptable level of reliability, and 0.8 or greater denotes a very good level (Field, 2013; Hulin, Netemeyer, & Cudeck, 2001). The existing scales are translated to a Dutch version that is applicable for mechanics that are in most cases secondary vocational educated.

Table 10: Questions and Cronbach's alphas of the measured constructs

Research construct	Related questions	Cronbach's α
Need for autonomy	Q18, Q20, Q25, Q29	0.721
Need for competence	Q21, Q23, Q26, Q28	0.758
Need for relatedness	Q19, Q22, Q24, Q27	0.660
Intrinsic motivation	Q30, Q35, Q43	0.729
Identified regulation	Q32, Q37, Q47	0.758
Introjected regulation	Q36, Q39, Q44, Q48	0.663
External regulation - social	Q33, Q40, Q46	0.660
External regulation - material	Q31, Q38, Q42	0.469
Amotivation	Q34, Q41, Q45	0.885
Learning goal orientation	Q49, Q51, Q54, Q57	0.762
Performance goal orientation	Q50, Q53, Q55, Q59	0.716
Performance goal orientation avoidance	Q52, Q56, Q58, Q60	0.638

The measurements utilized are explicated as follows:

Psychological need strength

The Psychological need strength measures the need for autonomy, competence, and relatedness using 12 items with a 7-point Likert scale from 1 ("Not at all") to 7 ("To an extremely large extent"). The questions are equally distributed over the three subscales of psychological needs. Cronbach's alphas for the need for autonomy, need for competence, and need for relatedness were 0.721, 0.758, and 0.660 respectively (Van Yperen, Rietzschel, & De Jonge, 2014). The questions asked per construct are shown in Appendix B. An example item of need for autonomy is "*I need to feel like I have a choice and freedom in what I do at work*". An example item of need for competence is "*I need to feel confident that I can do things well at work*". An example item of need for relatedness is "*I need to feel that the people I care about at work also care about me*". The final score per construct was calculated by using the average of its representative three questions.

The Multidimensional Work Motivation Scale

The Multidimensional Work Motivation Scale (MWMS) (Gagné et al., 2015) measures motivation for work at the domain level (Vallerand, 1997). The scale has a total of 19 items that assess intrinsic motivation, identified regulation, introjected regulation, external regulation, and amotivation. Here, external regulation was measured using two constructs, namely social (e.g. praise) and material (e.g. money) rewards. The response format is according to a 7-point Likert scale from 1 ("Strongly disagree") to 7 ("Strongly agree"). For this study, the questions were modified to measure the motivation to participate in training. In Appendix B, the questions asked for each construct are listed. An example item for intrinsic motivation is: "*Because the*

training I do is interesting”, Cronbach’s alpha for intrinsic motivation was 0.729. An example item for identified regulation is: *“Because putting efforts in this training aligns with my values”*, Cronbach’s alpha for identified regulation was 0.758. An example item for introjected regulation is: *“Because I have to prove to myself that I can”*, Cronbach’s alpha for introjected regulation was 0.663. An example item for external regulation-social is: *“To get others’ approval (e.g., supervisor, colleagues, family)”*, the Cronbach’s alpha for external regulation-social was 0.660. An example item for external regulation-material is: *“Because I risk losing my job if I don’t put enough effort into it”*, the Cronbach’s alpha for external regulation-material was 0.469. An example item for amotivation is: *“I don’t, because I feel that I’m wasting my time at training”*, Cronbach’s alpha for amotivation was 0.885. The final score was also calculated by the mean per construct (e.g. the mean of the three questions asked regarding intrinsic motivation).

Goal orientation

Goal orientation was measured with the Goal Orientation Measure (VandeWalle, 1997). This instrument can be used to evaluate a person’s goal orientation in a professional environment. The measurement consists of 12 items that are rated by respondents on a 7-point Likert-type scale that goes from 1 (“Strongly disagree”) to 7 (“Strongly agree”). Goal orientation measures learning goal orientation (LGO), and performance goal orientation (PGO). LGO has a Cronbach’s Alpha of 0.76. PGO can be divided into performance goal orientation (Cronbach’s Alpha of 0.7) and performance-avoidance goal orientation (Cronbach’s Alpha of 0.67). Appendix B lists the questions that were asked for each construct. The Cronbach’s alpha for learning goal orientation was 0.762, an example item for learning goal orientation is *“I am willing to select a challenging work assignment that I can learn a lot from”*. The Cronbach’s alpha for performance goal orientation was 0.716, an example item for performance goal orientation is *“I like to show that I can perform better than my coworkers”*. The Cronbach’s alpha for performance-avoidance goal orientation was 0.638, an example item for performance-avoidance goal orientation is *“I would avoid taking on a new task if there was a chance that I would appear rather incompetent to others”*. The average of the construct’s representative of three questions was used to calculate each final score.

4.3 Descriptive statistics

To provide greater insight into the twelve constructs, descriptive statistics were calculated. Table 11 displays the mean, standard deviation, Skewness, Kurtosis and Cronbach alphas for each construct. Because the majority of the constructs had Skewness and Kurtosis values between -2 and +2, it was presumed that the data were normally distributed. Only the construct need for competence had a Kurtosis of 6.756, therefore it was determined that this construct was considered non-normal.

As stated before, a Cronbach alpha of at least 0.6 is considered acceptable (Field, 2013). The Cronbach alphas were acceptable for all the constructs, except for the need for relatedness and introjected regulation through material rewards. When examining the construct need for relatedness, item 24 was the source for the lower Cronbach alpha. Item 24 was a statement about the need to “feel closely connected to colleagues because otherwise, I feel lonely”. Upon closer examination, it was determined that this phrasing may not have accurately captured the construct and may have instead introduced an extra element related to the experience of loneliness. Deleting item 24 regarding the construct of the need for relatedness increased Cronbach’s alpha from 0.588 to 0.660, which is an acceptable level of internal consistency reliability.

The construct of introjected regulation only had a Cronbach alpha value of 0.469. Unfortunately, removing items did not raise the construct’s Cronbach alpha to an acceptable level. This construct, which looked at whether someone was motivated to train because they might receive material rewards or punishments, was evaluated by three items. Specifically, the items focused on the fear of losing one’s job, the expectation of financial rewards, and greater work security. Due to the current shortage of skilled workers in the construction sector (CBS, 2022), the concern of job security had become less pressing for mechanics at VolkerRail. As a result, the factors that affect job stability and the danger of job loss may be viewed as being less significant when encouraging mechanics to pursue training. Consequently, it was determined that the construct inadequately captures introjected regulation through rewards or punishments in this context. The construct of material incentives was therefore decided to be excluded from the measurement of external regulation.

Table 11: Descriptive statistics

	μ	σ	Skewness	Kurtosis	α
Need for autonomy	5.582	0.728	-1.461	2.820	0.721
Need for competence	6.006	0.673	-1.713	9.943	0.758
Need for relatedness	5.565	0.763	-0.997	2.558	0.660
Intrinsic motivation	5.365	0.963	-0.867	1.129	0.729
Identified regulation	5.118	0.998	-0.761	0.755	0.758
Introjected regulation	4.131	1.084	-0.473	0.053	0.663
External regulation - social	3.619	1.164	-0.198	-0.444	0.660
External regulation - material	4.170	1.096	-0.378	-0.236	0.469
Amotivation	2.262	1.076	0.921	0.391	0.885
Learning goal orientation	5.478	0.810	-1.000	2.191	0.762
Performance goal orientation	3.949	1.088	-0.259	-0.087	0.716
Performance-avoidance goal orientation	3.231	0.989	-0.315	-0.609	0.638

4.4 Analysis

The data was coded, modified, and analyzed using SPSS. The mean and standard deviations of the constructs were compared to existing literature measuring the same constructs at similar sectors and companies. After this, Pearson correlations and linear regressions were computed to find relationships between one continuous dependent variable and one independent variable. The PROCESS plugin by Hayes (2013) was used to test moderating effects. These analyses helped to answer whether to accept or reject the hypotheses proposed and were used as input for the practical implications.

5 Results

5.1 Comparison of mean scores with other populations

The analysis of the data revealed several noteworthy findings when compared to previous literature. These findings are summarized in Table 12, which presents the results obtained from comparing the mean, standard deviation, and population using a t-test to determine if there are any significant differences.

Firstly, mechanics exhibited higher scores in the areas of need for autonomy, competence, and relatedness when compared to previous literature. The comparison was made with participants from various Dutch companies (Wörtler, Van Yperen, & Barelds, 2020), participants from a Dutch technology- and engineering-driven organization (Van Tuin, Schaufeli, & Van Rhenen, 2020), and psychology students (Müller & Louw, 2004).

The Multidimensional Work Motivation Scale (Gagné et al., 2015) was modified to measure the motivation to participate in training. Here, it was more difficult to compare the mean and standard deviation with previous literature since this scale measures motivation in the work domain instead of training participation (Vallerand, 1997). Mechanics demonstrated lower levels of intrinsic motivation to train in comparison to the study of Kotera et al. (2022), who investigated the motivation to work of construction workers in the UK. However, mechanics demonstrated higher levels of intrinsic motivation to train in comparison to the study of Müller and Louw (2004) where students' intrinsic motivation to learn was measured using the Academic Motivation Scale (Vallerand, 1997). Additionally, mechanics exhibited lower scores of identified regulation, introjected regulation, and amotivation to train in comparison to the construction workers (Kotera et al., 2022) and the students (Müller & Louw, 2004). Furthermore, mechanics scored lower on external regulation to train in comparison to construction workers' external regulation to work (Kotera et al., 2022) and higher in comparison to the students (Müller & Louw, 2004).

