Liveability and transport infrastructure

A case study of the development of the main station in Groningen

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1. Abstract

This paper investigates the influence of infrastructure development on the perception of liveability in the city of Groningen, taking the Groningen Spoorzone project as its focus. The project is aimed at improving local and regional connectivity by renovating the main station and its infrastructure assets. Additionally, the project includes a transformation of the adjacent area, among other things by establishing an inviting green space in front of the station building. This research investigates how the construction works associated with the project affect the daily lives of local residents and travellers by using a mixed methods approach, combining a survey questionnaire and interviews. The survey questionnaire collects data on several variables, most importantly the distance of the respondents' home address, the extent to which respondents are affected by the project, the extent to which respondents think they will be affected by the end results, and the extent to which respondents feel the end results will impact liveability in Groningen. Ordinal regression is used to analyse the results. To gain a deeper insight into how and why the project affects residents and travellers, three interviews are conducted. The questionnaire results show no significant relationship between any of the variables, except for a statistically significant relationship between the extent to which the respondents think they will be affected by the end results and the extent to which the respondents feel the end results will impact liveability in Groningen. The interviews show that, although the works may cause some minor inconveniences, the project causes no major nuisance to the participants. Moreover, the participants note that the outcomes of the project are likely to improve Groningen as a city and that the end results are worth the current discomfort caused by the works. In conclusion, the results show that the project does not cause major implications for local residents and travellers, while the end results are likely to improve Groningen as a city.

2. Introduction and theoretical framework

2.1 Introduction

Over the last few years, a growing body of literature has explored the concept of liveability and how it affects community well-being (Kyttä et al., 2015). Policymakers and advocacy groups even suggest that living standards should be assessed by liveability approaches (Paul & Sen, 2020). Liveable cities are cities that make their inhabitants happy and provide a high quality of life (Vanclay et al., 2015). Urban infrastructure projects are intended to alter the built environment in a way to improve it (Browne & Lowe, 2021). However, infrastructure developments can, e.g. during construction, cause hindrances to people that use that infrastructure, or people who live close by. This research could contribute to understanding the influence of infrastructure development on liveability from a citizens' perspective. Moreover, this research could contribute to how the importance of transport is perceived and how that contributes to the overall perception of liveability.

2.2 Theoretical framework

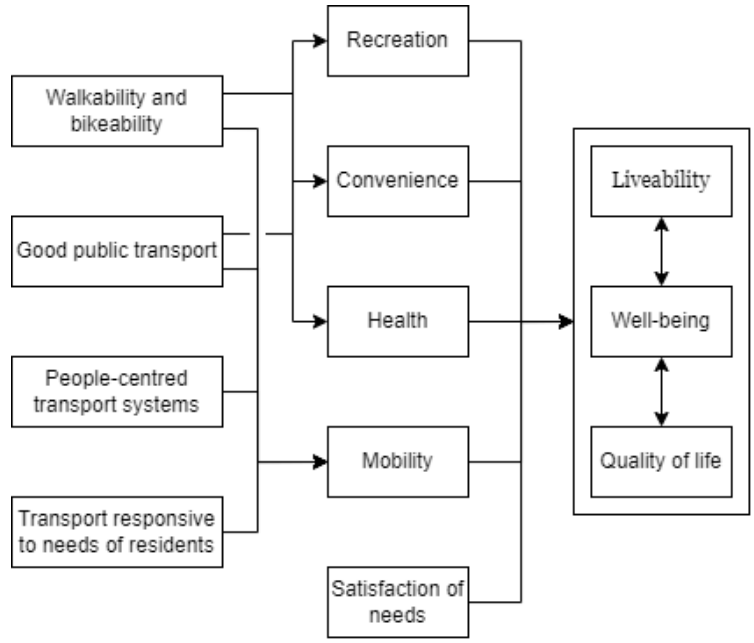
Since the 1960s, car ownership exploded and governments heavily invested in car-based infrastructure (Anciaes & Jones, 2020). "The car is an important part of the transport system that has brought increased mobility, convenience, employment, technological advances and economic prosperity" (Nieuwenhuijsen & Khreis, 2016, p.252). Car transport contributes more to traffic-related problems, such as injuries and fatalities, air pollution, congestion and noise, than other modes of transport (Gössling,

2020). These factors contribute to cities becoming less liveable. Consequently, governments are now aiming to reduce car use and to promote other modes of transport; “transport policy is moving from a car-centred to a people-centred paradigm” (Anciaes & Jones, 2020, p.157), aiming at developing transport systems that are healthy, equitable, sustainable, and improve liveability.

Definitions of liveability are diverse, as the concept is difficult to measure and difficult to define (De Haan et al. 2014). Liveability is influenced by many different factors that influence well-being and quality of life (Parker & Simpson, 2018). Liveability encompasses factors that improve safety, health, convenience, mobility and recreation; it is a reflection of quality of life, well-being and health, and the satisfaction of the needs of the people (De Haan et al., 2014). Pacione (2013) argues that a liveable city is designed in a way that is responsive to the varying needs of its residents. De Haan et al. (2014) argue that liveability is a normative concept, and therefore, as problems regarding liveability arise, solutions will be found if we would simply talk about it.

