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Service Innovation Management
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Assignment 2: Part I & 2
Global Document Solutions (GLODOSOL) Case

Group 6

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Disclaimer: The answers to questions 1b, 2a and 2b are based on the first (non revised) analysis. Question 1a is adapted according to the revised analysis and question 3 is based on this revised analysis.

Question 1

Question 1a: Characteristics of GLODOSOL service engineers

The data was prepared for the regression analysis by combining the items of the studied variables. The investigated variables are formed by taking the weighted average of the measured items. These variables are computed according to the relevant survey questions which can be found in Appendix A. The regression analysis is used to analyze what characteristics of GLODOSOL service engineers influences idea generation, service quality, service speed and customer satisfaction. The strategy behind the analysis lies in the general framework for studying frontline employee performance which can be found in Appendix B. This framework is divided into different blocks: organizational actions, employee perceptions and attitudes, employee behavior, employee performance, and customer evaluations.

The analysis builds upon the direct relationship between two blocks that consists of two sub-blocks. The employee perceptions and attitudes and employee behavior were combined and treated as the independent variables of the study. Likewise, employee performance and customer evaluations were combined and analyzed as the dependent variables of the study. The updated model for the analysis is shown in Figure 1.

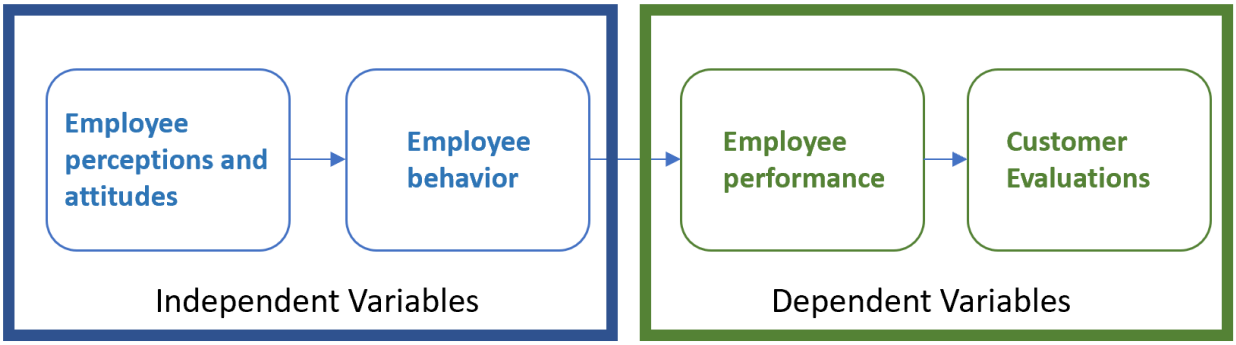

Figure 1. Updated model based on the general framework

There are two independent variables. Employee perceptions and attitude (consisting of service climate, self-efficacy and perceived autonomy) and employee behavior (consisting of customer oriented behavior, service delivery behavior and engagement). The two dependent variables are employee performance (which consists of ideas for improvement, speed and quality) and customer evaluations (which consist of customer satisfaction).

Dependent variable = Service Quality				
	Estimate	**Std. Error**	**t-value**	**p-value**
Intercept	68.029	6.264	10.861	0.000
Customer oriented behavior	4.702	1.346	3.493	0.001
Service delivery behavior	0.802	0.818	0.980	0.328
Engagement	2.800	1.223	2.289	0.023
Service climate	1.704	0.759	2.246	0.026
Self-efficacy	0.054	0.754	0.071	0.943
Perceived autonomy	0.430	0.725	0.593	0.553
Age	0.004	0.081	0.055	0.956
Tenure	0.050	0.060	0.833	0.405
Gender	-2.989	1.424	-2.100	0.037
R^2 = 0.239				

Table 1 - Regression analysis outputs for service quality

In table 1 it can be seen that customer oriented behavior, engagement, service climate, and gender are significant predictors of service quality ($p<0.05$). Customer oriented behavior has the most impact on the service quality ($\beta=4.702$) and high t-value of 3.493. Engagement has the second highest impact on service quality ($\beta=2.800$). Furthermore, the R^2 is 0.239, which means that 23.9% of the variation in the output variable (service quality) is explained by the input variables.