Lastly, the mechanics' dispositional goal orientations were compared to previous literature. Here, learning goal orientation, performance goal orientation, and performance-avoidance orientation were compared to construction workers in China (Lu, Wu, Shao, Liu, & Wang, 2019) and employees who worked in various Dutch organizations (Bakker, Petrou, Op den Kamp, & Tims, 2020). The learning goal orientation of mechanics was higher compared to the employees of the Dutch organization (Bakker et al., 2020). In contrast, mechanics scored lower in performance goal orientation compared to construction workers in China (Lu et al., 2019). Additionally, the performance-avoidance goal orientation was also lower than those of the employees working in Dutch organizations (Bakker et al., 2020).

Table 12: Comparing the mean and standard deviation to previous research with a t-test

	<i>N</i>	μ	σ	<i>t</i>	<i>df</i>	<i>p</i>
Need for autonomy						
This study	181	5.582	0.728			
Wörtler et al. (2020)	208	5.42	0.82	2.047	378	0.041
Van Tuin et al. (2020)	304	4.914	0.910	8.403	483	<0.001
Müller and Louw (2004)	123	5.096	1.120	4.586	302	<0.001
Need for competence						
This study	181	6.006	0.673			
Wörtler et al. (2020)	208	5.28	0.74	10.065	387	<0.001
Van Tuin et al. (2020)	304	5.222	0.826	10.810	483	<0.001
Müller and Louw (2004)	123	5.460	0.896	6.061	302	<0.001
Need for relatedness						
This study	181	5.565	0.763			
Wörtler et al. (2020)	208	4.24	1.02	14.331	387	<0.001
Van Tuin et al. (2020)	304	5.768	0.686	3.021	483	<0.001
Müller and Louw (2004)	123	4.466	1.092	10.331	302	<0.001
Intrinsic motivation						
This study	181	5.365	0.963			
Kotera et al. (2022)	155	6.398	2.184	5.746	334	<0.001
Müller and Louw (2004)	304	5.054	1.134	3.086	483	<0.001
Identified regulation						
This study	181	5.118	0.998			
Kotera et al. (2022)	155	5.838	2.212	3.963	334	<0.001
Müller and Louw (2004)	304	5.838	0.966	7.948	483	<0.001
Introjected regulation						
This study	181	4.131	1.084			
Kotera et al. (2022)	155	5.712	2.184	8.584	334	<0.001
Müller and Louw (2004)	304	4.788	1.456	5.263	483	<0.001
External regulation - social						
This study	181	3.619	1.164			
Kotera et al. (2022)	155	5.880	2.170	12.129	334	<0.001
Müller and Louw (2004)	304	3.178	1.260	3.834	483	<0.001
Amotivation						
This study	181	2.262	1.076			
Kotera et al. (2022)	155	3.794	1.792	9.650	334	<0.001
Müller and Louw (2004)	304	2.660	1.218	3.632	483	<0.001
Learning goal orientation						
This study	181	5.478	0.810			
Lu et al. (2019)	450	5.418	1.022	0.671	629	0.503
Bakker et al. (2020)	107	4.51	0.72	10.205	286	<0.001
Performance goal orientation						
This study	181	3.949	1.088			
Lu et al. (2019)	450	5.404	1.064	15.436	629	<0.001
Performance goal orientation avoidance						
This study	181	3.231	0.989			
Bakker et al. (2020)	107	5.05	0.92	15.474	286	<0.001

5.2 Correlations between key study variables

The second analysis aimed to examine the correlations between the constructs by employing the Pearson correlation coefficients. The resulting correlation coefficients are presented in Table 13, providing a comprehensive overview of the relationships between the variables under investigation.

The results showed a positive relationship between age and employment at VolkerRail. A negative relationship was found between age and the need for relatedness and learning goal orientation. Additionally, a positive relation was observed between age and amotivation. Regarding years of employment at VolkerRail, a positive relationship was only found between this variable and the need for autonomy.

The psychological needs (i.e., need for autonomy, competence, and relatedness) were positively related to intrinsic motivation, identified regulation and negatively related to amotivation. Moreover, positive relationships were found between the need for competence, relatedness, and introjected regulation. However, there was no relation found between the need for autonomy and introjected regulation. Therefore, hypotheses 1, 2 and 3 were accepted.

Additional relations were found between the psychological needs for autonomy, competence, relatedness and learning goal orientation. There was no relation found between the three psychological needs and both performance goal orientations. Besides, results showed that there were relations found between intrinsic motivation, identified regulation, introjected regulation, external regulation through social rewards, amotivation and learning goal orientation. There were also relations found between intrinsic motivation, identified regulation, introjected regulation, external regulation through the material and social rewards, and performance goal orientation. At last, the study found some relations between identified regulation, introjected regulation, external regulation through the material and social rewards, amotivation and performance-avoidance goal orientation.

Table 13: Pearson correlation

	1	2	3	4	5	6	7	8	9	10	11	12	13	14
1 Age														
2 Employed at VolkerRail	.718**													
3 Need for autonomy	.105	.175*												
4 Need for competence	-.062	-.001	.596**											
5 Need for relatedness	-.156*	-.087	.469**	.610**										
6 Intrinsic motivation	-.052	-.084	.240**	.430**	.302**									
7 Identified regulation	-.039	-.008	.227**	.449**	.351**	.602**								
8 Introjected regulation	-.045	.008	.081	.196**	.201**	.496**	.538**							
9 Externally regulation - material	.034	-.048	-.088	-.027	.116	.278**	.372**	.543**						
10 Externally regulation - social	-.095	-.079	.159*	.134	.221**	.362**	.319**	.485**	.525**					
11 Amotivation	.214**	.117	-.208**	-.376**	-.232**	-.315**	-.272**	.015	.272**	.085				
12 Learning goal orientation	-.153*	-.096	.363**	.503**	.310**	.432**	.442**	.191*	.013	.211**	-.370**			
13 Performance goal orientation	-.055	.003	.080	.108	.129	.180*	.276**	.507**	.510**	.398**	.065	.204**		
14 Performance-avoidance goal orientation	-.017	-.026	-.076	-.102	.068	.063	.191*	.447**	.457**	.421**	.291**	-.170*	.483**	

N = 181. **p<.01, * p<.05

5.3 Multiple regression analysis of key study variables

Multiple linear regression was used to test if the need for autonomy, need for competence, and need for relatedness predicted intrinsic motivation. The overall regression was statistically significant ($R^2 = 0.188$, $F(3, 177) = 13.653$, $p < 0.001$). It was found that need for autonomy did not significantly predict intrinsic motivation ($\beta = -0.049$, $p = 0.678$). It was found that need for competence did significantly predict intrinsic motivation ($\beta = 0.605$, $p < 0.001$). It was found that need for relatedness did not significantly predict intrinsic motivation ($\beta = 0.092$, $p = 0.421$). The results of the multiple linear regression are shown in Table 14.

Table 14: Multiple linear regression intrinsic motivation

Intrinsic motivation	<i>B</i>	<i>SE</i>	β	<i>t</i>	<i>Sig.</i>
Constant	1.248	.651		1.918	.057
Need for autonomy	-.049	.117	-.036	-.416	.678
Need for competence	.605	.141	.408	4.284	.000
Need for relatedness	.092	.113	.070	.807	.421

Multiple linear regression was used to test if need for autonomy, need for competence, and need for relatedness predicted identified regulation. The overall regression was statistically significant ($R^2 = 0.215$, $F(3, 177) = 16.197$, $p < 0.001$). It was found that need for autonomy did not significantly predict identified regulation ($\beta = -0.112$, $p = 0.317$). It was found that need for competence did significantly predict identified regulation ($\beta = 0.593$, $p < 0.001$). It was found that need for relatedness did not significantly predict identified regulation ($\beta = 0.175$, $p = 0.107$). The results of the multiple linear regression are shown in Table 15.

Table 15: Multiple linear regression identified regulation

Identified regulation	<i>B</i>	<i>SE</i>	β	<i>t</i>	<i>Sig.</i>
Constant	1.454	.617		2.355	.020
Need for autonomy	-.112	.111	-.084	-1.004	.317
Need for competence	.593	.134	.415	4.429	.000
Need for relatedness	.175	.108	.138	1.622	.107

Multiple linear regression was used to test if need for autonomy, need for competence, and need for relatedness predicted introjected regulation. The overall regression was statistically significant ($R^2 = 0.037$, $F(3, 177) = 3.292$, $p < 0.001$). It was found that need for autonomy did not significantly predict introjected regulation ($\beta = -0.119$, $p = 0.392$). It was found that need for competence did not significantly predict introjected regulation ($\beta = 0.255$, $p = 0.130$). It was found that need for relatedness did not significantly predict introjected regulation ($\beta = 0.205$, $p = 0.130$). Results of the multiple linear regression are shown in Table 16.