In the context of the previously mentioned new transport policy paradigm, “liveability is specifically related to the idea that the transport system would provide safe, attractive and enjoyable environments when people move around and when they use public places, as well as enhancing the benefits of those environments for all” (Anciaes & Jones, 2020, p.157). A city should provide good street networks and should improve pedestrian-friendly street design, as that presents an opportunity to reduce travel cost, time cost and automobile dependency (Shamsuddin, Hassan & Bilyamin, 2012). Walkability and bikeability promote active transport methods (Kellstedt et al., 2020), and therefore, good neighbourhood design may reinforce healthy behaviours (Van Cauwenberg et al., 2015). For instance, neighbourhoods that offer easy access to public services could result in walking or cycling being the default option, rather than driving (Van Cauwenberg et al., 2015). On the other hand, poor access to public transport infrastructure and shops and services can reduce public health (Badland et al., 2014). Badland et al. (2014) have found that increased use of public transport also contributes to public health, mainly due to increased physical activity when walking or cycling to public transport facilities (Khomenko et al., 2020). In conclusion, good access to public transport contributes to liveability (Higgs et al., 2019). Figure 1 presents a conceptual model of factors relevant to this research that influence liveability.

Figure 1 – Conceptual model of factors influencing liveability, mobility, well-being, and quality of life.



Source: Author (2022)

Cities are constantly changing and they need to adapt to those changes. Urban design and infrastructure need to maintain or improve the quality of living environments (Namazi-Rad et al., 2012). Growing cities must thus adapt their infrastructure to cope with the accompanying increasing mobility, and constructing, demolishing, and/or changing infrastructure is thus often necessary. Infrastructure development can cause many issues to arise as roads will be closed down, accessibility is compromised, congestion in surrounding areas may increase, etc., creating inconvenient situations that impact local residents and users of the infrastructure. Moreover, as more attention is put on reducing car use and providing alternative modes of transport, residents might feel forced to adapt to policy changes, creating resistance. Additionally, local residents and communities are impacted as the built environment is altered.

2.3 Case description

The case revolves around the main station of the city of Groningen in the north of the Netherlands. The population of the city is expected to grow by 14% in 2035 (Groninger Internet Courant, 2022). To be able to cope with this growth and the concomitant increasing number of travellers through, in and out of Groningen, parts of the transport infrastructure must extensively be reviewed. Several projects in and around the city focus on improving transport infrastructure, one of which is Groningen Spoorzone. The project will improve a multitude of aspects regarding public transport and liveability in the city of Groningen, while also improving connectivity in the area around Groningen and from Groningen to other parts of the Netherlands. The plan is part of Spoorplan Noord-Nederland, a plan aimed at improving connectivity in the north of the Netherlands but also from the north to the Randstad (ProRail, N.D.b). The plan was commissioned by the Ministry of Infrastructure and Water Management, the provinces of Friesland, Groningen, Drenthe and Overijssel, and the carriers Nederlandse Spoorwegen (NS) and Arriva (ProRail, N.D.b).

An overview of the main components of the Groningen Spoorzone plan (ProRail, N.D.a; Gemeente Groningen, 2023; Gemeente Groningen, N.D., Groningen Spoorzone, 2020):

- An underground pedestrian hall will be constructed to provide better access to the newly constructed train platforms and other modes of transport. Moreover, an underground bicycle parking will be built that could store up to 8.000 bicycles. The trains will all stop right above the pedestrian hall, allowing for easy changing between trains.
- The construction of a tunnel for pedestrians and cyclists underneath the station that runs from the north side of the station, through the newly constructed underground pedestrian zone and bicycle parking. This would not only improve accessibility into the station for pedestrians and cyclists, but it would also improve connectivity between the south of Groningen to the city centre.
- The bus station will be moved from the north side to the south side of the station. The bus station currently in use will be demolished and will be used for other purposes. The definitive plan or design for the north side is still unknown, but the idea is that the area will be green, pedestrian-friendly, well-connected to adjacent areas and the city centre, and pleasant to be in.
- Most regional railways will be extended or connected to other railways so that travellers need to change trains less often. This will increase regional connectivity.
- The area south of the station is currently empty but will be transformed into a liveable, sustainable, low-traffic, mixed-use neighbourhood. This new area will have 450-600 new homes and several office buildings to promote job creation. The definitive design for the area is to be determined in the second half of 2023.

These plans require drastic alterations to the built environment, and the accompanying construction works can cause negative effects, such as noise, travel delays, road closings and more. Groningen Spoorzone is expected to be finished in 2026 (Nederlandse Spoorwegen, N.D.).

2.4 Research statement

In short, Groningen Spoorzone is a project that is aimed at improving local and regional connectivity by transforming the main station in the city of Groningen, the Netherlands, while also revising the district around the station, attempting to make the city a bit more liveable (Groningen Spoorzone, 2020). This research will focus on the question ‘How does the development of Groningen Spoorzone affect the perception of local residents and travellers of liveability in Groningen?’. The sub-questions ‘How do the construction works affect the day-to-day lives of residents and travellers?’ ‘Does the distance from residents’ homes to the station influence this perception?’ will aid in answering the main research question.

