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An Explorative Study on the Relationship Between Stakeholder Expectation, Experience and Satisfaction in Road Maintenance

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AN EXPLORATIVE STUDY ON THE RELATIONSHIP BETWEEN STAKEHOLDER EXPECTATION, EXPERIENCE AND SATISFACTION IN ROAD MAINTENANCE

Andreas Hartmann[1] and Marieke Hietbrink[2]

ABSTRACT

Despite the increased attention of road agencies towards the needs of infrastructure stakeholders, little is known about how the satisfaction or dissatisfaction of infrastructure stakeholders with the agencies' service provision is formed. This paper explores the relationship between expectation, experience and satisfaction of infrastructure stakeholders affected by road maintenance from the perspective of public agencies. Drawing upon data collected during a road maintenance project in the Netherlands it shows that expectations only played a minor role in the formation of satisfaction and concludes that road agencies should direct their effort from trying to determine and meet stakeholder expectations to allowing stakeholders to experience the improvements of a maintenance project.

KEYWORDS: expectation disconfirmation, stakeholder management, road maintenance

INTRODUCTION

In recent years more and more road agencies have expanded their network operator role and have placed stronger emphasis on the needs of users and other infrastructure stakeholders. Stakeholder satisfaction has become an important measure for the success of the agencies' activities, which include construction and maintenance projects. Despite the increased attention of road agencies towards the needs of infrastructure stakeholders and the widespread use of stakeholder surveys as accounting mechanisms for the performance of governmental services, little is known about how the satisfaction or dissatisfaction of infrastructure stakeholders with the agencies' service provision is formed. In the light of the extension of private sector involvement in financing, designing and constructing infrastructure, most of the previous research has focused on the satisfaction of the agencies as clients and other actors participating in construction projects but has neglected infrastructure users and those stakeholders affected by these projects. In addition, a common assumption underlying prior research is that the expectations of stakeholders have to be met in order to achieve satisfaction. By using satisfaction as proxy to project success, it is argued that meeting stakeholders' expectations and needs will favor the prospects of successful projects, while failing to do so can cause projects to fail (Chinyo et al., 1998; Olander, 2006). Many previous studies have tried to determine stakeholder expectations about product and service attributes delivered in construction projects (e.g. quality of design, timeliness of service, communication, competence and reliability) and the extent to which these expectations are met (e.g. Al-Momani, 2000; Kärnä, 2004; Ling and Chong, 2005). The gap between expectation and actual performance is then used as an indication for the level of satisfaction. A main conclusion drawn from this comparison is that the challenge in satisfying stakeholders lies in the numerous individuals, groups and organizations, all having different and often conflicting expectations about objectives and outcomes of a project and who can impose their interests and power on a project (Chinyio and Akintoye, 2008). Since it is unlikely that all

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stakeholder expectations will be met, it is argued that stakeholder expectations need to be evaluated in relation to the main objectives of a project, in order to determine which expectations should be fulfilled to maximize the benefits stakeholders derive from a project and to minimize their negative impact on a project (Olander, 2006; Chinyio and Olomolaiye, 2010). Although prior research on stakeholder satisfaction in construction projects clearly points to a relationship between expectation, perceived performance and satisfaction, it provides little empirical evidence for the extent to which expectation (dis)confirmation leads to (dis)satisfied stakeholders. The implicit assumption of many studies that meeting expectations ensures stakeholder satisfaction has not been validated or even contrasted with competing theoretical explanations. That casts doubt on many of the suggested recommendations for the management of stakeholders in construction projects.

This paper addresses the aforementioned gaps by exploring the relationship between expectation, experience and satisfaction of infrastructure stakeholders affected by road maintenance from the perspective of public agencies. It seeks to reveal to which extent the disconfirmation of expectations of road stakeholder about the performance attributes of road infrastructure during and after road maintenance explains stakeholders' level of satisfaction with the maintenance. Based on that, it intends to show how expectations should be set in order to satisfy infrastructure stakeholders. To pursue these aims, the paper adopts an expectation-disconfirmation theory (EDT) perspective. EDT has its roots in marketing and consumer behavior research (Oliver, 1997) and has been applied in different fields ranging from information technology adoption (e.g. Brown et al., 2011; Lankton and McNight, 2012) and education (e.g. Appleton-Knapp and Krentler, 2006; Bordia et al., 2006) to tourism management (e.g. Yüksel and Yüksel, 2001; Zehrer et al., 2012) and public service provision (e.g. Van Ryzin, 2005; Poister and Thomas, 2011). The core argument of EDT is that satisfaction is a function of prior expectations and the discrepancy between expectations and actual experiences (Oliver, 1980). Size and direction of the disconfirmation determine the level of (dis)satisfaction. In the wider sense, EDT covers several models of the combined influence of a priori expectation and a posteriori experience which differ in the postulated influence of deviations from expectations on satisfaction. This research does not empirically test or compare these existing models. Rather, it explores the relationship between expectation, experience and satisfaction in the specific context of road maintenance by drawing upon data collected during a road maintenance project in the Netherlands. The project concerned the renewal of the top asphalt layer of 7 km of highway located in one of the most traffic-intense and densely populated areas in the Netherlands. A questionnaire survey with two points of measurement was conducted. Before the maintenance project started, the expectations of road user, neighbors and companies about maintenance outcome, maintenance process and information provision were measured. After the project was completed, the stakeholders' experience and satisfaction with the maintenance project were determined. By using a partial least square (PLS) path modeling approach for data analysis, it was possible to investigate the importance of road performance attributes in forming expectations, experiences and consequently satisfaction with maintenance process and outcome.