Dependent variable = Customer Satisfaction				
	Estimate	**Std. Error**	**t-value**	**p-value**
Intercept	-0.018	0.529	-0.034	0.973
Customer oriented behavior	0.245	0.114	2.151	0.032
Service delivery behavior	0.062	0.069	0.892	0.373
Engagement	0.361	0.103	3.493	0.001
Service climate	0.132	0.064	2.056	0.041
Self-efficacy	0.126	0.064	1.978	0.049
Perceived autonomy	0.041	0.061	0.669	0.504
Age	0.000	0.007	-0.020	0.984
Tenure	0.003	0.005	0.592	0.555
Gender	0.036	0.120	0.296	0.767
R^2 = 0.251				

Table 2 - Regression analysis outputs for customer satisfaction

Table 2 shows that engagement, customer-oriented behavior, service climate, and self-efficacy found out to be significant predictors of customer satisfaction ($p<0.05$). Engagement has the most impact on customer satisfaction ($\beta=0.361$) and a high t-value of 3.493, which is greater than 2 suggesting that we have confidence in this coefficient as a predictor. It is followed by customer-oriented behavior ($\beta=0.245$) and self-efficacy has the lowest impact on customer

satisfaction. Moreover, the R^2 of this model is 0.251 shows 25.1% of the variation in the dependent variable (customer satisfaction) is explained by the independent variables.

Dependent variable = Service Speed				
	Estimate	**Std. Error**	**t-value**	**p-value**
Intercept	95.079	6.456	14.728	0.000
Customer oriented behavior	-3.430	1.387	-2.473	0.014
Service delivery behavior	1.876	0.843	2.226	0.027
Engagement	-0.832	1.260	-0.660	0.510
Service climate	-0.320	0.782	-0.409	0.683
Self-efficacy	1.132	0.777	1.457	0.146
Perceived autonomy	0.228	0.747	0.305	0.761
Age	0.081	0.084	0.966	0.335
Tenure	0.173	0.062	2.773	0.006
Gender	-1.049	1.467	-0.715	0.475
R^2 = 0.073				

Table 3 - Regression analysis outputs for service speed

Table 3 highlights that customer oriented behavior, service delivery behavior and tenure are significant predictors of service quality ($p<0.05$). Customer oriented behavior has the most impact on the service quality. However, the beta value is negative (β=-3.430) indicating that the expected change of service speed will decrease if customer oriented behavior would increase. Moreover, the second highest impact is done by service delivery behavior (β=1.876). Additionally, in this model the R^2 is 0.073, which indicates that this model explains a lot of the response variability and that the independent variables are not explaining much in the variation of service speed.

Dependent variable = Idea Generation				
	Estimate	**Std. Error**	**t-value**	**p-value**
Intercept	-0.127	0.518	-0.246	0.806
Customer oriented behavior	0.330	0.111	2.968	0.003
Service delivery behavior	0.168	0.068	2.480	0.014
Engagement	0.228	0.101	2.255	0.025
Service climate	0.270	0.063	4.301	0.000
Self-efficacy	0.027	0.062	0.428	0.669
Perceived autonomy	-0.013	0.060	-0.209	0.835
Age	-0.002	0.007	-0.310	0.757
Tenure	0.002	0.005	0.454	0.650
Gender	0.081	0.118	0.688	0.492
R^2 = 0.316				

Table 4 - Regression analysis outputs for idea generation

Table 4 shows that customer-oriented behavior, service delivery behavior, engagement and service climate are found to be significant for predicting idea generation ($p<0.05$). Customer oriented behavior has the most impact on the idea generation ($\beta=0.330$ and t-value=2.968). This indicates high confidence in customer oriented behavior as a predictor of idea generation. The highest impact is followed by the service climate ($\beta=0.270$). Furthermore, R^2 of 0.316 indicates that 31.6% of the variation in the dependent variable (idea generation) is explained by the predicting variables.