The project is expected to positively impact the perception of liveability of residents of Groningen. Although some may be bothered by the construction works, these inconveniences are only temporary and are likely to contribute to liveability for many in the long run. Residents that live closer to the main station are expected to be more affected by the negative externalities of the project, but they are also expected to most appreciate the positive future changes. Frequent users of the station are expected to be less negatively affected by the project but are expected to more appreciate future changes.

3. Methodology

3.1 Research methods

To better understand how the perception of liveability is influenced by the developments of Groningen Spoorzone, a questionnaire was used. Questionnaires are particularly useful for capturing people's attitudes and opinions, such as quality of life, or political, social, and environmental issues (Clifford, French & Valentine, 2010). Moreover, questionnaires allow for the fast and efficient collection of large amounts of data and information (McGuirk & O'Neill, 2016). Respondents were asked to enter their zip code, which was used for spatial analysis. They were asked how frequently they visit the main station and what their usual mode of transport from or to the station is. Then, respondents were asked to rate to what extent they are affected by the construction works on a scale of 1 to 5, 1 being very negatively affected, 3 not being affected at all, and 5 being very positively affected. They were also asked to what extent they feel that the end result will influence their daily lives. Finally, the respondents were asked to rate to what extent they think the end results will influence liveability in Groningen. The questionnaire questions can be found in Appendix A.

The results were analysed using ordinal regression by using SPSS software, to determine if there is a relationship between the distance from the respondents' zip codes and the station and the impact of the project and/or perception of liveability. In addition, ordinal regression was used to determine whether there is a relationship between how the respondents are impacted by the construction works, and how they think they will be influenced by the end results. Moreover, GIS software was used to visualise the spatial relationship between the distance of the respondents' homes and to what extent they are affected by the project and to what extent they feel their lives will be affected by the end results of the project.

To gain a deeper insight into how and why this project affects and benefits people, and to complement the quantitative part of this research, three interviews were conducted. The interviews focused more on why and how residents and users of the station are affected by the project, how they think the end results will influence their daily lives, and how people consider the trade-off between being affected now and benefiting in the future. The interviews also focused on how transport plays a part in making Groningen a liveable city. The interviews were recorded, transcribed and analysed by coding using Atlas.ti software. The interview questions can be found in Appendix B.

3.2 Sampling and research ethics

For the questionnaire, convenience sampling was used. The respondents were selected based on convenience and accessibility. According to Clifford, French & Valentine (2010), this type of sampling is likely to result in a biased sample. Factors such as age, gender or occupation are not relevant to this research, but care was put into preventing specific groups to be overrepresented to prevent the sample from being biased in any way. The questionnaire was distributed via social media through personal connections.

For the interviewees, convenience sampling was also used. The interviewees were to be found through personal connections, but care was put into selecting interviewees that had no direct personal connection with the researcher to ensure that there was no bias. The interviewees would either be people living in Groningen, preferably close to the main station, or people that regularly travel to and from Groningen.

In the questionnaire, respondents were informed about the questionnaire being completely anonymous and that participation is voluntary. The gathered data was stored in a private Google Drive folder. The data would not be published and would only be used for this research. For the interviews, the participants were asked to sign an informed consent form. The participants were informed of the nature and purpose of this research. They knew what the gathered data would be used for, and how it would be used and stored. They were allowed to withdraw from the research at any given time without having to give a reason for it.

The standards of the Netherlands Code of Conduct for Research Integrity (2018) were upheld during the entire research. This code of conduct revolves around five main principles: honesty, scrupulousness, transparency, independence and responsibility. Honesty and transparency were practised by discussing the limitations and weaknesses of this research, and by making clear how conclusions were formed. Independence was safeguarded by not allowing e.g. political, commercial or non-scientific factors to influence this research and its results. Scrupulousness was practised by using scientific research methods and exercising care in designing, undertaking and reporting research. Responsibility was reflected by doing research that is scientifically and societally relevant.