Table 16: Multiple linear regression introjected regulation

Introjected regulation	<i>B</i>	<i>SE</i>	β	<i>t</i>	<i>Sig.</i>
Constant	2.165	.773		2.803	.006
Need for autonomy	-.119	.139	-.079	-.858	.392
Need for competence	.255	.168	.157	1.522	.130
Need for relatedness	.205	.135	.142	1.520	.130

Multiple linear regression was used to test if need for autonomy, need for competence, and need for relatedness predicted external regulation through social rewards. The overall regression was statistically significant ($R^2 = 0.027$, $F(3, 177) = 2.655$, $p = 0.050$). It was found that need for autonomy did not significantly predict external regulation through social reward ($\beta = -0.241$, $p = 0.107$). It was found that need for competence did not significantly predict external regulation through social reward ($\beta = -0.142$, $p = 0.428$). It was found that need for relatedness did significantly predict external regulation through social reward ($\beta = 0.362$, $p = 0.013$). Results of the multiple linear regression are shown in Table 17.

Table 17: Multiple linear regression external regulation

External regulation - social	<i>B</i>	<i>SE</i>	β	<i>t</i>	<i>Sig.</i>
Constant	3.803	.824		4.614	.000
Need for autonomy	-.241	.149	-.151	-1.621	.107
Need for competence	-.142	.179	-.082	-.795	.428
Need for relatedness	.362	.144	.237	2.518	.013

Multiple linear regression was used to test if need for autonomy, need for competence, and need for relatedness predicted amotivation. The overall regression was statistically significant ($R^2 = 0.128$, $F(3, 177) = 9.773$, $p < 0.001$). It was found that need for autonomy did not significantly predict amotivation ($\beta = 0.040$, $p = 0.758$). It was found that need for competence did significantly predict amotivation ($\beta = -0.618$, $p < 0.001$). It was found that need for relatedness did not significantly predict amotivation ($\beta = -0.013$, $p = 0.918$). Results of the multiple linear regression are shown in Table 18.

Table 18: Multiple linear regression amotivation

Amotivation	<i>B</i>	<i>SE</i>	β	<i>t</i>	<i>Sig.</i>
Constant	5.823	.721		8.072	.000
Need for autonomy	.040	.130	.027	.309	.758
Need for competence	-.618	.156	-.387	-3.952	.000
Need for relatedness	-.013	.126	-.009	-.102	.918

5.3.1 Moderating effect

In this study, the moderating effects of dispositional goal orientation on the relationship between psychological needs and motivation were examined. The analysis was conducted using Hayes' (2013) PROCESS Macro for SPSS, with 5,000 bootstraps iterations to create two-sided bias-corrected confidence intervals at the 95% level. A total of eighteen analyses were performed to test the moderating effects of Hypothesis 6 to 9. The interaction of these analyses is shown in Table 19.

Table 19: The moderating effects of dispositional goal orientation

	Intrinsic motivation			Identified regulation			Introjected regulation			External regulation			Amotivation		
	<i>B</i>	<i>SE</i>	<i>p</i>	<i>B</i>	<i>SE</i>	<i>p</i>	<i>B</i>	<i>SE</i>	<i>p</i>	<i>B</i>	<i>SE</i>	<i>p</i>	<i>B</i>	<i>SE</i>	<i>p</i>
Intercept	1.860	1.625	0.254	-0.890	1.544	0.565									
AUTONOMY	0.100	0.316	0.751	0.696	0.301	0.022									
LGO	0.457	0.319	0.154	1.097	0.303	<0.001									
Interaction	0.006	0.060	0.914	-0.118	0.057	0.039									
Intercept	2.115	1.643	0.200	-1.341	2.232	0.549									
COMPETENCE	0.161	0.292	0.583	0.972	0.361	0.008									
LGO	0.017	0.363	0.963	0.842	0.610	0.017									
Interaction	0.059	0.061	0.335	-0.049	0.058	0.403									
Intercept	0.922	1.667	0.581	-1.634	1.563	0.297									
RELATEDNESS	0.305	0.320	0.341	0.875	0.300	0.004									
LGO	0.525	0.331	0.144	1.037	0.310	0.001									
Interaction	-0.012	0.062	0.841	-0.166	0.058	0.047									
Intercept	1.713	1.973	0.386				0.229	1.949	0.907	-0.449	2.033	0.826			
AUTONOMY	0.498	0.340	0.144				0.337	0.336	0.317	0.316	0.350	0.369			
PGO	0.449	0.528	0.396				0.952	0.522	0.070	1.400	0.544	0.011			
Interaction	-0.052	0.091	0.567				-0.077	0.089	0.392	-0.146	0.093	0.120			
Intercept	-2.700	2.381	0.258				1.070	2.509	0.670	1.680	2.681	0.532			
COMPETENCE	1.203	0.385	0.002				0.192	0.406	0.637	-0.045	0.433	0.917			
PGO	1.149	0.651	1.766				0.424	0.686	0.538	0.729	0.733	0.322			
Interaction	-0.166	0.105	0.115				0.012	0.110	0.917	-0.028	0.118	0.813			
Intercept	1.142	2.042	0.577				1.248	2.031	0.540	-0.067	2.173	0.975			
RELATEDNESS	0.617	0.360	0.088				0.176	0.357	0.623	0.277	0.382	0.470			
PGO	0.513	0.543	0.346				0.459	0.540	0.039	0.847	0.578	0.014			
Interaction	-0.067	0.095	0.480				0.006	0.094	0.950	-0.054	0.101	0.591			
Intercept													-1.455	2.004	0.469
AUTONOMY													0.477	0.349	0.173
PAGO													1.662	0.608	0.007
Interaction													-0.240	0.106	0.025
Intercept													5.813	1.848	0.002
COMPETENCE													-0.291	0.328	0.376
PAGO													-0.171	0.408	0.675
Interaction													-0.105	0.131	0.425
Intercept													-1.455	2.004	0.469
RELATEDNESS													0.477	0.349	0.173
PAGO													1.662	0.608	0.025
Interaction													-0.049	0.099	0.619

AUTONOMY = Need for autonomy, COMPETENCE = Need for competence, RELATEDNESS = Need for relatedness
LGO = Learning goal orientation, PGO = Performance goal orientation, PAGO = Performance-avoidance goal orientation

The study found two moderating effects of learning goal orientation on the relationship between

the need for autonomy, the need for relatedness and identified regulation. The moderating effect of learning goal orientation on the relationship between the need for autonomy and identified regulation is seen in Figure 4.

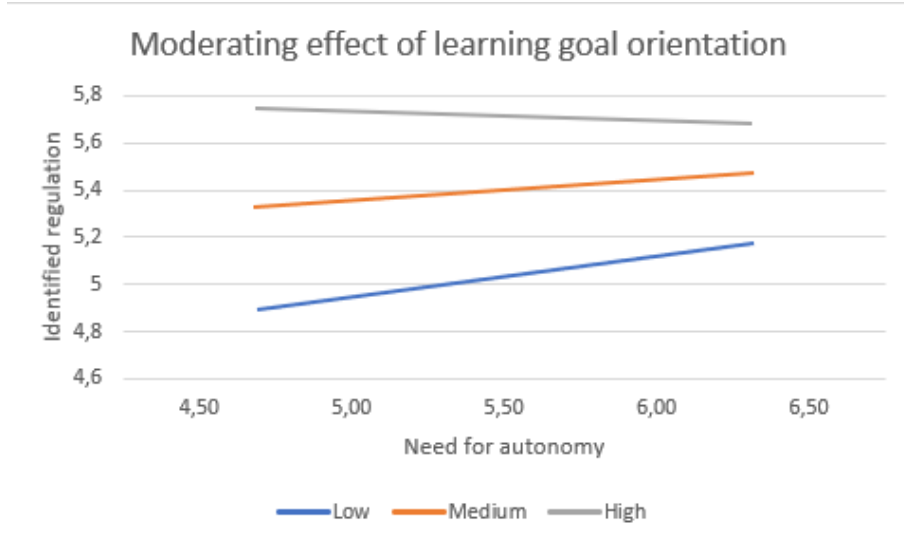


Figure 4: Need for autonomy on identified regulation by learning goal orientation

The entire model for identified regulation, which included all three variables (need for autonomy, learning goal orientation, and identified regulation) was significant, with $F = 16.574$, $p < 0.001$, and $R^2 = 0.219$. The interaction between the need for autonomy and performance-avoidance goal orientation was significant ($B = -0.118$, $SE = 0.057$, $p = 0.039$).

The simple slope analysis was not significant for low learning goal orientation ($B = 0.144$, $SE = 0.096$, $p = 0.136$). For average levels of learning goal orientation, the simple slope analysis was also not significant ($B = 0.049$, $SE = 0.098$, $p = 0.620$). For high levels of learning goal orientation, the simple slope was significant ($B = -0.047$, $SE = 0.119$, $p < 0.001$).

Table 20: Moderating effect of learning goal orientation on the relationship of need for autonomy with identified regulation

Outcome	Identified regulation			
	Predictor	B	SE	p
Intercept		-0.890	1.544	0.565
Need for autonomy	b1	0.696	0.301	0.022
Learning goal orientation	b2	1.097	0.303	0.000
Interaction	b3	-0.118	0.057	0.039
		R^2	F	p
Model		0.144	9.920	0.000

The moderating effect of learning goal orientation on the relationship between the need for relatedness and identified regulation is seen in Figure 5.