Question 1b: Main effects that drive service characteristics

Idea generation

Frontline employees have a vital role in service innovation (Karlsson, 2018). Previous research has shown that the absence of frontline employee involvement can even result in services that mismatch the customer needs and are therefore unwanted (Ordanini and Parasuraman, 2011). Customers often have ideas on how to improve current services and processes based on their own experiences and needs regarding value creation (Karlsson, 2018). However, the customers' needs are often hard to capture due to them being latent, tacit or the customer not opening up about their needs (Matthing et al., 2004). In order to capture these needs and ideas, certain capabilities are needed within frontline employees.

McCabe (2012) describes extraversion as a personality trait of active people who are sociable, talkative, and assertive. Extraversion increases the level of intimacy with a customer and helps to determine the service need the employee was called in for (Beatty et al. 1996). Next to this, extraversion supports knowledge sourcing behavior by opening up the dialogue around the service provided (van der Heijden, 2013). As an example, van der Heijden (2013) states that "In a personal conversation, the customer tells the frontline employee that the room temperature fluctuates over the day. Combining this new information with existing knowledge leads the frontline employee to adjust a series of software settings, a hitherto unknown service routine". For the initiation of such a personal conversation, extraversion is needed. In order for frontline employees to participate in service innovation, they need frequent and personal interactions with their customers in order to uncover their latent needs and knowledge on how to improve the service. The trait of extraversion will help the employee to initiate conversation, build long lasting relationships and uncover the latent needs and knowledge (Ordanini & Parasuraman, 2011). Therefore, the following hypothesis can be composed:

H1a: Extraversion is positively related with idea generation

Similar to extraversion, customer oriented behavior positively impacts idea generation for service innovation by being a capability for uncovering and capturing latent customer needs and knowledge. Customer oriented behavior is defined as the ability of the employee to help customers, leading to customer satisfaction, a long lasting relationship, emotional commitment and retainment (de Araújo et al., 2013). In service delivery, capturing customer needs is especially important given the high level of employee-customer interaction. Lages (2013) states that the more the employee listens to customers to capture their needs, the more able they are to exchange ideas for service improvement with the organization (Lages & Piercy, 2013). Frontline employees carry out customer oriented behavior to satisfy customer needs and achieve customer satisfaction (Donavan, Brown, and Mowen, 2004). This behavior includes giving suggestions for improving the services and exchanging ideas with customers on how to solve problems

(Bettencourt and Brown, 2003). By carrying out these constructive behaviors, customer needs are satisfied and customer satisfaction is achieved (Lages & Piercy, 2013). Therefore, the following hypothesis can be composed:

H1b: Customer oriented behavior is positively related with idea generation

Quality

Service quality is a highly studied subject which is generally perceived as a multi-attribute construct (Kang & James, 2004). A famous instrument to measure service quality is the SERVQUAL model, which focuses on aspects of the service delivery process. However, many researchers argue that there are other factors that should also be considered while measuring service quality (Brady & Cronin, 2001). Therefore, researchers have turned to examining employee interaction with customers and its effect on perceived service quality. This behavior is defined by high interaction with the consumer, paying special attention to the needs and expectations of a customer, paying attention to details and developing a long term relationship with the customer (de Araújo et al., 2013). Executing this behavior leads to a high level of emotional commitment to the consumers and the retainment of these consumers. It allows the employee to anticipate the needs of the customers, meet their expectations and build on a long term relationship leading to gratification and thus perceived quality by the customer. Ultimately, it is shown that customer oriented behavior has positive effects on sales, quality perception by the customer, and customer satisfaction (de Araújo et al., 2013). These prior findings lead to the composition of the following hypothesis:

H1c: Customer oriented behavior is positively related with quality

The definition of employee engagement has been defined first by Kahn (1990) and is stated as follows: “the harnessing of organization members’ selves to their work roles; in engagement, people employ and express themselves physically, cognitively and emotionally during performance” (1990). Pantouvakis (2013) states that engaged employees tend to be more productive, provide better services, and thus, can enhance business profitability (Pantouvakis & Bourante, 2013). Next to that, engagement leads to a reduction in turnover and more customer oriented behavior (Wallace & Trinka, 2009). As discussed in H1c, this increase in customer oriented behavior, leads to improvement in the perceived quality by the customer. In order to further investigate this relationship, the following hypothesis is composed:

H1d: Engagement is positively related with quality

Customer satisfaction

According to Cain et al. (2018), employee engagement represents job satisfaction, involvement and enthusiasm for work. Job satisfaction is defined as: "a positive attitude or emotional state resulting from the appraisal of one's job or job experience" (Landy & Conte, 2013). Service employees with a higher level of job satisfaction are more likely to create a positive mood. Service employees and customers are emotionally linked during work interactions. Therefore, their attitudes and emotions tend to converge that affects the customers' experience and reactions leading to a positive impact on the level of customer satisfaction (Hur et al., 2015). Next to this, employees with a high level of job satisfaction are more likely to possess better performance motivation. This increased performance motivation results in better performance, leading to more satisfactory evaluations by customers (Hur et al., 2015). Therefore, employee job satisfaction exerts an important influence on customer satisfaction, because satisfied employees tend to be more productive, provide better services leading to a higher perceived service quality that affects customer satisfaction (Pantouvakis & Bourante, 2013). Therefore, the following hypothesis can be composed:

H1e: Engagement is positively related with customer satisfaction

Next to customer oriented behavior being the ability of a service provider to help customers (Choi & Joung, 2017), it also refers to specific behaviors by service providers during interactions with customers (Pimpakorn & Patterson, 2010). In service industries, the customer is the most critical external factor for the success of a business and therefore organizations should develop a customer-oriented strategy according to Tajeddini (2010). Frontline employees in the service industry deliver the service and are part of the service, looking from a customers' perspective, because customers often rely on employees' attitudes and behaviors when judging the quality of the service (Henning-Thurau, 2004). By displaying this behavior through high interaction, capturing the needs & expectations and developing a long term relationship with the consumer, employees are able to anticipate the needs of the customer and meet their expectations (de Araújo et al., 2013). Being enabled to meet the customers expectations through customer oriented behavior improves the overall customer satisfaction with a service. Consequently, this will lead into the following hypothesis:

H1f: Customer oriented behavior is positively related with customer satisfaction

Question 2

Question 2a: Ways for GLODOSOL management to stimulate desirable employee attitudes and behaviors

Similar to the reasoning in the first question, the general framework for studying frontline employee performance that is presented in Appendix B is used for the analysis of the influence of concrete actions/characteristics of the management on employee attitudes and behaviors. The framework indicates that organizational actions and employee perception and attitudes are the antecedents of employee behavior and employee performance. The following tables show the regression analysis outputs for the analysis of the effect of organizations actions and employee perceptions and attitudes to the employee behavior and employee performance.

Dependent variable = Customer oriented behavior				
	Estimate	**Std. Error**	**t-value**	**p-value**
Intercept	0.652	0.319	2.047	0.042
Perceived autonomy	0.082	0.032	2.528	0.012
Service climate	0.209	0.033	6.377	0.000
Transformational leadership	0.087	0.057	1.534	0.126
Customer dashboard	0.020	0.003	5.825	0.000
Customer participation	0.022	0.036	0.609	0.543
Customer relationship length	-0.003	0.005	-0.734	0.464
Tech support media richness	0.111	0.079	1.395	0.164
$R^2 = 0.337$				

Table 5 - Regression analysis outputs for customer oriented behavior

Table 5 shows that perceived autonomy, service climate and customer dashboard are significant predictors of customer oriented behavior ($p<0.05$). Service climate has the most impact on customer oriented behavior. The beta value is 0.209, which means that the expected change of service climate is 0.209 for an one unit change in the customer oriented behavior, while holding the other variables constant. In addition, t-value for service climate is relatively high (6.377), which provides an argument against null hypothesis. The R^2 value is 0.337 which indicates that 33.7% of the customer oriented behavior is explained by the independent variables.