In the next section expectation-disconfirmation theory is outlined, followed by an introduction of the structural model investigated in this study. The paper continues with the description of the research design. After presenting the findings, it discusses the results in terms of the relevance of meeting stakeholder expectations to satisfy stakeholders. Finally, the paper draws some conclusions about the management of stakeholders in construction projects, limitations of the study and recommendations for further research.

EXPECTATION-DISCONFIRMATION THEORY (EDT)

In general, the expectancy-disconfirmation theory suggests that individuals -– when forming judgments about products or services – already possess a set of expectations with respect to the characteristics or benefits the particular product or service will provide (Oliver, 1980). Expectations are the individuals' predictions or anticipations of the performance of the product or service (Van Ryzin, 2005). Upon experiencing the actual performance of the product or service, the expectations then serve as a comparative reference for the formation of satisfaction judgments (Oliver, 1997). The discrepancy or gap between prior expectations and actual performance has been termed expectancy disconfirmation (Van Ryzin, 2005). This disconfirmation can be either positive or negative. Disconfirmation suggests that when experiences fall short of expectations, the satisfaction will be lower – i.e. a disappointment effect. When experiences exceed expectations, expectations exert a positive influence on satisfaction – i.e. a surprise effect (Strong et al., 2001; Brown et al., 2008). From this perspective, expectations should be understated in order to maximize the extent to which experiences exceed expectations. Although most of the studies on satisfaction in construction adopt a disconfirmation perspective, they only measure the gap between expectation and experience and implicitly assume that the more experiences fall short of expectations the less satisfied are individuals. Only few authors explicitly address the relationship between expectation, experience and satisfaction in their structural models. For example, Poister and Thomas (2011) investigated the satisfaction of motorists with road conditions, traffic flow and safety on highways in Georgia (US) by asking respondents about the level of service the state should provide on the highways, the perceived highway quality, and how satisfied they are with the provided service. In addition, the respondents were requested to indicate the perceived level of (dis)confirmation between expectation and experience. Poister and Thomas (2011) found that perceived road condition, traffic flow and highway safety and their comparison to expectations have a strong positive effect on satisfaction which they regard as further substantiation of the expectancy disconfirmation model.

However, besides the general expectancy disconfirmation there are three other distinct models which offer alternative theoretical explanation for the interplay between expectations, experiences and satisfaction. The first model is known as the assimilation model which suggests that experiences are adjusted to expectations in order to prevent cognitive dissonance (Sherif and Sherif, 1967). As a consequence, individuals use expectations as an anchor for their experiences which are then adjusted to be more consistent with the expectations. This reduction of dissonance would suggest that the higher the expectation, the higher the satisfaction and that an overstatement of expectations increases satisfaction. The second model is labeled the ideal point model. This model proposes that any difference between expectations and experiences, regardless of the direction, will result in a lowered evaluation. In contrast to the disconfirmation model, the ideal point model anticipates negative outcomes when expectations are both not attained and when they are exceeded (Olsen and Dover, 1979). It is argued that the dissatisfaction stems from physiological tension created by an unfair perceived mismatch between what someone received and what someone expects to get. The implication is that raised expectations should be closely met and experiences should not deviate from expectations in order to attain satisfaction. The third model is the expectation/experience-only model. This model suggests that only expectations or only experiences determine the satisfaction of stakeholders. Brown et al. (2008) compared disconfirmation, ideal point and experience-only model for the adoption of information systems and could show that the overall influence of

expectations is much less than suggested in prior research. Just like the study of Irving and Meyer (1999) on job satisfaction, their research points to an overemphasis of expectations in determining satisfaction. In light of the different competing models it is surprising that research on stakeholder satisfaction in construction adopts the expectancy disconfirmation model without any strong empirical evidence for its appropriateness in the construction context.