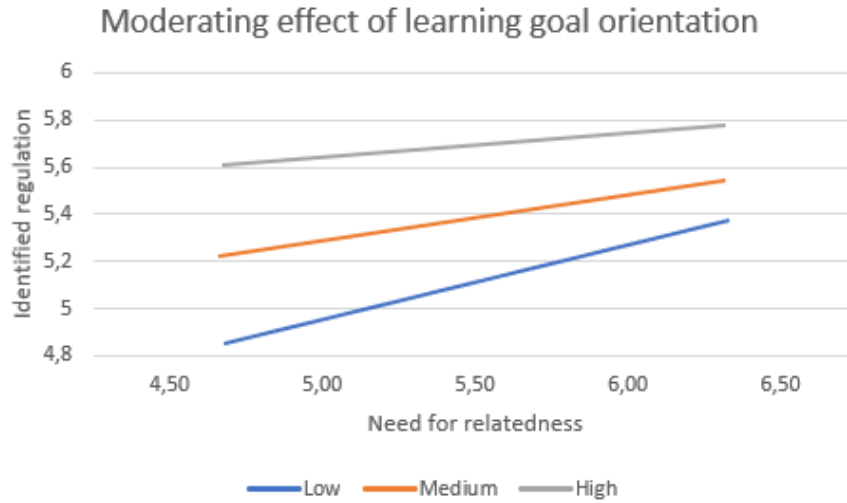


Figure 5: Need for relatedness on identified regulation by learning goal orientation

The entire model (Table 21 for identified regulation, which included all three variables (need for relatedness, learning goal orientation, and identified regulation) was significant, with $F = 21.018$, $p < 0.001$, and $R^2 = 0.263$. The interaction between the need for relatedness and performance-avoidance goal orientation was significant ($B = -0.116$, $SE = 0.058$, $p = 0.047$).

The simple slope analysis showed that for low learning goal orientation, identified regulation was related to the need for autonomy ($B = 0.335$, $SE = 0.088$, $p < 0.001$). For average levels of learning goal orientation, identified regulation was related to the need for autonomy ($B = 0.241$, $SE = 0.091$, $p = 0.008$). For high levels of learning goal orientation, the simple slope was not significant ($B = 0.148$, $SE = 0.117$, $p = 0.200$).

Table 21: Moderating effect of learning goal orientation on the relationship of need for relatedness with identified regulation

Outcome	Identified regulation			
	Predictor	B	SE	p
Intercept		-1.634	1.563	0.297
Need for relatedness	b1	0.875	0.300	0.004
Learning goal orientation	b2	1.037	0.310	0.001
Interaction	b3	-0.116	0.058	0.047
		R^2	F	p
Model		0.144	9.920	0.000

The study found one moderating effect of performance-avoidance goal orientation on the relationship between the need for autonomy and amotivation. The moderating effect of performance-avoidance goal orientation on the relationship between the need for autonomy and amotivation is seen in Figure 6.

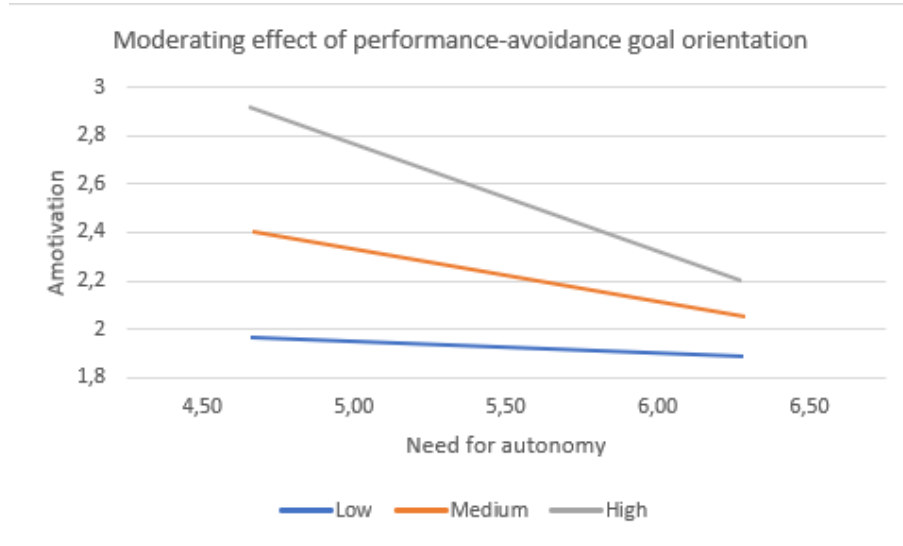


Figure 6: Need for autonomy on amotivation by performance-avoidance goal orientation

The entire model for amotivation, which included all three variables (need for autonomy, performance-avoidance goal orientation, and amotivation) was significant, with $F = 9.9202$, $p < 0.001$, and $R^2 = 0.144$. The interaction between the need for autonomy and performance-avoidance goal orientation was significant ($B = -0.240$, $SE = 0.106$, $p = 0.025$).

The simple slope analysis was not significant for low performance-avoidance goal orientation ($B = -0.061$, $SE = 0.140$, $p = 0.664$). For average levels of performance-avoidance goal orientation, more amotivation was related to less autonomy ($B = -0.299$, $SE = 0.104$, $p = 0.004$). For high levels of performance-avoidance goal orientation, more amotivation was related to less autonomy ($B = -0.536$, $SE = 0.155$, $p < 0.001$).

Table 22: Moderating effect of performance-avoidance goal orientation on the relationship of need for autonomy with amotivation

Outcome	Amotivation			
Predictor		<i>B</i>	<i>SE</i>	<i>p</i>
Intercept		-1.455	2.004	0.469
Need for autonomy	b1	0.477	0.349	0.173
Performance-avoidance goal orientation	b2	1.662	0.608	0.007
Interaction	b3	-0.240	0.106	0.025
		<i>R</i> ²	<i>F</i>	<i>p</i>
Model		0.144	9.920	0.000

The study's findings indicated that there was no additional moderating influence of learning goals orientation, performance approach orientation, or performance goal orientation avoidance on the link between psychological needs and motivation. Therefore, hypotheses 7 and 8 were fully rejected, and hypotheses 6 and 9 were partially accepted.

5.3.2 Overview hypotheses

Table 23 gives a summary of the findings of the main hypothesized relations.

Table 23: Hypotheses overview

Hypothesis	Description	
H1	Mechanics' psychological needs (i.e., the need for autonomy, need for competence, need for relatedness) is positively related to intrinsic motivation to train	Accepted
H2	Mechanics' psychological needs (i.e., the need for autonomy, need for competence, need for relatedness) is positively related to identified regulation to train	Accepted
H3	Mechanics' psychological needs (i.e., the need for autonomy, need for competence) is negatively related to amotivation to train	Accepted
H4	For high levels of learning goal orientation, mechanics' psychological needs (i.e., the need for autonomy, need for competence, need for relatedness) are more strongly related to autonomous motivation (i.e. intrinsic motivation, identified regulation) than for low levels of learning goal orientation	Partially accepted
	→ For high levels of learning goal orientation, mechanics' need for autonomy is more strongly related to identified regulation than for low levels of learning goal orientation	Accepted
	→ For high levels of learning goal orientation, mechanics' need for relatedness is more strongly related to identified regulation than for low levels of learning goal orientation	Accepted
H5	For high levels of performance goal orientation, mechanics' psychological needs (i.e., the need for autonomy, need for competence, need for relatedness) are more strongly related to controlled motivation (i.e., introjected regulation, external regulation) than for low levels of performance goal orientation	Rejected
H6	For low levels of performance goal orientation, mechanics' psychological needs (i.e., the need for autonomy, need for competence, need for relatedness) are more strongly related to intrinsic motivation than for high levels of performance goal orientation	Rejected
H7	For high levels of performance-avoidance goal orientation, mechanics' psychological needs (i.e., the need for autonomy, need for competence, need for relatedness) are more strongly related to amotivation than for low levels of performance-avoidance goal orientation	Partly accepted
	→ For high levels of performance-avoidance goal orientation, mechanics' needs for autonomy is more strongly related to amotivation than for low levels of performance-avoidance goal orientation	Accepted

6 Discussion and conclusion

This master thesis aimed to investigate the motivations of the mechanics of VolkerRail towards training courses to develop training programs specifically aimed at improving their abilities and knowledge. Qualitative research revealed that the mechanics of VolkerRail were driven to train because they want to advance their knowledge and abilities, crave workplace autonomy, and want to stay abreast of industry advances. In addition, cooperation and teamwork among mechanics were crucial to the success of training programs. Based on the findings in the qualitative research, the study's theoretical framework was based on the Self-Determination Theory (Deci & Ryan, 1985), which emphasizes the importance of psychological needs for motivation, and Dweck (1999) theory of dispositional goal orientation.

6.1 Theoretical implications

The study contributed to the existing literature by confirming current relationships and examining new relationships. By the use of nine hypotheses, we tested the direct relationship between psychological needs and motivation as well as the moderating role of goal orientation in this relation.