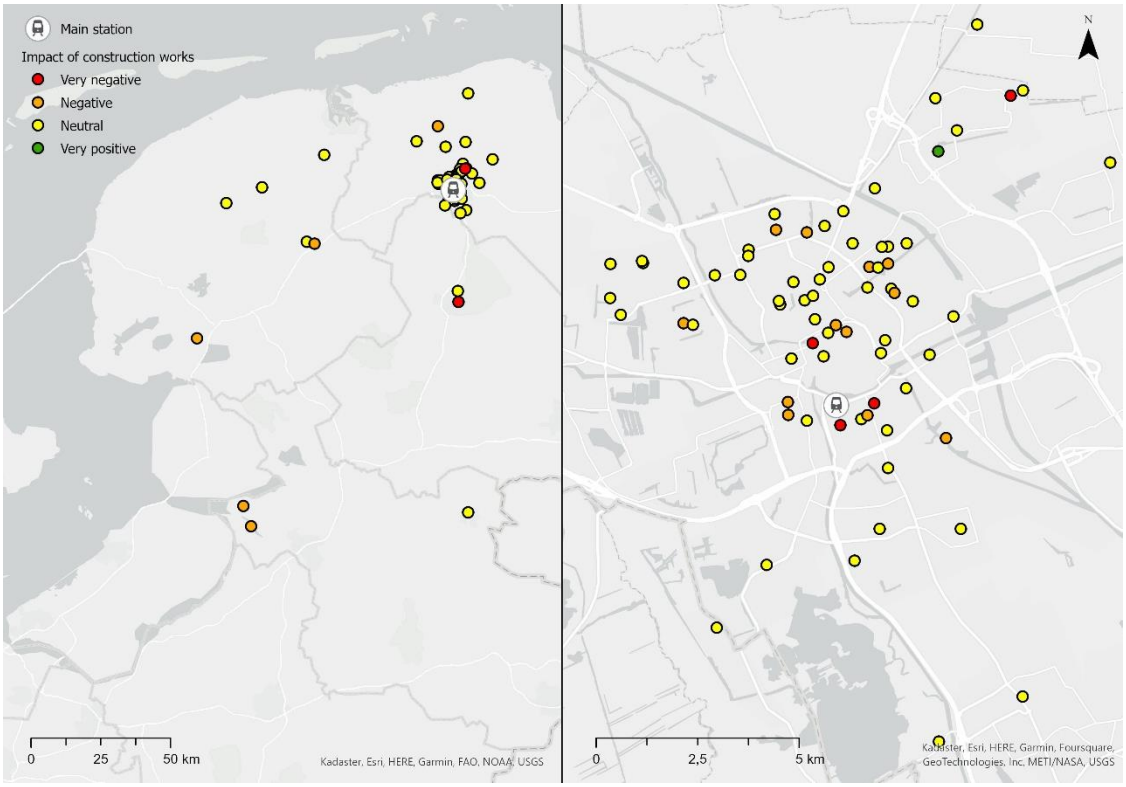
4. Results

4.1 Quantitative analysis

In total, 95 respondents filled in the questionnaire. The data of the survey was analysed using ordinal regression, in order to determine if there is a significant relationship between the variables in the survey. In total, 95 respondents filled in the survey. Firstly, the zip code of the respondents was asked to determine the distance from their residence to the station. Then, they were asked to rate to what extent they were affected by the construction works, on a scale of 1 to 5, where 1 is very negatively and 5 is very positively. After that, the respondents were asked to rate how they feel the end results will affect their lives. The respondents were also asked to rate how they feel the end results will affect liveability in the city of Groningen. Lastly, the respondents were asked to indicate if they feel that the end results are worth the current nuisance that results from the construction works.

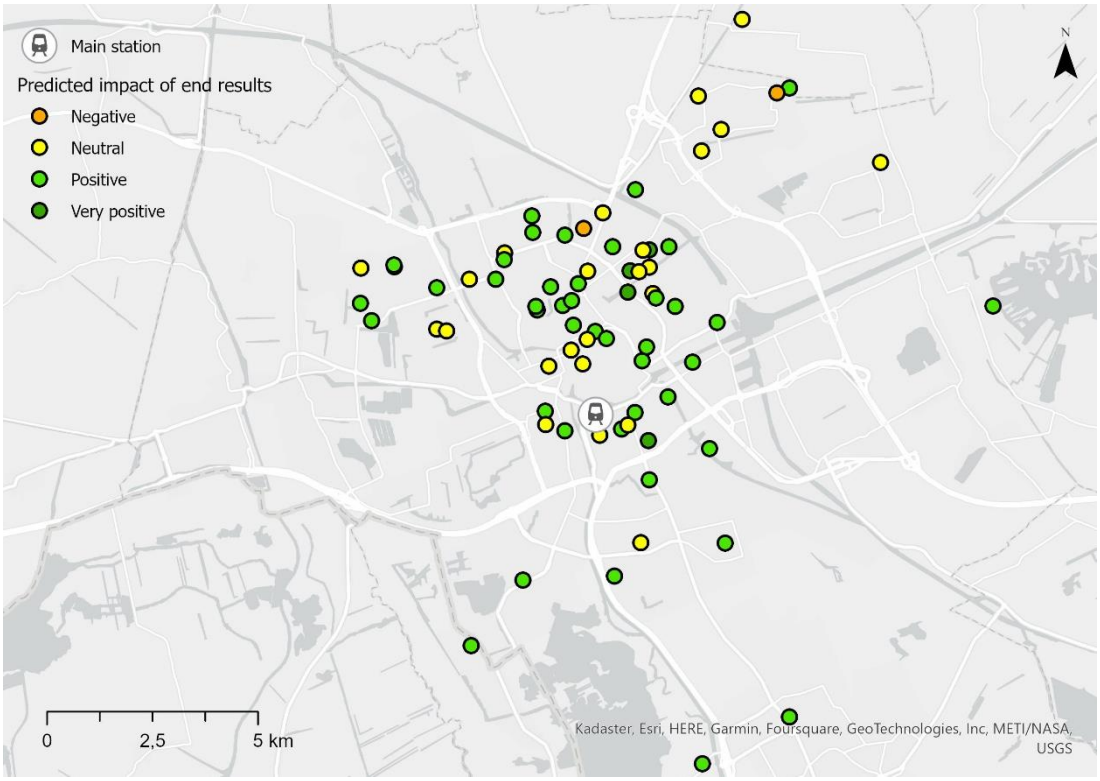
Figure 2 shows the spatial distribution of the respondents and how they rated how they are affected by the project. Figure 3 shows the spatial distribution of the respondents and how they rated the way that the end results will affect them.