STRUCTURAL MODEL

In order to explore the role of expectation and experience in forming satisfaction in construction a structural model is developed from transferring EDT to the specific context of road maintenance. That first requires a further specification of the aspects of road maintenance about which stakeholders can form expectation and which they can experience. The notion of value as being adopted by service-dominant logic (Vargo and Lusch, 2004) seems particularly fruitful in this regard. From a service-dominant logic perspective it is argued that value does not reside in products or services but rather is created through the phenomenological experience of the consumer of these products and services. As a consequence, manufacturers and service organizations cannot provide value to the customer. They can only make value propositions which the customer makes use of in a given context and by doing so the customer determines and co-creates the actual value (Ng, 2010). In the context of road maintenance it is the road that offers value, and it is the experience of this offer, for example through a safe and reliable journey, which creates actual value. Maintenance work temporarily reduces the value offering of a road by imposing traffic disturbance to the network, decreasing road capacity and increasing the probability of accidents. Why then do maintenance if the value propositions of a road cannot be fully reaped while maintenance is executed? The benefit of road maintenance lies in improving and enhancing the value offering of a road. Roads deteriorate over time, which will diminish the value a road can provide, for example through a reduction of speed or uncomfortable rides. Resurfacing asphalt layers, placing traffic management devices, or renewing the drainage system are maintenance interventions that intend to increase the value proposition of a road. It is this conflict between the temporary loss of proposed value during maintenance and the intended increase of offered value after maintenance which suggests two aspects of road maintenance that play an important role in forming stakeholder satisfaction: the maintenance outcome and the maintenance process. The maintenance outcome relates to the improvement of a road's value proposition; stakeholders can have certain expectations about this improvement before the maintenance, and they will experience the extent of this improvement after the maintenance. The maintenance process addresses the downgrade of the proposed value during maintenance, and again stakeholders can have expectation about the extent of the decline and can experience its actual reduction. For both maintenance outcome and maintenance process it can be argued that, in line with EDT, a certain interplay of expectation and experience will determine (dis)satisfaction of stakeholders. In addition, while forming expectation about a maintenance project as well as while experiencing the outcome and process of the maintenance, stakeholders will heavily rely on information. It is posited that satisfaction depends on accurate information regarding realistic expectations and accurate depiction of actual performance (Strong et al., 2001). Since information received by road stakeholders will be used to make decisions about, for example, the routes taken during maintenance or the time of traveling after maintenance, the information provision is considered to be the third aspect in the formation of satisfaction in road maintenance, and again the interplay of expectation and experience will yield a certain level of satisfaction. Besides the satisfaction with maintenance outcome, process and

information provision, the structural model also includes the overall satisfaction with a maintenance project which is conceptualized as an aggregated assessment of the three maintenance aspects and as such is an indicator for the relative importance of maintenance outcome, process and information provision for the formation of satisfaction. The structural model is depicted in Figure 1.

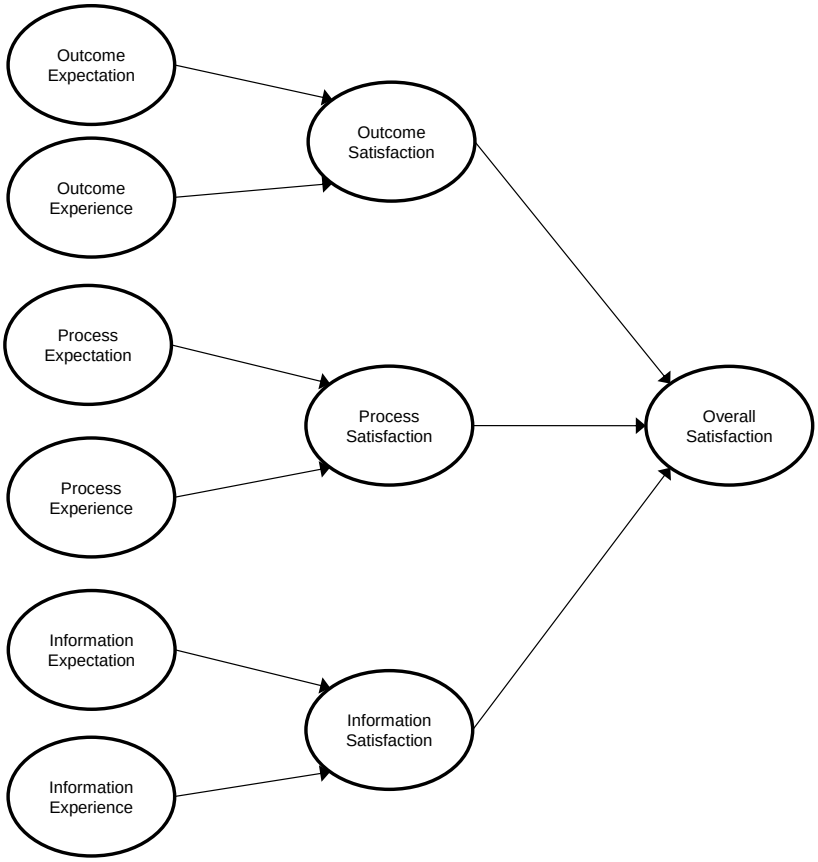


Figure 1 Structural model

RESEARCH DESIGN

The empirical setting

A road maintenance project on the A20, an arterial highway at the ring of Rotterdam in the Netherlands, was chosen as empirical setting for the research. The project was particularly appropriate for exploring stakeholder satisfaction because of its location and organization. The project was executed in a densely populated area. Besides residential houses, the area includes three industrial zones mostly used by spin-offs from the Rotterdam harbor, such as logistics companies and food chain companies. Before maintenance, the highway caused noise and air pollution but also problems of accessibility due to regular traffic jams during rush hours. Although the road agency identified a number of stakeholders such as the port and the municipality of Rotterdam, gas stations, public transport, the research will focus on those stakeholders which are directly affected by the maintenance: highway users, neighbors, and companies located around the A20.