Relation between psychological needs and intrinsic motivation

During this study, a relationship was found between psychological needs and intrinsic motivation. In other words, when a mechanic feels that he/she has a sense of choice and control over their actions (autonomy), feels capable and effective in their actions (competence), and feels a sense of belonging and connection with others (relatedness), they are more likely to be intrinsically motivated to participate in training. Here, intrinsically motivated means that they are more likely to engage in training because they find it inherently enjoyable and interesting, rather than because of external factors. This finding aligns with the Self-Determination Theory proposed by Deci and Ryan(1985), which suggests that fulfilling individuals' needs can foster intrinsic motivation. Similar results have been observed in other studies concerning students' motivation to learn, where intrinsic motivation was associated with perceived autonomy, competence, and relatedness (Müller & Louw, 2004). Moreover, research conducted by Dysvik et al. (2013) in the workplace domain also corroborated this relationship, as employees exhibited higher motivation when their psychological needs were met. Our findings are further supported by studies conducted by Goudas et al. (1995) that investigated students at an English University and Parashakti et al. (2020) who investigated employees at a hospital.

Upon closer examination of the needs, this study also found that the need for competence of mechanics had the greatest influence on intrinsic motivation to train. This finding was interesting because it suggests that providing opportunities for mechanics to enhance their competence, such as offering training programs that help them develop and refine their skills, can be a powerful motivator. By addressing this need for competence, VolkerRail and the RCC can

tap into mechanics' intrinsic motivation and increase their willingness to participate in training activities voluntarily.

Relation between psychological needs and autonomous extrinsic motivation

Previous research also found relations between psychological needs and identified regulation, since this is similar to intrinsic motivation an autonomous type of motivation (Ryan & Deci, 2020; Deci & Moller, 2005; Teixeira et al., 2012). This was also seen in earlier research conducted in a learning environment where, when students' psychological needs were satisfied, they demonstrated autonomous extrinsic motivation to learn (Müller & Louw, 2004). The relation between psychological needs and identified regulation was confirmed during this research. When mechanics felt that a need for autonomy, competence, and relatedness, they were more likely to engage in training because they value the outcomes of those activities and identify with the underlying values. When the impact of the three psychological needs was compared, it was also observed that the need for competence had the greatest influence on identified regulation to train.

Relation between psychological needs and amotivation

The study showed that higher levels of psychological needs were associated with lower levels of amotivation to train among mechanics. This finding suggested that mechanics who have high psychological needs are less likely to have a lack of motivation to participate in training. This also confirms previous research who have shown that fulfilling an individual's psychological needs helps reduce amotivation. Here, research has shown that teaching behaviors that do not support basic needs are related to students that are amotivated (Deci & Ryan, 2013; Jackson-Kersey & Spray, 2016).

The moderating role of learning goal orientation

During this research, six analyses were used to test if there was a moderating effect of learning goal orientation between the relation of psychological needs and autonomous types of motivation to train. Here, two moderating effects of learning goal orientation were found. The first moderating effect that was found was learning goal orientation on the relationship between the need for autonomy and identified regulation. The results of this study implied that individuals with a strong learning goal orientation and a high need for autonomy are more likely to exhibit a higher level of identified regulation to train. This meant that when they perceive training that is aligned with their values and interests, they are more likely to engage in the training.

The second moderating effect that was found was learning goal orientation on the relationship between the need for relatedness and identified regulation. Therefore, we assumed that mechanics with a strong learning goal orientation and a high need for relatedness are more likely to exhibit a higher level of identified regulation to train. This means that when they perceive training as relevant to their values and beliefs, and they also feel a sense of connection and belongingness within a social context, they are more likely to engage in the training.

This study did not find any additional moderating effect of learning goal orientation on the relationship between psychological needs and motivation. One possible explanation for this could be that psychological needs and goal orientation are distinct constructs that influence motivation in different ways, especially intrinsic motivation. These constructs may operate independently and have separate effects on motivation, without goal orientation moderating the relationship between psychological needs and intrinsic motivation. However, the results showed a relationship between learning goal orientation and motivation. This finding aligns with previous research conducted in an educational setting by Elliot and Church (1997) as well as Elliot and Harackiewicz (1996). These earlier studies supported the existence of a relationship between learning goal orientation and autonomous types of motivation. This implies that mechanics who approach learning tasks with a desire to acquire knowledge and improve their skills are more likely to experience a sense of personal enjoyment, interest, and engagement in the learning process. They are motivated to participate in training by internal factors and find value in the learning activity itself, rather than relying solely on external rewards or pressures.

The moderating effect of performance goal orientation

Fifteen analyses were conducted as part of this study to determine whether performance approach and avoidance goal orientation had a moderating effect on the relationship between psychological needs and motivation to train. The only moderating effect that was identified was performance-avoidance goal orientation on the relationship between the need for autonomy and amotivation. This may imply that individuals who are focused on avoiding poor performance or failure are less likely to be motivated to participate in training when their need for autonomy is not being met. In other words, it could be possible mechanics who are primarily concerned with avoiding failure or performing poorly are less inclined to feel motivated to engage in training activities when they perceive a lack of autonomy or control over their actions.

This study aimed to investigate the moderating effect of performance(-avoidance) goal orientation on the relationship between psychological needs and motivation. Surprisingly, no additional moderating effects of performance goal orientation were found. This lack of effect can be attributed to the distinct nature of psychological needs and performance goal orientations, which have varying impacts on motivation. The analysis of the results of the moderating effects supported this notion. However, it is important to note that significant associations between performance goal orientations and motivation were discovered in this thesis. These findings suggest that mechanics with a strong performance goal orientation may exhibit a specific type of motivation linked to their training. Previous research has also demonstrated a connection between performance goal orientation and different types of extrinsic motivation. Here, Gao et al. (2012) has found that students with high performance goal orientations tend to have low intrinsic motivation to follow courses. On the contrary, other research showed that students with a performance goal orientation tend to be more extrinsically motivated (Gonzalez et al., 2001). In

the context of this master thesis, it can be concluded that mechanics' pronounced performance goal orientation may lead to motivation primarily influenced by external factors.

6.2 Practical implications

Based on the results of the study, several practical implications for the RCC of VolkerRail are identified regarding training and education courses for mechanics. By using the findings of this study, VolkerRail can create more effective training programs for its mechanics that provide their psychological needs and goal orientations.

Need satisfaction

The mechanics scored higher on psychological needs (i.e., the need for autonomy, competence, and relatedness) compared to employees of various Dutch companies (Wörtler et al., 2020; Van Tuin et al., 2020). This suggests that the mechanics of VolkerRail have a stronger sense of satisfying their psychological needs within the workplace. Additionally, the study discovered a small to medium effect of psychological needs on autonomous types of motivation (i.e., intrinsic motivation and identified regulation). This meant that mechanics were more motivated to participate in training activities when these psychological needs were met. Two recommendations were constructed in light of these findings.

Firstly, to effectively motivate mechanics to participate in training, the Rail Competence Center (RCC) could create training that holds meaning for them. This is primarily because mechanics' intrinsic motivation and identified regulation to engage in training are influenced by their need for competence. Currently, the RCC is actively involved in developing training programs in collaboration with mentors. A key approach to accomplishing meaningful training for mechanics is by gaining a deeper understanding of their preferences and interests. In this regard, it is essential to foster a mechanic-centered approach where mechanics actively contribute to shaping their learning paths alongside their mentors. By involving mechanics in this process, the RCC can not only tailor training experiences to align with their specific needs and interests, but also give the mechanics a sense of autonomy over their learning process. However, it is important to acknowledge the practical realities of certifications, which requires certain obligatory activities such as recertification. While these activities may be perceived as tedious, striking a balance between these necessary components and the mechanics' interests becomes crucial. By achieving this balance, the RCC can promote a training environment that enhances mechanics' motivation and engagement.

Secondly, if the training program offers opportunities for teamwork and collaboration, mechanics with a stronger sense of relatedness may be more encouraged to participate, as this can promote a sense of support among trainees. This was also supported by the qualitative investigation before the quantitative research of this study. Here, mechanics stated they quickly exchange information with colleagues, which also could apply in a learning setting. Therefore, a

learning course should not be designed as an individual, self-paced, and self-directed course with no opportunities for group work or collaboration.

Goal orientation

In comparing the scores of mechanics' dispositional goal orientations, it was found that their learning goal orientation was higher when compared to the learning goal orientation of Chinese construction workers (Lu et al., 2019). However, it is worth noting that this comparison might not be the most appropriate since the referenced research was not conducted in the Netherlands. Unfortunately, no additional research focusing specifically on goal orientations in the construction sector was found. Nevertheless, when considering goal orientations among Dutch employees across various sectors (Bakker et al., 2020), it was observed that VolkerRail's mechanics had a higher learning goal orientation than those employees. This finding provides some context within the Dutch setting and indicates that the mechanics at VolkerRail exhibit a stronger inclination towards learning goals compared to employees from different sectors. Additionally, when mechanics have a high level of learning goal orientation, they were more likely to be autonomously motivated to train. Besides that, the impact of psychological needs on identified regulation was influenced by a mechanics' learning goal orientation. In light of these findings, two recommendations were created regarding learning goal orientation.