Figure 2 – Map showing the spatial distribution of respondents and how they are affected by the project.



Source: Author (2023)

Figure 3 - Map showing the spatial distribution of respondents and how they think the end results of the project will affect them.



Source: Author (2023)

Most importantly, it was the goal to determine the relationship between distance and to what extent the respondents are affected by the construction works, and then to determine the relationship between distance and to what extent the respondents will be affected by the end results. Then, an attempt was made to determine the relationship between the extent to which the respondents are affected by the construction works and to what extent the respondents will be affected by the end results. A couple more relationships were tested. The relationships were tested against a standard level of $\alpha = 0{,}05$. The tested relationships and their outcomes are displayed in Table 1.

Table 1 – Table showing the tested relationships between variables and their outcomes.

Variable 1	Variable 2	P-value	Test result
Distance	Impact of the project	0,110	Insignificant
Distance	Impact of the end results	0,441	Insignificant
Distance	Impact of the end results on liveability in Groningen	0,099	Insignificant
Impact of the project	Impact of the end results	0,087	Insignificant
Impact of the end results	Impact of the end results on liveability in Groningen	<0,001	Significant
Frequency of visiting the station	Impact of the project	0,122	Insignificant
Frequency of visiting the station	Impact of the end results	0,690	Insignificant

The null hypothesis for ordinal regression is that there is mostly no statistically significant relationship between the predictor variable and the response variable. As can be seen, most tested relationships have turned out to be insignificant. This means that indeed, there are no significant relationships between the variables. However, for the relationship between the impact of the end results on the respondents' lives and the impact of the end results on liveability in Groningen, there is a significant test result. This means that there is a significant relationship between these two variables. The model fitting information gave a p-value of <0,001, and the goodness-of-fit test gave a p-value of 0,995. The null hypothesis of the goodness-of-fit test states that the sample data follows the hypothesised distribution. Since for the goodness-of-fit test, the p-value is greater dan the α-level of 0,05, we do not reject that null hypothesis, and thus assume that our sample data follows the hypothesised distribution. In other words, the model that is run by the statistical software fits the data well. We can thus continue investigating the relationship between the two variables.

Table 2 – Table showing the parameter estimates of the relationship between the impact of the project and the impact of the end results on liveability in Groningen

Value of the variable 'impact of the end results on daily lives'	Estimate	Odds of increasing**	P-value	Test result
Impact of the end results = 2	-5,957	-0,26%	<0,001	Significant
Impact of the end results = 3	-3,602	-2,72%	0,004	Significant
Impact of the end results = 4	-2,646	-7,09%	0,028	Significant
Impact of the end results = 5*	0	.	.	.

*Note that impact of the end results = 5 is taken as a reference category and therefore set to 0 since there is no higher value than 5.

** This column displays the odds of the variable 'impact of the end results on liveability in Groningen' increasing when the variable 'impact of the end results on daily lives' increases by 1.

The ‘estimate’ column in Table 2 contains only negative values. This means that by going up one step on the rating of the impact of the end results, there is a decrease in the log odds of going up one step on the rating of the impact of the end results on liveability in Groningen. In other words, when going up one step when rating the impact of the end results, the odds going up one step when rating the impact of the end results on liveability in Groningen decrease. For instance, when moving from 4 to 5 when rating the impact of the end results, the odds of rating moving up one step when rating the impact of the end results on Groningen decreases by 7,09%.

4.2 Qualitative analysis

After coding and analysing the interviews, it appeared that the construction works and side effects are not very notable. All three participants live within walking distance of the station. Out of them, only Participant 2 uses public transport very often, and the other two rarely use it. Participant 1 notes that, in general, the works cause no inconvenience at all, except for some rare cases in which they were working at night time. In total, noise disturbance was mentioned 6 times.

> *Once, they were working on pile drives in the middle of the night, causing me to wake up and be awake for 1,5 hours. They should have let us know, so I could have gotten some earplugs. (Participant 1)*

Participant 2 mentioned that the side effects of the works have caused some inconveniences, as the railroad works can cause service times to change or trains to be replaced by alternative transport methods, which are sometimes poorly arranged. In total, accessibility issues or hindrance was mentioned 7 times.