In the period between July 30 and August 14, 2011 both directions of the 7 km four-lane highway from the intersection Kleinpolderplein to the intersection Terbregseplein were closed

one week after each other. The maintenance work included renewing of top asphalt layer, repairing bridge joints and replacing road furniture. Due to existing capacity limits of the highway during rush hours, closing an entire direction for maintenance was expected to cause additional traffic problems, even though the work would be executed during the school holidays. Moreover, it was expected that during the project, highway neighbors would suffer from the noise air pollution induced by the maintenance work and would also have reduced accessibility to the highway network and the area. However, the intervention strategy of a complete highway closure for a short time was preferred over a lane-based maintenance which would have had a longer impact on the traffic.

In order to decrease traffic problems and complaints during and after the maintenance, the Dutch highways agency informed highway users, neighbors, and companies about the project several weeks before the maintenance started. Neighbors and companies situated near the road received information letters. Companies were also visited by people from the agency and asked to offer their employees the possibility of working at home or traveling by public transport in order to reduce traffic problems during the project. In addition, the agency published articles about the project in newspapers and launched a website with information about the project. During the project the agency made use of dynamic re-routing, which included signs near the road with advice for taking other routes. Neighbors and highway users were offered discounted fares for the public transport system to decrease the amount of traffic in the area.

This research focuses on three main categories of stakeholders: highway users, people living close to the highway, and companies located along the highway. Although there are other stakeholders that directly or indirectly influence the project, such as municipalities and the government, the particular interest was on the stakeholders directly affected by the maintenance project.

Measurement model

It was argued that outcome and process of road maintenance projects are two important aspects in establishing stakeholder satisfaction. On the one hand, at the end of a maintenance project the offered value of a road should be increased. On the other hand, during maintenance the proposed value of a road decreases. The value of a road for directly affected stakeholders relates to a diverse and disparate set of social, economic and environmental impacts of a road system after and during maintenance. Although there are different conceptualizations of road system impacts, widely accepted impacts include (Baird and Stammer, 2000; Sinha and Labi, 2007; PIARC, 2008; Adey et al., 2010):

- Safety

  Safety refers to the effect of a road system on the risk of getting involved in an accident involving at least one vehicle and causing fatal injuries and vehicle damage.
- Travel Time

  Travel time refers to the effect of a road system on time spent traveling.
- Comfort

  Comfort refers to the effect of a road system on the quality of traveling and includes the quality of the traffic information system and the road condition.
- Economic

  Economy refers to the effect of a road system on the economic activities in an area/region by allowing for freight transport, accessibility of firms and emergence of new business.
- Emissions

Emissions refer to the effect of a road system on the negative consequences of road traffic and include noise and particle emissions.

- Vehicle costs

  Vehicle costs refer to effect of a road system on the consumption of fuel and other material for vehicle operation, as well as the repair and maintenance of a vehicle.

- Visual quality

  Visual quality refers to effect of a road system on the perception of its aesthetics and architectural look as well as its cleanness and integration into its surrounding.

The different road system impacts were used as indicators forming stakeholders' expectation about and experience with maintenance outcome and process, which resulted in a formative measurement model. In the questionnaire each indicator represented a 5-point Likert scale item measuring the expected and experienced change of the road system impact during and after the maintenance project (see Appendix). It is proposed that these indicators cause stakeholder expectation and experience and that the coalescence of the indicator effects on the model constructs supports a more focused analysis of the interplay between expectation, experience and satisfaction in road maintenance.

Information expectation and experience were reflectively measured using the amount of information received as indicator. The measurement of information, outcome, process and overall satisfaction was also based on reflective indicators (see Appendix).

Data collection and analysis

The process of the formation of satisfaction was studied by measuring stakeholder expectations prior to the maintenance of the A20 and measuring stakeholder experiences after the maintenance work was finished. One month before the maintenance, the first questionnaire was administered, while the second questionnaire was sent out approximately one month after the project was completed. This approach echoes Venkatesh and Goyal (2010) who opted for more focused research via longitudinal studies at pre-implementation and post-implementation time periods. Many previous EDT studies were cross-sectional with *a posteriori* expectation measurement. This may cause biased results since respondents have to recall their pre-exposure expectations after gaining experiences which are far more salient and available. That may not only lead to guesses when people are not able to recall expectations, but also to a disproportional influence of the current and prevailing experiences (Irving and Meyer, 1994). In addition, people often try to prevent dissonance between expectations and experiences and try to stay cognitively consistent (Festinger, 1962). If they are asked to report on the extent to which their expectations are met, it is highly likely that they overstate the agreement between expectations and experiences. As a consequence, it will be difficult to assess whether experiences were adjusted towards expectations or vice versa (Brown et al., 2008).