The first recommendation highlights the need for the RCC to prioritize the development of competence among mechanics rather than focusing solely on competition. This entails offering training and developmental programs that aim to enhance the skill sets of individuals. Research conducted by (Papaioannou & Christodoulidis, 2007) (2007) suggests that learning-oriented individuals tend to highly value organizational support. By providing comprehensive training initiatives that support competence development, the RCC can increase the satisfaction levels of mechanics who possess a learning-oriented mindset. This approach not only fosters personal growth and fulfilment but also promotes a collaborative and supportive work culture.

The second recommendation is that the training should be shaped in such a way that it promotes the mechanics' learning goal orientation. The importance of mechanics' learning can be emphasized by, for instance, ensuring that the mechanics have enough time to grow professionally and to learn from one another. Additionally, it is recommended to make every effort to ensure that mechanics can attend a course or training when they determine that they need it. Another tactic to boost a mechanics' learning goal orientation is to acknowledge their success, which includes their professional growth, solutions to challenges, and new ideas.

Learning goal orientation is related to autonomous types of motivation and scored higher in comparison to other studies. On the contrary, relationships were found between the performance goal orientations and extrinsic motivation to train. Medium effects were found between performance goal orientation, performance-avoidance goal orientation, and controlled types of motivation (i.e., introjected regulation, external regulation). This meant that mechanics who had

a higher performance goal orientation or performance-avoidance goal orientation were more likely to be motivated to participate in training due to external factors or pressures. Additionally, performance approach and avoidance goal orientation scored lower compared to previous research. Mechanics scored lower in performance goal orientation compared to construction workers in China (Lu et al., 2019). Similarly, their performance-avoidance goal orientation was also lower compared to employees in various Dutch organizations (Bakker et al., 2020). This suggests that mechanics may be less focused on achieving performance-related goals and targets in their work. This could be due to various factors such as cultural differences, work environment, or job characteristics. Upon close examination of the statements in the questionnaire regarding the performance goal orientation, it became clear that the construct depends on how competitive the mechanic was (e.g. “I like to show that I can perform better than my coworkers”). Mechanics scoring low on performance goal orientation may exhibit reduced competitiveness compared to their colleagues. They may not engage in competition or strive to outperform others. Additionally, mechanics with a low performance-avoidance goal orientation are less concerned about avoiding mistakes or failures. Two suggestions were made about the performance-approach and avoidance goal orientation in light of these findings.

Firstly, mechanics’ low performance approach goal orientation suggests that they may be less driven by competition with others. Instead, they may prioritize fulfilling their need for relatedness, which can be achieved by creating an environment that fosters collaboration, teamwork, and mutual support. By promoting a cooperative culture within the RCC, we can avoid intense competition and encourage mechanics to work together towards shared goals. For example, mechanics could be encouraged to form teams across different disciplines of VolkerRail to tackle complex situations or problem-solving tasks. By pooling their knowledge and perspectives, they can learn from one another’s expertise. This collaborative approach not only enhances the overall quality of work but also promotes a sense of shared purpose among mechanics. Additionally, the mentorship of the RCC can play a big role in a cooperative learning culture. Here, experience mentors guide and support (junior) mechanics. This creates opportunities for knowledge transfer, skill development, and relationship building. Mechanics can benefit from the guidance and insights of their mentors, while mentors can experience fulfilment by contributing to the growth of their peers.

Lastly, mechanics scored lower on performance-avoidance goal orientation. This might imply that the mechanics are less concerned about avoiding mistakes or failures. Therefore, they could be more open to taking risks and trying new approaches. The RCC could capitalize on this by creating a supportive learning environment where mechanics feel comfortable experimenting, making mistakes, and learning from them without fear of negative consequences. The environment should see mistakes as opportunities for mechanics to grow.

Motivation to train Results have shown that mechanics are more likely to engage in training

activities out of personal interest, value, and a sense of personal importance rather than feeling pressured or controlled by external factors. For the RCC, these findings can inform the design and delivery of training programs. Therefore, it was recommended that the RCC is that training should not be too heavily focused on extrinsic rewards, such as grades or certifications, as this can diminish the trainee's intrinsic motivation and sense of autonomy. Instead, the RCC should recognize and tap into the mechanics' intrinsic motivation by highlighting the personal benefits and relevance of the training. The RCC should create an intrinsically motivating environment where the mechanics feel empowered, valued, and encouraged to pursue their training goals. Emphasize how the training can enhance their skills, knowledge, and career development, fostering a sense of personal satisfaction and growth.

In summary, the practical implications derived from the study emphasize the importance of satisfying psychological needs, supporting learning goal orientations, and fostering intrinsic motivation and identified regulation within the training programs offered by the RCC. By implementing these recommendations, the RCC can create a more effective and engaging learning environment for mechanics, leading to enhanced skills, motivation, and overall performance within VolkerRail.

6.3 Strengths, limitations, and future research

The study demonstrated the important relationship between psychological needs, motivation to train and dispositional goal orientation of mechanics. The strength of this master's thesis is that it addressed a relevant issue in the Dutch railway sector, namely the shortage of technically trained employees. Investigating the motivations of secondary vocational-educated mechanics can help fill this gap in the literature and contribute to a better understanding of the factors that influence the success of training programs. Therefore, the sample population exclusively consisted of secondary vocationally educated mechanics within the construction sector. It should be noted that the findings cannot be readily extrapolated to encompass the entirety of VolkerRail, as the study exclusively examined "group 1" comprising operating personnel. Although quantitative research was conducted with a subset of "group 2" consisting of support staff, the relatively small sample size of 59 participants precluded meaningful comparisons between the two groups. A more comprehensive investigation of the VolkerRail study, encompassing a broader range of participants, would be opportune when considering the implementation of the learning department for "group 2" by the RCC.

However, it is crucial to acknowledge the limitations inherent in the study design. The first limitation is the potential impact of social desirability bias on mechanics completing the questionnaire in a group environment and on paper. When responding to the questionnaire in the presence of their peers or supervisors, mechanics may feel inclined to provide answers that they perceive as more socially acceptable or favorable. This bias could lead to skewed or inaccurate

responses, ultimately impacting the validity and reliability of the collected data (Van de Mortel, 2008). This research may have yielded incorrect theoretical or practical results because it failed to acknowledge and correct this bias (Kim & Kim, 2016).

Lastly, the perspective of this study is the final limitation. VolkerRail and the RCC also have visions, goals, and duties that must be completed, but in this study, the only viewpoint was the mechanics that were taken into account. The best scenario for mechanics might not be the best scenario for the business. Therefore, a greater organizational viewpoint should be included in future studies as well.

6.4 Conclusion

This master thesis focused on understanding the motivations of mechanics at VolkerRail to participate in training courses, their psychological needs and their goal orientations. Through a qualitative and quantitative research approach, it was discovered that the psychological needs of mechanics, such as autonomy, competence, and relatedness, were important factors in maintaining their training motivation. The Self-Determination Theory was used to comprehend these findings, which emphasizes the importance of psychological needs for motivation. The study found a relationship between psychological needs and intrinsic motivation and identified regulation, suggesting that mechanics are more likely to engage in training when their psychological needs are satisfied. The findings revealed two significant moderating effects of learning goal orientation, indicating that individuals with a strong learning goal orientation and a high need for autonomy or relatedness are more likely to exhibit higher levels of identified regulation to engage in training. On the other hand, only one moderating effect of performance-avoidance goal orientation was found, suggesting that mechanics focused on avoiding failure or poor performance may be less motivated to engage in training when their need for autonomy is not met. However, the study did not find another moderating effect of learning goal orientation, performance goal orientation or performance-avoidance goal orientation on the relationship between psychological needs and motivation. Nevertheless, direct relationships between goal orientations and motivation to train were found. Here, mechanics with a learning goal orientation perceive training as aligned with their values and interests or relevant to their beliefs and experience a sense of connection within a social context, they are more motivated to participate in the training activities. Besides, mechanics with a performance goal orientation may be motivated by external rewards and the desire to outperform others.

The study found that mechanics at VolkerRail have higher scores in psychological needs, such as autonomy, competence, and relatedness, compared to employees in other Dutch companies. It suggests that mechanics at VolkerRail have a stronger sense of satisfaction in meeting their psychological needs at work. The study also revealed that the mechanics' motivation to participate in training activities was influenced by their psychological needs and learning goal orientation. Based on these findings, two recommendations were made. Firstly, the

Rail Competence Center (RCC) should create training programs that hold meaning for mechanics and involve them in shaping their learning paths to foster autonomy and competence. Secondly, the training should provide opportunities for teamwork and collaboration to enhance mechanics' sense of relatedness. The study also highlighted that mechanics exhibited a higher learning goal orientation compared to other studies, indicating their inclination towards learning goals. It recommended prioritizing competence development and creating a learning-oriented environment to support mechanics' learning goal orientation. Additionally, the study found that mechanics were more motivated by intrinsic factors than external pressures, suggesting that the training programs should focus on intrinsic motivation and emphasize personal benefits and relevance rather than extrinsic rewards like grades and certification.

Overall, this study's findings suggest that understanding the psychological needs of employees can be crucial in developing effective training programs and maintaining their motivation to participate in them. Additional research may be required to generalize and confirm the results on a larger scale.