> *Usually, they arrange alternative transportation, like buses, if the trains don’t go. I’ve used them a couple of times, and they usually take way longer than the train does. I’ve also had some occasions in which I could not find the arranged alternative bus, which forced me to stay home and miss school. It can be quite annoying when you rely on public transport like that, especially if it is arranged poorly. (Participant 2)*

Participants 1 and 3, who both live within a five-minute walking distance from the station, note that the construction works generally do not really cause any nuisance or hindrance. They both say that they do not visit the station regularly since they do not (need to) use public transport often. Therefore, they are both not directly confronted with the effects of the works.

> *Despite the fact that I live next to the station, I don’t feel like it has that much of an effect. I also don’t use the station that frequently. Like, I don’t go there a lot. (Participant 1)*

When talking about how the end results will influence the lives of the participants, the improved experience of the transformed station area was most prominently talked about. All participants mentioned that they appreciate the plans of creating the green space in front of the station that will connect the station to the city centre. All three participants note that they do visit the station area quite frequently, e.g. when cycling past it towards other parts of the city. They say that the new green area is very likely to improve their experience of the area. For instance, Participant 3 mentions that “it would be cool to pick up friends and family at the station, and see how impressed they would be by the new station and the new park”. Participant 2 notes

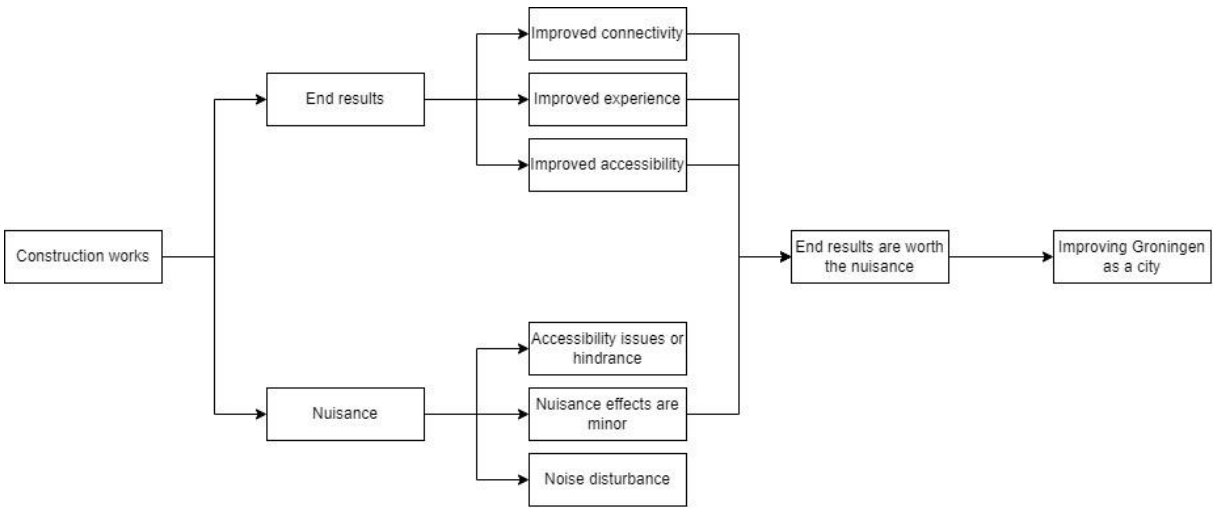
that “it would be really nice if the area would become more green so that you could sit there and relax”.

All participants said that they feel that the end results are likely to make Groningen a better city. The experience of the area and visual elements were mentioned most frequently, a total of 10 times. Participant 1 mentions that the new plans fit in with what the Municipality of Groningen is doing all over the city centre; they are giving back the city to the inhabitants by creating open spaces that are inviting and attractive. Both participants 2 and 3 mention that the improved area in front of the station will make an attractive area to sit in and relax, and is likely to appeal to tourists. Participant 2, who makes frequent use of the station, mentions that the improved accessibility and convenience of new services will also improve Groningen as a city. The new bicycle storage under the station will contribute to the user-friendliness and convenience of the new station. Moreover, Participant 2 notes that connecting the regional train lines will also contribute to improved mobility in the city of Groningen and surrounding cities and towns.

> *I think that the end results will make Groningen a better city. I have always found the station hall a beautiful building, and if the surroundings are improved, things will only get better. If friends and family visit and everything looks nice, that will really help, especially if the city is easier to get to. (Participant 3)*

Lastly, all participants state that they think that the end results are worth the nuisance caused by the project, especially since they do not feel that the project is causing any major inconveniences. When talking about the trade-off of being affected now and enjoying the potential benefits of the end results, all participants say that they do not think that the extent to which they are affected influences the way they think the end results will affect them. A code tree, resulting from the analysis of the interviews, is displayed in Figure 4 below.

Figure 4 – Code tree of the interview results.