Before the maintenance project 700 questionnaires were sent to neighbors and 300 questionnaires were sent to companies. Only companies and neighbors within 200 meters of the maintenance work were selected. Each questionnaire was accompanied by a cover letter from the university and the road agency. 85 road users were interviewed at a gas station and 23 road users filled in the questionnaire via the website of the road agency. In total, 244 stakeholders (128 road users, 85 neighbors and 31 companies) returned the first questionnaire. Respondents were asked to report how much they expect the seven road impacts introduced above to be improved after the maintenance and to be affected during maintenance. The questionnaire also asked about how

much respondents expect to be informed about the maintenance project. To obtain individual expectation (dis)confirmation it was important during the second measurement to get responses from the individuals who already participated in the first questionnaire. Therefore respondents were asked to fill in their e-mail address on the first questionnaire. From the respondents who provided their e-mail address and were approached for the second questionnaire, 81 respondents (33%) returned the questionnaire. In the second questionnaire the respondents were asked to report how much they experienced the seven road impacts to be improved after the maintenance and to be affected during maintenance, and how satisfied they were with the outcome and process of the maintenance. The questionnaire also included questions about the information provision the respondents experienced, their satisfaction with it, and their overall satisfaction.

To estimate the structural model, the variance-based partial least square (PLS) approach was used which relaxes some of the assumptions and requirements of covariance-based techniques such as sample size, formative measurements, and normality (Hair et al., 2012). Since PLS is particularly useful for exploratory studies (Chin, 1998), it was regarded as suitable approach for this research. The data were analyzed with the software program SmartPLS (Ringle et al., 2005). Before the analysis the measures were scale-centered, in order to reduce multicollinearity. A scan for outliers led to the exclusion of 4 cases from the data set, since their standard deviation from the average of the expectation or experience measures was above 3.

RESULTS

The analysis of the PLS model is a two-step approach which first assesses the measurement model and then the structural model. Due to the lack of a global quality criterion, several criteria to evaluate reflective and formative constructs as well as the path model have been suggested (cf. Ringle et al., 2012).

Measurement model

Formative indicators are primarily evaluated on the basis of their weights (Hair et al., 2012). The weight indicates how important the variable is for determining the associated construct, controlling for the effects of all other indicators of that construct. It shows the relative importance of an indicator to the construct. Another criterion is the statistical significance of the indicator weights, which was obtained by applying a bootstrapping procedure (the observed sample is seen as the population from which a large number of bootstrap samples is created (Henseler et al., 2009)). The indicator weights and their significance are presented in Table 1. For the construct ‘outcome expectation’ the analysis shows that comfort, economy, safety and travel time are important and significant, which suggests that stakeholders’ outcome satisfaction is affected by the expectation related to these indicators. Emission, vehicle cost and visual quality are less important and not significant, and the low factor loadings (the absolute importance of an indicator to its construct) for these indicators support their little relevance for the formation of satisfaction through expectation. The analysis also revealed a negative sign for comfort, emission, safety, vehicle cost and visual quality and a positive sign for economy and travel time. Since all bivariate correlations between the indicators and the construct were positive and only minimal collinearity was indicated (max. VIF=2.012), the presence of a suppression effect could be assumed (Cenfetelli and Bassellier, 2009). However, the loadings also show negative signs which then suggest a reversed effect of these indicators on outcome expectation and its subsequent relationship with outcome satisfaction. The outcome satisfaction of stakeholders is formed by the experiences related to comfort, travel time and visual quality,

which are important and significant indicators for the outcome experience construct. Besides their relative importance these indicators also show a high loading on the construct and thus also contribute to outcome experience in a one-to-one relationship. It should be noted that safety highly loads on outcome experience but only has a non-significant weight. That indicates that safety does not influence outcome experience beyond the contribution of the other indicators, but is still important when independently assessed.