Dependent variable = Service delivery behavior				
	Estimate	**Std. Error**	**t-value**	**p-value**
Intercept	0.370	0.529	0.699	0.485
Perceived autonomy	0.037	0.054	0.685	0.494
Service climate	0.313	0.055	5.735	0.000
Transformational leadership	0.214	0.094	2.283	0.023
Customer dashboard	0.001	0.006	0.213	0.832
Customer participation	0.044	0.059	0.741	0.459
Customer relationship length	-0.005	0.008	-0.663	0.508
Tech support media richness	0.286	0.132	2.172	0.031
R^2 = 0.186				

Table 6 - Regression analysis outputs for service delivery behavior

Additionally, Table 6 highlights that service climate, tech support media richness and transformational leadership found out to be significant for predicting service delivery behavior ($p<0.05$).The output illustrates that service climate has the most impact on the service delivery behavior. Service climate has a beta value of 0.313 with a high t-value (5.375) which illustrates a high confidence predicting service delivery behavior. Moreover, R^2 value of 0.186 indicates only 18.6% of the service delivery behavior is explained by the input variables in the analysis.

Dependent variable = Engagement				
	Estimate	**Std. Error**	**t-value**	**p-value**
Intercept	-0.395	0.342	-1.157	0.248
Perceived autonomy	0.087	0.035	2.524	0.012
Service climate	0.276	0.035	7.822	0.000
Transformational leadership	0.227	0.061	3.746	0.000
Customer dashboard	0.008	0.004	2.248	0.025
Customer participation	0.017	0.038	0.459	0.647
Customer relationship length	0.000	0.005	0.066	0.947
Tech support media richness	0.521	0.085	6.118	0.000
R^2 = 0.381				

Table 7 - Regression analysis outputs for engagement

Moreover, Table 7 illustrates that tech support media richness, service climate, perceived autonomy, transformational leadership and customer dashboard found out to be significant for predicting engagement ($p<0.05$).The output shows that tech support media richness has the most impact on the engagement. Tech support media richness has a beta value of 0.521 with a high t-value of 6.118, supporting the argument of being a strong predictor of engagement. The R^2 of 0.381 shows that 38.1 % of the variation in the engagement is explained by the investigated independent variables.

Dependent variable = Extraversion				
	Estimate	**Std. Error**	**t-value**	**p-value**
Intercept	0.956	0.608	1.573	0.117
Perceived autonomy	0.153	0.062	2.481	0.014
Service climate	0.264	0.063	4.217	0.000
Transformational leadership	0.246	0.108	2.281	0.023
Customer dashboard	0.000	0.007	0.050	0.960
Customer participation	0.049	0.068	0.726	0.469
Customer relationship length	-0.008	0.009	-0.870	0.385
Tech support media richness	-0.018	0.151	-0.117	0.907
R^2 = 0.165				

Table 8 - Regression analysis outputs for extraversion

Lastly, Table 8 shows that perceived autonomy, service climate, and transformational leadership found out to be significant for predicting extraversion ($p<0.05$).The output shows that service climate has the most impact on the extraversion. Service climate has a beta value of 0.264 and the t-value of service climate (4.217) is high enough to indicate a high reliability of the predictive power of the coefficient. Finally, the R^2 value of 0.165 illustrates that only 16.5% of the variation in extraversion constructs and since the value is not relatively high, the independent variables are not explaining enough variation in extraversion constructs.

Question 2b: Variables that drive engagement

Service climate is the basis of fundamental support for employees to perform their job effectively. According to Schneider et al. (1998) service climate refers to employee perceptions of the practices, procedures and behaviors that get rewarded and supported with regards to customer service and customer service quality. Employees feel obligated to meet performance expectations when they recognize that their work is supported and rewarded based on a psychological contract with the organizations towards its level of engagement (Macey et al., 2009). A psychological contract is based on the belief that a promise has been made and is an important source that affects the level of engagement of employees. In case of a strong psychological contract, employee attachment increases because employees feel obliged to give something in return for what they receive and are more (Ishtiaq & Zeb, 2020). In other words, when psychological needs (such as a psychological contract) are fulfilled, employees are more likely to invest time and energy and thus are more engaged in their work (Kang & Busser, 2018). Therefore, we hypothesize:

H2a: Service climate is positively related to engagement

According to Bass (1999), transformational leaders motivate their followers to perform beyond what is expected. Through the use of inspirational motivation and intellectual stimulation, transformational leaders are able to challenge employees to adopt different methods to deal with novel situations (Sosik, 2006). Moreover, transformational leadership focuses on coaching and mentoring their employees to prepare them to assume more responsibility and to become part of the overall organizational culture and environment (Datche & Mukulu, 2015; Sosik, 2006). Thus, with transformational leadership, workers are developed to take on greater responsibility and at the same time are provided the freedom to make increasingly larger contributions to organizational performance (Breevaart et al., 2013). The feeling of responsibility and involvement in the organization may lead to higher engagement of the employees. Therefore, we hypothesize:

H2b: Transformational leadership is positively related to engagement

Engineers can ask for second-line support when stumbling upon specific customer problems that cannot be solved. The second-line support will provide possible solutions using different forms of media and its level of richness. The concept of media richness is linked to the media richness theory (MRT) that possesses a set of objective characteristics that determine their capability to carry information regarding communication channels (Tseng et al., 2017). Furthermore, the theory focuses on different media platforms that achieve different levels of interaction richness for processing information and knowledge transfer (Hardwick & Anderson, 2019). As stated in Hardwick & Anderson (2017), MRT is also informed by the social presence theory (SPT), a critical factor influencing social effects on interaction, which states that non-verbal cues such as

facial expressions and body gestures determine the interaction quality. “Rich media platforms are more capable of conveying high social presences” (Hardwick & Anderson, 2017). Lakin (2005) identified social presence as a key driver for success of online collaboration. Moreover, Homer et al. (2008) argue that the process is more engaging if the information is presented in a way that increases social presence. These findings all point toward the idea that high tech support media richness is positively related to engagement, and thus, in order to increase employees’ engagement it might be interesting to increase tech support media richness. Therefore, the following hypothesis is created:

H2c: Tech support media richness is positively related to engagement

Question 3

In this section, the optimal solution service system for GLODOSOL will be engineered. It will be investigated how GLODOSOL can optimise innovation, service speed, service quality and customer satisfaction.

Method

To see whether relationships are strengthened or weakened by specific factors, it is necessary to explore moderating effects. The focus of this part of the paper will be on potential contingencies in the relationships between (1) service climate and engagement, (2) customer-oriented behavior and quality, (3) customer-oriented behavior and customer satisfaction. Each of these relationships will be tested on four potential interaction effects which are constructs from the service and marketing departments. These variables are Tech Support Media Richness, Customer Participation, Customer Dashboard, and Customer Relationship Length.

Prior to the analysis, the variables were grouped into blocks by referring to the updated model (Figure 1) based on the general framework in Appendix B. The variables are included in the blocks which are represented in Figure 2. Moreover, the investigated variables are analyzed by the predecessor blocks and those blocks are treated as the independent variables along with the demographic variables of the study (age, gender, tenure).

In the analysis, all the variables were standardized so that they have the same mean and standard deviation and throughout the analysis, standardized values were used. Then, new moderator variables are computed by the multiplication of the standardized independent variable of the investigated relationship and standardized moderator variable. Lastly, linear regression was performed with the dependent variable and all the standardized independent variables including the moderator, and the new moderator variable. Each moderator is analyzed separately in linear regression analysis.

To better interpret the significant effects of the interaction, visual plots were created using procedures from Dawson (2014) gained from the SPSS output. The visual plot that is used is a two-way linear interaction because a relationship between an independent variable and a dependent variable moderated by a third variable is tested. On the x-axis of the plot the independent variable is presented for both a high and a low value. The y-axis represents the dependent variable between a range of values. Furthermore, the moderator is tested for a high and a low value related to specific values of the independent variable and its relationship to the dependent variable. In abstract terms a high value indicates a situation where the variable/moderator is (strongly) present and a low value signifies a situation where the variable/moderator is very weakly or not present. According to the output of the regression analysis of the moderating effect, the plots are created and will be interpreted separately.