Source: Author (2023)

4.3 Results in a theoretical context and mixed methods analysis

The theoretical framework mostly revolves around transport and how a transport system of good quality is an essential part of a liveable city. As Namazi-Rad et al. (2012) argue, infrastructure needs to maintain or improve the quality of living environments. The city of Groningen is currently doing that by both improving public transport both in the city itself and in the region, but also by transforming the area around the main station. Transport systems should provide "safe, attractive and enjoyable environments when people move around and when they use public places, as well as enhancing the benefits of those environments for all" (Anciaes & Jones, 2020, p157). The quantitative part of this research mostly did not produce any statistically significant outcome, except for how the end results of the project will impact the respondents and how the end results will impact liveability in Groningen. We can thus make no accurate claims on the relationship between the other variables. The qualitative part of the research mainly pointed out that the transformation of the areas adjacent to the station is important for the participants' perception of Groningen as a liveable city. They noted that the experience of the area is of great importance to making Groningen a better city. This corroborates with the findings of Anciaes & Jones (2020), that transport systems should enhance public places and Namazi-Rad et al. (2012), that infrastructure should maintain or improve the quality of living environments. De Haan et al. (2014) mention that, among other things, mobility is an important factor in a liveable city, but surprisingly, during the interviews, little attention was given to the aspect of improved connectivity and improved convenience due to the renovated station.

Together, the quantitative and qualitative research in this paper generally show a similar outcome. No statistically significant relationships could be found between the different variables, except for the one found, possibly because most respondents answered 'neutral' when asked to rate how they are or will be affected. One could therefore argue that, as the data is not skewed towards either positive or negative, the data has no 'direction'. This is in line with the interview results; the participants all indicated that the project and the accompanying nuisance do not have a major impact on their lives. Moreover, they noted that the end results are likely to make Groningen a better place to live because of the city's improved connectivity and experience, but the end results will probably also not have a major impact on their daily lives. In a way, the interviews and the survey confirm each other's outcomes. When looking at Figure 2 and Figure 3, one could argue that there seems to be some pattern in the distribution of participants and how they ranked they are affected by the project or how they are likely to be affected by the end results of the project. However, this is just speculation, and, above all, the relationship between distance and the rankings all proved to be statistically insignificant.

5. Conclusion and discussion

5.1 Discussion

This research aimed to demonstrate how the inhabitants of Groningen and those that use the main station of Groningen are affected by the construction works around the main station. The main focus of the research was to collect quantitative data through a survey that would be used to find relationships between different variables, such as distance and the extent of being affected by the works, or the extent of being affected and the extent of benefitting from the end results in the future. For future research, the sample size should be larger to produce a more accurate statistical output. The small sample size did not allow for the analysis of different groups of respondents, based on e.g. travel mode. The respondents were asked to rate a number of aspects on a scale of 1 to 5, 1 being very negatively affected, 3 being a neutral option, and 5 being very positively affected. A large portion of the respondents chose the neutral option, causing a large part of the data to have no 'direction'. For future research, there may be a need for reconsidering the way in which these questions are asked. Moreover, initially, this data would be used to create a spatial analysis and accompanying maps. However, to be able to create a visually appealing map displaying the spatial analysis, the sample size should have been notably larger, and the respondents, displayed as points on the maps in Figure 2 and Figure 3, should have been more equally distributed around the city of Groningen.

The qualitative analysis yielded useful insights into the way that local residents and users of the station are affected by the project, and how the end results could improve the quality of the city of Groningen. It also largely confirmed the outcome of the quantitative analysis. Though, more care could have been put into selecting more different participants, e.g. participants in different stages of life, participants that use different modes of transportation, etc. This research may have needed a more qualitative approach in general, to more uncover *how* and *why* people are influenced by the project and its end results, and how this influences their perception of the quality of life in Groningen as a city.

5.2 Conclusion

This research was conducted in order to gain an answer to the question 'How does the development of Groningen Spoorzone affect the perception of local residents and travellers of liveability in Groningen?'. A survey was conducted to gain insight into the statistical relationships between distance, being affected by the project, being affected by the end results of the project, and the effects of the end results on liveability in Groningen. Moreover, interviews were conducted to gain a deeper insight into how the construction works affect the day-to-day lives of local residents and travellers. In conclusion, the results of both the quantitative and qualitative analysis show that the project does not majorly affect the daily lives of inhabitants of Groningen and travellers from and to Groningen.

The quantitative analysis mostly did not display any significant relationships between distance, being affected by the project, being affected by the end results, or the effects of the end results on liveability in Groningen. There was also no significant relationship between the frequency of visiting the station and the other variables. The variables also did not have any statistically significant relationships between them, except for being affected by the end results and the effects of the end results on liveability in Groningen. Surprisingly, the relationship turned out to be a negative one; when the rating for the effect of the end results on people's lives goes up, the odds of

giving a more positive rating for the effect of the end results on liveability in Groningen go down.

The qualitative analysis mainly demonstrated that the construction works do not majorly affect the lives of the participants. The works can cause some minor inconveniences such as noise disturbance or different train service times. However, this differs from person to person. Those who use the station more frequently are likely to be more disturbed by some specific hindrances than people who do not. In general, the participants noted that the transformation of the station is worth the trouble caused by the construction works. Moreover, they all state that the end results of the project will make Groningen a better city to travel from and to, and in general, to be in.