Tabel 1 Results of the measurement model

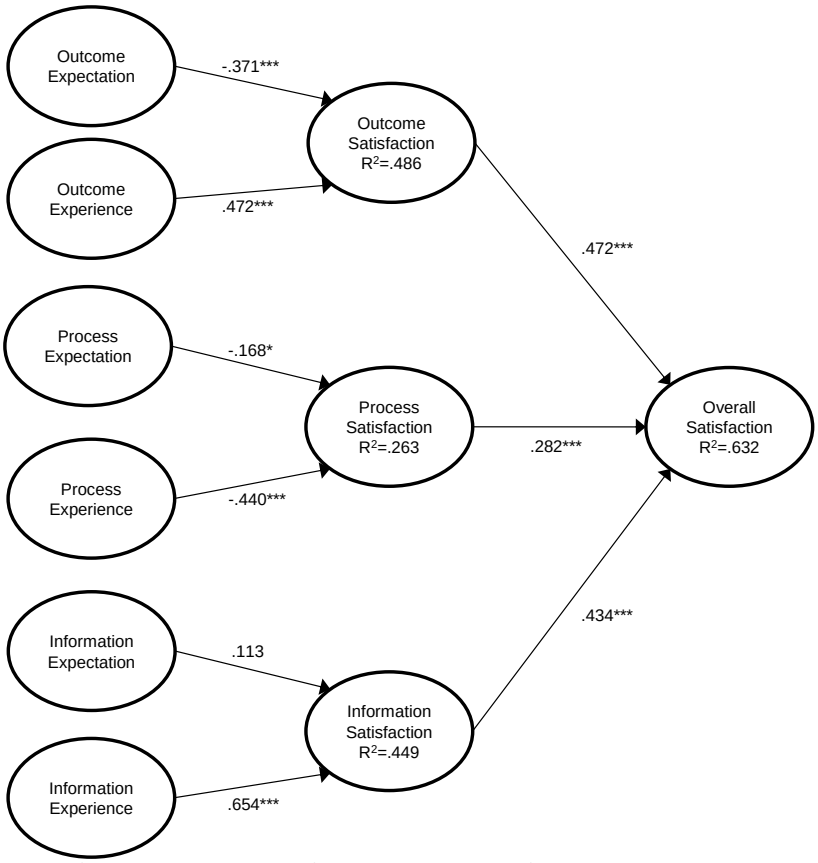
Construct	Indicator	Weight	Loading	t-value
Outcome Expectation	OEX_Comfort	-.455**	-.439	2.090
	OEX_Economy	.651**	.529	2.163
	OEX_Emission	-.220	-.129	1.428
	OEX_Safety	-.498**	.068	2.020
	OEX_Travel Time	.637**	.583	2.493
	OEX_Vehicle Cost	-.218	-.247	1.479
	OEX_Visual Quality	-.199	-.182	1.004
Outcome Experience	OEP_Comfort	.430**	.716	2.179
	OEP_Economy	-.029	.495	.271
	OEP_Emission	.098	.505	.945
	OEP_Safety	.217	.731	1.583
	OEP_Travel Time	.352*	.727	1.876
	OEP_Vehicle Cost	-.094	.079	.818
	OEP_Visual Quality	.344**	.726	2.040
Outcome Satisfaction	OU_Satisfaction		1.000	
Process Expectation	PEX_Comfort	.055	.138	.272
	PEX_Economy	-.500**	-.256	2.338
	PEX_Emission	.401*	.255	1.703
	PEX_Safety	-.597**	-.422	2.527
	PEX_Travel Time	.794***	.621	3.536
	PEX_Vehicle Cost	.108	.148	.500
	PEX_Visual Quality	-.004	.057	.020
Process Experience	PEP_Comfort	.175	.464	.883
	PEP_Economy	-.667***	-.045	2.938
	PEP_Emission	.323*	.429	1.859
	PEP_Safety	.143	.583	.654
	PEP_Travel Time	.428*	.545	1.832
	PEP_Vehicle Cost	.485**	.673	2.304
	PEP_Visual Quality	.263	.423	1.576
Process Satisfaction	PR_Satisfaction		1.000	
Information Expectation	INF_Expectation		1.000	
Information Experience	INF_Experience		1.000	
Information Satisfaction	INF_Satisfaction		1.000	
Overall Satisfaction	OV_Satisfaction		1.000	

***significant at .001 level, **significant at .05 level, * significant at .10 level

Economy, emission, safety, and travel time have a significant effect on the process expectation constructs and therefore on the process of satisfaction formation. Again, the negative signs for the weights and loadings of economy and safety point to a reversed coding effect. Economy and safety will negatively impact process expectation and its relationship with process satisfaction. Relevant indicators determining process experience are economy, emission, travel time and vehicle cost with economy showing a negative effect. Although some of the indicators show a low weight as well as loading which would question their theoretical relevance (Cenfetelli and Bassellier, 2009), they should be kept for further analysis. That is because this explorative study was conducted in the context of a specific maintenance project. The results may reflect the particular setting of the project and might be different in other settings.

Structural model

The results of the assessment of the structural model are shown in Figure 2. The central criterion for the assessment of the structural model is the coefficient of determination R^2, which is used to characterize the ability of the model to explain and predict the dependent variable (Ringle et al., 2012). The R^2 values of outcome satisfaction (.486), information satisfaction (.449) and overall satisfaction (.632) are satisfactory. With a R^2 value of .263 the explained variance of process satisfaction is lower, but is still sufficient for an explorative study. The analysis of the path coefficient revealed a positive influence of outcome experience (.472) on outcome satisfaction whereas outcome expectation exhibits a slightly less, but negative influence (-.371). The influence of process experience (-.440) and information experience (.654) on process satisfaction and information satisfaction respectively is much stronger than the influence of process expectation (-.168) and information expectation (.113). The path coefficients of process expectation and experience have negative signs suggesting a reversed effect of both variables on process satisfaction. The higher the expected or experience impact of the project on the stakeholders, the less satisfied they were with the maintenance process. The strongest influence on the overall satisfaction exerts outcome satisfaction followed by information satisfaction and process satisfaction. Except for information expectation all coefficients are significant after applying bootstrapping procedure.



***significant at .001 level, **significant at .05 level, * significant at .10 level

Figure 2 Results of the structural model

DISCUSSION

At the beginning of the paper it was ascertained that previous research on stakeholder satisfaction in construction is built around the assumption that expectations of stakeholders have to be met to satisfy them and increase the probability of project success. The present study took a specific road maintenance project in the Netherlands as empirical setting to investigate the interplay of expectation and experience in forming stakeholder satisfaction. One may argue that the focus on a single project reduces the generalizability of the results. However, generalization was not a major concern due to the explorative nature of the research. The contextual characteristics of the maintenance project are very beneficial in this regard, since they support the interpretation of the findings and allow for a more thorough understanding of an otherwise underexposed topic with little empirical evidence.