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Appendices

Appendix A

Welkom bij deze vragenlijst. Graag zou ik je willen vragen 15 minuten vrij te maken om deze vragenlijst in te vullen. Deze vragenlijst is onderdeel van een onderzoek naar het Rail Competence Center (RCC) van VolkerRail. Voordat je besluit deel te nemen, is het belangrijk dat je op de hoogte bent van de procedure. Lees deze informatie aandachtig door.

De vragenlijst richt zich op hoe je tegen je werk aankijkt en wat voor jou redenen zijn om trainingen te volgen. Dit onderzoek is uitgevoerd door Lonneke Moonen, student aan de Technische Universiteit Eindhoven.

Deze vragenlijst is anoniem. Dit betekent dat wij geen gegevens verzamelen waaruit jouw identiteit bekend zou kunnen worden. De ingevulde informatie wordt vertrouwelijk behandeld.

Het invullen van de vragenlijst is vrijwillig. Je kunt weigeren deel te nemen en je kunt op elk moment je deelname stopzetten.

Voor meer informatie over dit onderzoek kun je contact opnemen met Lonneke (lonneke.moonen@volkerrail.nl).

Het is belangrijk dat alle vragen ingevuld worden. **Bij voorbaat dank!**

1. Heb je bovenstaande informatie gelezen en ben je bereid mee te doen aan de vragenlijst?

- Ja Nee

2. Wat is je leeftijd?

..... jaar

3. Wat is je geslacht?

- Man Vrouw Anders, namelijk..... Zeg ik liever niet

4. Wat is je hoogst behaalde opleidingsniveau?

- Basisschool
 VMBO basis
 VMBO kader
 VMBO theoretisch/gemengd, MAVO
 HAVO
 VWO
 LTS
 MBO niveau 1
 MBO niveau 2
 MBO niveau 3
 MBO niveau 4
 HBO, HEAO, HTS
 Universiteit

5. Hoelang ben je werkzaam bij VolkerRail? (in jaren)

..... jaar

6. Waar ben je voornamelijk werkzaam? (Kruis 1 antwoord aan) |

- Onderhoud
- Nieuwbouw & vernieuwing
- Industrie & lightrail
- Connectiviteit
- Materieeldienst
- Veiligheid
- Anders

7. In welk techniekveld/discipline ben je voornamelijk werkzaam? (Kruis 1 antwoord aan)

- Baan, lightrail en/ of industrie
- Energievoorziening & bovenleiding
- Werkplaats
- Machinist
- Lassen
- Seinwezen (LSR & BFI)
- Veiligheid
- Systems
- Wisselverwarming en water
- Kunstwerken
- Voedingen
- Anders

8. In welke groep vervul jij je rol?

- Aspirant monteur, aspirant lasser, aspirant machinist / LLV1/ VHM
- Monteur, lasser, machinist / Beheerder A / LWB2
- Senior monteur, senior lasser, senior machinist / Beheerder B / LWB 3
- Technicus / Ploegleider / Werkverantwoordelijke / Voorman / Beheerder C / LWB 4
- Anders

Algemeen

Het onderstaande gedeelte bevat stellingen over het Rail Competence Center. Dit gedeelte bevat 9 vragen:

	Erg mee oneens	Mee oneens	Enigszins mee oneens	Neutraal	Enigszins mee eens	Mee eens	Erg mee eens
	1	2	3	4	5	6	7
9. Mijn leidinggevende stimuleert mij om me te blijven ontwikkelen in mijn werk	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
10. Ik vind de huidige trainingen voldoen aan mijn behoefte	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
11. Ik heb behoefte om naast opleidingen vanuit het Railcenter ook door VolkerRail georganiseerde trainingen te volgen	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

	Erg mee oneens	Mee oneens	Enigszins mee oneens	Neutraal	Enigszins mee eens	Mee eens	Erg mee eens
12. Ik vind het fijn om door collega's opgeleid te worden in plaats van door externe trainers/opleiders	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
13. Ik vind het fijn om getraind te worden aan de hand van praktijkvoorbeelden	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
14. Ik vind het fijn om getraind te worden aan de hand van e-learning's	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
15. Ik ben bereid om in mijn eigen tijd energie te stoppen in mijn ontwikkeling	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

16. Hoeveel dagen aan trainingen/opleidingen heb jij gevolgd in het afgelopen jaar?

..... dagen

17. Hoeveel dagen ben je bereid om een training/opleiding te volgen?

..... dagen

Behoeftte naar Competentie, autonomie, en verbondenheid

Het onderstaande gedeelte bevat stellingen over de behoefte naar competentie, autonomie en verbondenheid. Dit gedeelte bevat 12 vragen:

	Erg mee oneens	Mee oneens	Enigszins mee oneens	Neutraal	Enigszins mee eens	Mee eens	Erg mee eens
Ik heb de behoefte...	1	2	3	4	5	6	7
18. ... om zelf te kunnen beslissen over hoe ik mijn werk uitvoer	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
19. ... om mijn collega's als vrienden te beschouwen	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
20. ... om inspraak te hebben bij het bepalen van mijn activiteiten en taken	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
21. ... om de kennis en vaardigheden te hebben om mijn werk goed te doen	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
22. ... om het goed met mijn collega's te kunnen vinden	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
23. ... om me vakbekwaam te voelen	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
24. ... om met andere collega's te zijn zodat ik me niet eenzaam voel	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
25. ... om in mijn werk mijn ideeën en meningen kan uiten die betrekking hebben op de uitvoering ervan	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

	Erg mee oneens	Mee oneens	Enigszins mee oneens	Neutraal	Enigszins mee eens	Mee eens	Erg mee eens
26. ... om het gevoel te hebben dat ik moeilijke taken tot een goed einde kan brengen	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
27. ... om het gevoel te hebben dat ik deel uitmaak van een team	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
28. ... om goed te zijn in mijn werk	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
29. ... aan vrijheid om mijn werk te doen op de manier die volgens mij het beste is	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Motivatie voor volgen van training

Het onderstaande gedeelte bevat stellingen over de motivatie naar trainingen. Bij deze trainingen kun je denken aan trainingen bij RailCenter, VolkerWessels Vakschool en de interne trainingen voor het behalen van je certificaten maar ook voor het trainen naar een nieuwe functie. Dit gedeelte bevat 19 vragen:

	Erg mee oneens	Mee oneens	Enigszins mee oneens	Neutraal	Enigszins mee eens	Mee eens	Erg mee eens
	1	2	3	4	5	6	7
30. Ik volg trainingen omdat ik het leuk vind om in trainingen nieuwe dingen te leren	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
31. Ik volg trainingen zodat ik een beter salaris zal ontvangen	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
32. Ik volg trainingen omdat ik het belangrijk vind om me in te zetten voor mijn werk	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
33. Ik volg trainingen omdat het me de kans geeft om erkenning te krijgen van mijn leidinggevende en mijn collega's	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
34. Ik weet niet waarom ik trainingen volg, ik heb de indruk dat ik niet in staat ben om te slagen in deze trainingen	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
35. Ik volg trainingen omdat ik veel persoonlijke voldoening haal uit het onder de knie krijgen van mijn werk	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
36. Ik volg trainingen omdat ik mezelf wil bewijzen dat ik het kan	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
37. Ik volg trainingen omdat ik het belangrijk vind mij in te zetten voor mijn werk	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
38. Ik volg trainingen om meer baanzekerheid te krijgen	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

	Erg mee oneens	Mee oneens	Enigszins mee oneens	Neutraal	Enigszins mee eens	Mee eens	Erg mee eens
39. Ik volg trainingen zodat ik trots kan zijn op het werk dat ik doe	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
40. Ik volg trainingen zodat collega's mij zullen respecteren	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
41. Ik weet niet meer of ik door wil gaan met het investeren van mijn tijd en energie in trainingen	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
42. Ik volg trainingen omdat ik anders het risico loop om mijn baan te verliezen	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
43. Ik volg trainingen voor de voldoening die ik ervaar als ik mijn capaciteiten aan het perfectioneren ben	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
44. Ik volg trainingen omdat ik me slecht zou voelen tijdens het uitvoeren van mijn werk als ik geen trainingen gevolgd zou hebben	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
45. Ik weet niet waarom ik trainingen volg, ik denk dat deze trainingen niet de moeite waard zijn	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
46. Ik volg trainingen om kritiek door mijn leidinggevende of collega's te voorkomen	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
47. Ik volg trainingen omdat ik vind dat het hoort bij de inzet die ik moet leveren voor mijn werk	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
48. Ik volg trainingen omdat ik mij zou schamen als ik mijn werk niet zou kunnen uitvoeren	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Doel oriëntatie

Het onderstaande gedeelte bevat stellingen over jezelf ontwikkelen. Dit gedeelte bevat 12 vragen:

	Erg mee oneens	Mee oneens	Enigszins mee oneens	Neutraal	Enigszins mee eens	Mee eens	Erg mee eens
	1	2	3	4	5	6	7
49. Ik ben bereid om binnen mijn werk een uitdaging te kiezen waarvan ik veel kan leren	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
50. Ik laat graag zien dat ik beter kan presteren dan mijn collega's	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
51. Ik ben vaak op zoek naar mogelijkheden om nieuwe vaardigheden te ontwikkelen	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