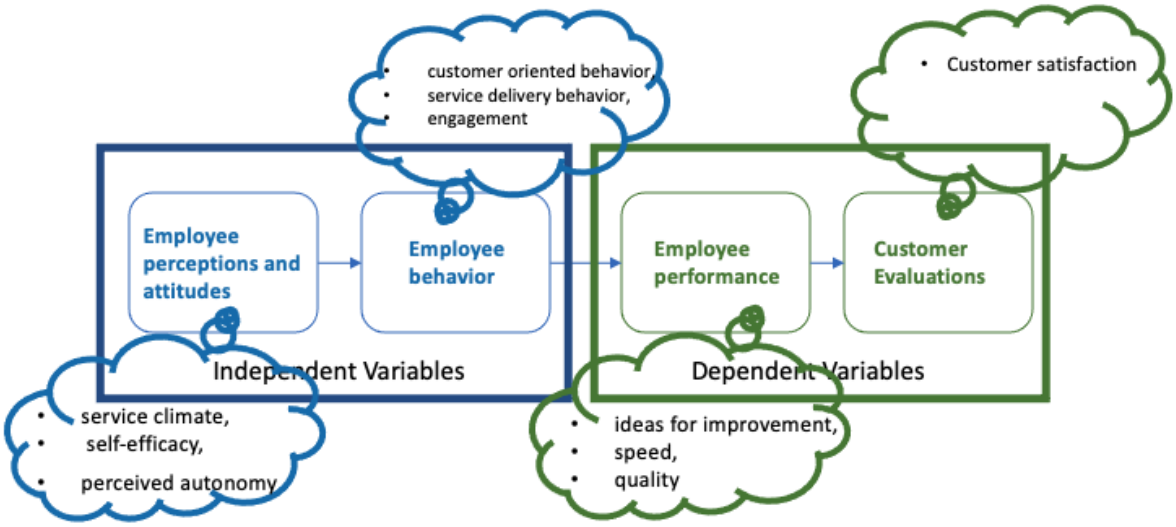

Figure 2. The variables included in different blocks

Moderator analysis

(1) Moderating effect of tech support media richness on the relationship between service climate and engagement

As discussed in hypothesis H2a above, service climate is hypothesized to be positively related to engagement. When psychological needs are fulfilled, employees are more likely to invest time and energy and thus are more engaged in their work (Kang & Busser, 2018). Elaborating on this, there might be factors that affect this relationship between service climate and engagement. Since this relationship is about the internal situation of GLODOSOL, customers are not involved. The construct Tech Support Media Richness is likely to interact with the relation between service climate and engagement since it indicates the average richness of support interaction between an employee and technology experts over the last 6 months and therefore plays a role in the internal communication at GLODOSOL. The description of the variables in the dataset shows that in a high service climate, employees are likely to be satisfied about, among others, the technology provided to employees to support the delivery of superior quality work (sc5 in Appendix A). The variable tech support media richness logically plays a role in determining the employees' satisfaction with the service climate since it is one of the resources provided to support employees. The direction of this interaction effect can be predicted by the suggestion that rich media platforms are more capable of conveying high social presences which are a key driver for success in online collaboration (Lakin, 2005). This could be an argument that suggests that tech support media richness positively interacts with this relationship, which led to the following hypothesis:

H3a: Tech support media richness positively moderates the relationship between service climate and engagement.

Table 9 shows the interaction effect of the moderator tech support media richness between the predictor service climate and the dependent variable engagement. The moderating effect shows a significant effect (p-value < 0.05) with a beta value of 0.084 and a t-value of 2.115. This is an indication that tech support media richness moderates the effect between self-efficacy and engagement. The adjusted R^2 is 0.343, which gives a higher value than the other models tested with different non-significant moderators (see Appendix C).