The analysis revealed a strong influence of the experience with maintenance process and information provision on stakeholder satisfaction. Process and information expectations are less important and only have a marginal influence on satisfaction with the maintenance projects. This stands in sharp contrast to the generally assumed necessity of meeting stakeholder expectations. Stakeholders were most satisfied if they experienced sufficient information provision and acceptable impact during the maintenance. In this sense the information strategy adopted by the road agency for the maintenance of the A20 was appropriate, which included substantial effort to inform road users, neighbors and companies about the maintenance work, the maintenance

duration, and alternative traffic routes and modes and to keep them informed during the maintenance. The process strategy of the agency could not clearly address the findings of the study. This can be ascribed to the nature of road maintenance which always will impact stakeholders. A process strategy should aim at keeping maintenance impacts on a level which is for the stakeholders acceptable. In the case of the A20 the agency tried to ensure this level by minimizing the duration of the maintenance and scheduling the maintenance for the holiday period. The case study also suggests that the information provision throughout the maintenance project facilitated the acceptance forming of the stakeholders rather than their expectation forming.

Although process expectation only had a small influence on satisfaction, the formative indicators used to measure expectation and experience point to differences in the relative importance of indicators for the formation of satisfaction. The most important indicator for process expectation was travel time followed by safety, economy and emission. That suggests that stakeholders first of all expected traffic problems, which is comprehensible given the traffic intensity on the associated highway network. Travel time was less important for process experience, and instead economy became the most important indicator. In addition, safety became less important and vehicle cost gained in importance. This switch in importance indicates that the formation of expectations can differ from the formation of experiences and - from a value perspective - that the evaluation of the value a road is offering before using the road is different from the evaluation of the value a road is providing when using the road (Ng et al., 2012). It is particularly this value-in-use which accounted for the formation of satisfaction in the maintenance project.

Value-in-use also plays a prominent role in the formation of outcome satisfaction. Again, experiences exert a greater influence on satisfaction than expectations. Yet, compared to maintenance process and information provision, expectations had a stronger influence on satisfaction. The path coefficient of expectation shows a negative sign whereas the sign of the experience coefficient is positive. That suggests a disconfirmation mechanism in forming satisfaction with the maintenance outcome, yet with a bias towards experiences. Stakeholders were most satisfied when they had low outcome expectations and experienced a strong improvement of the highway performance. They were least satisfied when they had high outcome expectations and experienced a low performance improvement. With the experience bias in mind this is partly in line with the assumption of meeting stakeholder expectations and achieving a higher level of satisfaction by exceeding expectations. It seems to be also supported when looking at the relative importance of the formative indicators. The most important indicators causing outcome expectation are economy and travel time, but they are much less important for determining outcome experience. In addition, they are the only indicators of outcome expectation with a positive sign. That suggests that the disconfirmation of expectations was mainly related to economy and travel time. That also would mean that the other indicators had a reversed effect on outcome expectation and satisfaction and the existence of assimilation effects could be assumed. The higher the expectations related to these highway impacts, the higher the level of satisfaction. However, it is the combined effect of the seven indicators which accounts for the relationship between outcome expectation on satisfaction. That clearly points to the importance of specifying the formative model. Removing or adding formative indicators may change the weights of the indicators and the relationship of the latent constructs in the structural model (Cenfetelli and Bassellier, 2009).

The findings also suggest that the expectation (dis)confirmation only partly explains stakeholder satisfaction, since the highway performance impacts again differ in their relative importance for expectation and experience formation. As mentioned, from the formative indicators causing outcome expectations, economy is the most important characteristic followed by travel time, safety and comfort. The most important indicators for outcome experience are comfort, visual quality and travel time. Particularly economy is no longer relevant. In other words, expectations on the performance of certain highway characteristic appeared to be compensated by experiences on the performance of other highway characteristics. The importance switch can be explained by the maintenance work of this project which included the repair of several bridge joints and the resurfacing of the top asphalt layer and which noticeably improved the appearance (visual quality) of and the driving experience on the highway (comfort). In addition, the duration of the maintenance project could lead to a decrease of the initial importance of indicators over time and indicators gain in importance which are related to the immediate experience of the road during and after the maintenance. It might be this time effect which finally accounts for the limited role of expectations in forming stakeholder satisfaction (Miceli, 1986).

CONCLUSION

This research investigated the interplay of expectation, experience and satisfaction in the specific context of a road maintenance project in the Netherlands and shed more light on the general assumption of meeting stakeholder expectations in construction projects. It revealed that expectations only played a minor role in the formation of satisfaction about the maintenance process and the information provision. The experience of the actual maintenance project and the information received about the project had a much stronger influence on stakeholder satisfaction. Although the expectations about the maintenance outcome had a greater impact on the formation of satisfaction, they still had a lower influence than outcome experiences. Moreover, depending on the highway characteristics and the contextual setting, expectations were positively or negatively related to satisfaction.