Future research could focus more on the impact of the project on different groups of people, such as disabled travellers, everyday users of public transport, commuters that are hindered by road closings due to construction works, etc. By taking a more qualitative approach in future research, and uncovering the experiences of different groups of people, useful insights can be found into additional measures that should be taken to minimise the impacts of infrastructure development.

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Appendix A – Questionnaire questions

1. What is your zip code?
2. How often do you visit the station? (1: bus; 2: train; 3: bicycle and 4: other)
3. What (public) transportation type do you most frequently use?
4. The construction works can cause some inconveniences. How do the construction works on and around the station affect your daily life? (1: very negatively, 2: negatively, 3: neutrally, 4: positively and 5: very positively)
5. How do you think the end results will affect your daily life? (1: very negatively, 2: negatively, 3: neutrally, 4: positively and 5: very positively)
6. How do you think the end results will influence liveability in Groningen? (1: very negatively, 2: negatively, 3: neutrally, 4: positively and 5: very positively)
7. To what extent do you think the nuisance you experience now is worth it to ensure increased liveability in the end results? (1: not worth it, 2: neutral and 3: worth it)

Appendix B – Interview guide

English	Dutch
Hello, I am Stefan and I am currently conducting research on liveability and transport, focussing on the development of the main station in Groningen. I am a student at the Rijksuniversiteit Groningen, following the programme Human Geography and Planning, and I am currently working on my bachelor thesis. I want to research how people are affected by the construction works and how that influences how they feel the end result will affect people's day to day lives. I also want to know how (public) transport plays a role in liveability (in Groningen). The interviews will be analysed and the results will eventually be put into a thesis. The unedited output will be shared only with my research supervisor. Your output can be anonymised if you wish. Your name will then be changed to 'participant [x]'. This interview is voluntary and you can stop the interview at any time without having to give a reason. You also do not have to answer any question you do not want to answer. I would like to record the interview in order to be able to make a transcript and process this data accordingly. Do you consent to me recording the interviews? Do you have any questions or remarks about the project or this interview, or any general questions?	Hallo, mijn naam is Stefan en ik doe onderzoek naar leefbaarheid en transport, waarbij ik me focus op de ontwikkeling van het Hoofdstation in Groningen. Ik studeer Sociale Geografie en Planologie aan de Rijksuniversiteit Groningen, waar ik nu bezig ben met mijn scriptie. Ik wil onderzoeken hoe dit project het dagelijks leven beïnvloedt en hoe dat in relatie staat tot hoe zij denken dat het eindresultaat hun dagelijks leven mogelijk gaat beïnvloeden. Daarnaast wil ik kijken hoe belangrijk openbaar vervoer is voor leefbaarheid in de stad Groningen. De interviews zullen worden geanalyseerd en de resultaten worden gebruikt voor in mijn scriptie. De onbewerkte output wordt alleen gedeeld met mijn supervisor. Als je wil kan ik de output anoniem maken. Dan verander ik je naam naar 'participant [x]'. Het interview is compleet vrijwillig en je mag stoppen op enig moment zonder dat je daar een reden voor hoeft op te geven. Ik wil graag het interview opnemen zodat ik er een transcript van kan maken, zodat ik de data daarna zorgvuldig kan analyseren. Geef je me toestemming om dit interview op te nemen? Heb je verder nog vragen of opmerkingen over het onderzoek, dit interview of iets anders?
How old are you? Where are you from? How long have you lived in Groningen?	Hoe oud ben je? Waar kom je vandaan? Hoe lang woon je al in Groningen?
How often do you use public transport? What transport modes do you make use of?	Hoe vaak maak je gebruik van het openbaar vervoer? Van welk soort openbaar vervoer maak je dan gebruik?
How important is public transport to you in your daily life?	Hoe belangrijk is openbaar vervoer in je dagelijks leven?
How do you feel about the quality of public transport in Groningen?	Wat vind je van de kwaliteit van het openbaar vervoer in Groningen?
(If applicable: How does this compare to where you lived before?)	(Indien toepasselijk: Is dit anders dan waar je vandaan komt? Waarom?
Are you aware of the developments around the main station of Groningen? What do you think about the plans?	Ben je op de hoogte van wat er op het station gebeurt? Wat vind je van deze plannen?
How do the current plans/construction works affect your day-to-day life?	Hoe beïnvloeden de werkzaamheden je dagelijks leven?
How do you think the end result will affect your day-to-day life?	Hoe denk je dat de eindresultaten je dagelijks leven zullen beïnvloeden?

Do you think that how you are affected by the construction works influences your opinion on the end results?	Denk je dat in hoeverre je wordt beïnvloed door de werkzaamheden invloed heeft over hoe je denkt over het eindresultaat?
Do you think the end results will make Groningen a better place to live (and/or travel to or through)? Why?	Denk je dat de eindresultaten Groningen een betere stad maakt om in te wonen (en van/naar te reizen)?
Do you have any other questions or remarks?	Heb je nog overige vragen of opmerkingen?