	Erg mee oneens	Mee oneens	Enigszins mee oneens	Neutraal	Enigszins mee eens	Mee eens	Erg mee eens
52. Ik zou een nieuwe taak vermijden als de kans bestond dat ik ten opzichte van anderen incompetent zou overkomen	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
53. Ik probeer te achterhalen wat er nodig is om mijn capaciteiten aan anderen op het werk te bewijzen	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
54. Ik vind uitdagende en moeilijke taken leuk als ik hierdoor nieuwe vaardigheden leer	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
55. Ik vind het leuk als anderen op het werk zich ervan bewust zijn hoe goed ik het doe	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
56. Het is voor mij belangrijker dat ik verberg ergens incompetent in te zijn dan dat ik een nieuwe vaardigheid echt ga leren	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
57. Voor mij is ontwikkeling van mijn vakbekwaamheid voldoende belangrijk om initiatief te nemen tijdens de uitvoering van mijn werk	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
58. Ik zie er tegenop om op het werk een taak op me te nemen als uit mijn prestatie zou kunnen blijken dat ik te weinig vaardigheden had	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
59. Ik werk het liefst aan taken waarbij ik mijn eigen vakbekwaamheid aan anderen kan bewijzen	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
60. Op het werk wil ik het liefst situaties voorkomen waarin ik slecht zou kunnen presteren	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Appendix B

Table 24: The Multidimensional Work Motivation Scale

Variable	Item	English statement	Dutch statement
Intrinsic motivation	IM1	"Because the work I do is interesting."	"Als ik intensief in de trainingen bezig ben voel ik mij echt in de training betrokken"
	IM2	"Because what I do in my work is exciting."	"Ik volg trainingen omdat ik veel persoonlijke voldoening haal uit het onder de knie krijgen van mijn werk"
	IM3	"Because I have fun doing my job."	"Ik volg trainingen voor de voldoening die ik ervaar als ik mijn capaciteiten aan het perfectioneren ben"
Identified regulation	ID1	"Because putting efforts in this job aligns with my personal values."	"Ik volg trainingen omdat het een goede manier is om veel te leren wat ik weer in andere aspecten van mijn werk kan gebruiken"
	ID2	"Because I personally consider it important to put efforts in this job."	"Ik volg trainingen omdat het een van de beste manieren is om aspecten in mijn werk te ontwikkelen"
	ID3	"Because putting efforts in this job has personal significance to me."	"Ik volg trainingen omdat deze training mijn werkprestatie zal verbeteren"
Introjected regulation	INTRO1	"Because I have to prove to myself that I can."	"Ik volg trainingen omdat ik mezelf wil bewijzen dat ik het kan"
	INTRO2	"Because it makes me feel proud of myself."	"Ik volg trainingen zodat ik trots kan zijn op het werk dat ik doe"
	INTRO3	"Because otherwise I will feel bad about myself."	"Ik volg trainingen omdat ik me slecht zou voelen tijdens het uitvoeren van mijn werk als ik geen trainingen gevolgd zou hebben"
	INTRO4	"Because otherwise I will feel ashamed of myself."	"Ik volg trainingen omdat ik mij zou schamen als ik mijn werk niet zou kunnen uitvoeren"
Extrinsic regulation social	EXS1	"To get others approval (e.g., supervisor, colleagues, family, clients)."	"Ik volg trainingen omdat het me de kans geeft om erkenning te krijgen van mijn leidinggevende en mijn collega's"
	EXS2	"To avoid being criticized by others (e.g., supervisor, colleagues, family, clients)."	"Ik volg trainingen om kritiek door mijn leidinggevende of collega's te ontwijken "
	EXS3	"Because others will respect me more (e.g., supervisor, colleagues, family, clients)."	"Ik volg trainingen zodat collega's mij zullen respecteren "
Extrinsic regulation material	EXM1	"Because I risk losing my job if I don't put enough effort in it."	"Ik volg trainingen omdat ik anders het risico loop om mijn baan te verliezen "
	EXM2	"Because others will reward me financially only if I put enough effort in my job (e.g., employer, supervisor)."	"Ik volg trainingen zodat ik een beter salaris zal ontvangen ."
	EXM3	"Because others offer me greater job security if I put enough effort in my job (e.g., employer, supervisor)."	"Ik volg trainingen om meer baanzekerheid te krijgen "
Amotivation	AMO1	"I don't, because I really feel that I'm wasting my time at work."	"Ik weet niet meer of ik door wil gaan met het investeren van mijn tijd en energie in trainingen"
	AMO2	"I don't know why I'm doing this job, it's pointless work."	"Ik weet niet waarom ik trainingen volg, ik denk dat deze trainingen niet de moeite waard zijn."
	AMO3	"I do little because I don't think this work is worth putting efforts into."	"Ik weet niet waarom ik trainingen volg, ik heb de indruk dat ik niet in staat ben om te slagen in deze trainingen"

Table 25: Psychological needs strength

Variable	Item	English statement	Dutch statement
Need for autonomy	AUT1	"I have a feeling of choice and freedom in what I do at work"	"Ik heb de behoefte... " "... aan vrijheid om mijn werk te doen op de manier die volgens mij het beste is."
	AUT2	"I feel that the decisions I make at work reflect what I really want"	"... om in mijn werk mijn ideeën en meningen kan uiten die betrekking hebben op de uitvoering ervan "
	AUT3	"At work, I feel that the choices I make express who I really am"	"... om zelf te kunnen beslissen over hoe ik mijn werk uitvoer"
	AUT4	"At work, I feel that I do what really interests me"	"... om inspraak te hebben bij het bepalen van mijn activiteiten en taken"
Need for competence	COMP1	"I feel confident that I can do things well at work"	"... om goed te zijn in mijn werk "
	COMP2	"I feel capable of doing what I do at work"	"... om de kennis en vaardigheden te hebben om mijn werk goed te doen "
	COMP3	"I feel competent in reaching my goals at work"	"... om me vakbekwaam te voelen "
	COMP4	"I feel that I can successfully complete difficult tasks at work"	"... om het gevoel te hebben dat ik moeilijke taken tot een goed einde kan brengen. "
Need for relatedness	REL1	"I feel that the people I care about at work also care about me"	"... om mijn collega's als vrienden te beschouwen "
	REL2	"I feel connected to the people at work who care about me and whom I care about"	"... om het goed met mijn collega's te kunnen vinden "
	REL3	"I feel closely connected to other people who are important to me at work"	"... om met andere collega's te zijn zodat ik me niet eenzaam voel"
	REL4	"I experience a warm and good feeling with the people I spend time with at work"	"... om het gevoel te hebben dat ik deel uitmaak van een team"

Table 26: Goal orientation measure

Variable	Item	English statement	Dutch statement
Learning goal orientation	LGO1	"I am willing to select a challenging work assignment that I can learn a lot from"	"Ik ben bereid om binnen mijn werk een uitdaging te kiezen waarvan ik veel kan leren."
	LGO2	"I often look for opportunities to develop new skills and knowledge."	"Ik ben vaak op zoek naar mogelijkheden om nieuwe vaardigheden en kennis te ontwikkelen "
	LGO3	"I enjoy challenging and difficult tasks at work where I'll learn new skills."	"Ik vind uitdagende en moeilijke taken leuk als ik hierdoor nieuwe vaardigheden leer"
	LGO4	"For me, development of my work ability is important enough to take risks."	"Voor mij is ontwikkeling van mijn vakbekwaamheid voldoende belangrijk om initiatief te nemen tijdens de uitvoering van mijn werk "
Performance goal orientation	PGO1	"I like to show that I can perform better than my coworkers."	"Ik laat graag zien dat ik beter kan presteren dan mijn collega's "
	PGO2	"I try to figure out what it takes to prove my ability to others at work."	"Ik probeer te achterhalen wat er nodig is om mijn capaciteiten aan anderen op het werk te bewijzen"
	PGO3	"I enjoy it when others at work are aware of how well I am doing."	"Ik vind het leuk als anderen op het werk zich ervan bewust zijn hoe goed ik het doe"
	PGO4	"I prefer to work on projects where I can prove my ability to others."	"Ik werk het liefst aan taken waarbij ik mijn eigen vakbekwaamheid aan anderen kan bewijzen"
Performance goal orientation avoidance	PGOA1	"I would avoid taking on a new task if there was a chance that I would appear rather incompetent to others."	"Ik zou een nieuwe taak vermijden als de kans bestond dat ik ten opzichte van anderen incompetent zou overkomen "
	PGOA2	"Avoiding a show of low ability is more important to me than learning a new skill."	"Het is voor mij belangrijker dat ik verberg ergens incompetent in te zijn dan dat ik een nieuwe vaardigheid echt ga leren "
	PGOA3	"I'm concerned about taking on a task at work if my performance would reveal that I had low ability."	"Ik zie er tegenop om op het werk een taak op me te nemen als uit mijn prestatie zou kunnen blijken dat ik te weinig vaardigheden had"
	PGOA4	"I prefer to avoid situations at work where I might perform poorly."	"Op het werk wil ik het liefst situaties voorkomen waarin ik slecht zou kunnen presteren "