A main implication of the research is that road agencies should direct their effort from trying to determine and meet stakeholder expectations to allowing stakeholders to experience the improvements of a maintenance project. That includes sufficient information provision before and during the project and an intervention strategy that takes the peculiarities of the road section into account. These peculiarities will also determine whether a road agency should not raise high but realistic expectations about certain road impacts or should overstate what can be expected from the maintenance in order to gain satisfied stakeholders. In either case, maintenance projects should lead to noticeably improved road infrastructure, since the value of a road will emerge at the moment of its usage.

The research shows some limitations which are mainly related to the research setting. The data were collected around a specific maintenance project, which restricts the generalizability of the results. Future studies should therefore investigate how expectation, experience and satisfaction interrelate in other project settings. That would also include a comparison of different types of roads and different stakeholders. Road agencies could benefit from such insights when formulating maintenance strategies and defining stakeholder management approaches for particular projects. In other words, it may help them in increasing the effectiveness of their service provision under remaining budget constraints, if stakeholder satisfaction is an important success criteria.

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APPENDIX

Questionnaire items

Process expectation

As a *road user (neighbor, company)* I think that during the maintenance of the A20 the effect on *travel time* (is very little…is very great).

As a *road user (neighbor, company)* I think that during the maintenance of the A20 the effect on *safety (i.e. risk of accidents and damages caused by accidents)* (is very little…is very great).

As a *road user (neighbor, company)* I think that during the maintenance of the A20 the effect on *comfort (i.e. quality of the road surface, convenience of travelling)* (is very little…is very great).

As a *road user (neighbor, company)* I think that during the maintenance of the A20 the effect on *emissions (i.e. noise, exhaust gases)* (is very little…is very great).

As a *road user (neighbor, company)* I think that during the maintenance of the A20 the effect on *vehicle costs (i.e. car damages, fuel consumption)* (is very little…is very great).

As a *road user (neighbor, company)* I think that during the maintenance of the A20 the effect on *visual quality (i.e. cleanliness)* (is very little…is very great).

Process experience

As a *road user (neighbor, company)* I think that during the maintenance of the A20 the effect on *travel time* (was very little…was very great).

As a *road user (neighbor, company)* I think that during the maintenance of the A20 the effect on *safety (i.e. risk of accidents and damages caused by accidents)* (was very little…was very great).

As a *road user (neighbor, company)* I think that during the maintenance of the A20 the effect on *comfort (i.e. quality of the road surface, convenience of travelling)* (was very little…was very great).

As a *road user (neighbor, company)* I think that during the maintenance of the A20 the effect on *emissions (i.e. noise, exhaust gases)* (was very little…was very great).

As a *road user (neighbor, company)* I think that during the maintenance of the A20 the effect on *vehicle costs (i.e. car damages, fuel consumption)* (was very little…was very great).

As a *road user (neighbor, company)* I think that during the maintenance of the A20 the effect on *visual quality (i.e. cleanliness)* (was very little…was very great).

Outcome expectation

As a *road user (neighbor, company)* I think that the maintenance of the A20 improves *travel time* (very little…very much).

As a *road user (neighbor, company)* I think that the maintenance of the A20 improves *safety (i.e. risk of accidents and damages caused by accidents)* (very little…very much).

As a *road user (neighbor, company)* I think that the maintenance of the A20 improves *comfort (i.e. quality of the road surface, convenience of travelling)* (very little…very much).

As a *road user (neighbor, company)* I think that the maintenance of the A20 improves *emissions (i.e. noise, exhaust gases)* (very little…very much).

As a *road user (neighbor, company)* I think that the maintenance of the A20 improves *vehicle costs (i.e. car damages, fuel consumption)* (very little…very much).
As a *road user (neighbor, company)* I think that the maintenance of the A20 improves *visual quality (i.e. cleanliness)* (very little…very much).

Outcome experience
As a *road user (neighbor, company)* I think that the maintenance of the A20 improved *travel time* (very little…very much).
As a *road user (neighbor, company)* I think that the maintenance of the A20 improved *safety (i.e. risk of accidents and damages caused by accidents)* (very little…very much).
As a *road user (neighbor, company)* I think that the maintenance of the A20 improved *comfort (i.e. quality of the road surface, convenience of travelling)* (very little…very much).
As a *road user (neighbor, company)* I think that the maintenance of the A20 improved *emissions (i.e. noise, exhaust gases)* (very little…very much).
As a *road user (neighbor, company)* I think that the maintenance of the A20 improved *vehicle costs (i.e. car damages, fuel consumption)* (very little…very much).
As a *road user (neighbor, company)* I think that the maintenance of the A20 improved *visual quality (i.e. cleanliness)* (very little…very much).

Information expectation
As a *road user (neighbor, company)*I expect to be informed about the maintenance of the A20 (very little…very much).

Information experience
As a *road user (neighbor, company)*I was informed about the maintenance of the A20 (very little…very much).

Satisfaction
With the influence of the maintenance project on me I am (very dissatisfied…very satisfied).
With the improvements of the A20 after the maintenance I am (very dissatisfied…very satisfied).
With the extent of information I received about the maintenance of the A20 I am (very dissatisfied…very satisfied).
With the maintenance project of the A20 I am overall (very dissatisfied…very satisfied).