Dependent variable = Engagement				
	Estimate	**Std. Error**	**t-value**	**p-value**
Intercept	3.007	0.227	13.225	0.000
Gender	0.075	0.073	1.019	0.309
Age	-0.001	0.004	-0.290	0.772
Tenure	0.001	0.003	0.474	0.636
Moderator Tech support media richness	0.084	0.040	2.115	0.035
Tech support media richness	0.309	0.048	6.476	0.000
Service climate	0.362	0.042	8.718	0.000
Self-efficacy	0.100	0.038	2.650	0.009
Perceived autonomy	0.078	0.038	2.059	0.041
R^2 = 0.362				
Adjusted R^2 = 0.343				

Table 9 - Regression analysis output for engagement

As presented in figure 2 the line of high tech support media richness is slightly higher than the line of low tech support media richness. This means that when tech support media richness is present, the relationship between service climate and engagement is strengthened. This effect is stronger in case there is a high service climate and weaker for a low service climate. Therefore, as supported by regression analysis in Table 9, it can be concluded that tech support media richness positively moderates the relationship between service climate and engagement. This is in line with hypothesis 3a as constructed earlier.

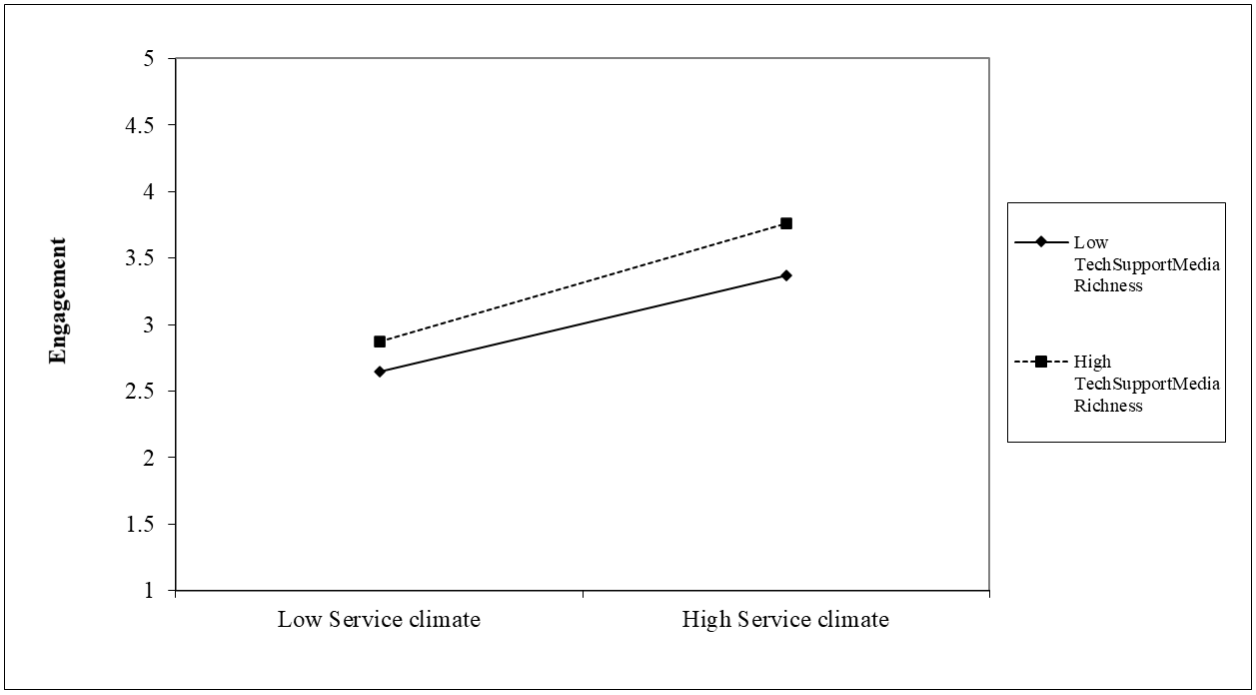

Figure 2 - Graph moderation effect of tech support media richness

(2) Moderating effect of customer participation between customer-oriented behavior and quality

As addressed in hypothesis H1c in question 1, customer oriented behavior is expected to be positively related to service quality.

Customer participation is defined as the willingness of customers to work together with service engineers to solve problems. As Jiang (2019) discusses, in most services production and consumption of the service delivery occur at the same time. Therefore, the customer must participate in the production and delivery of the services. Participating customers can save part of the working input that comes from the employees, which helps to reduce the workload of service employees and improve productivity and efficiency of the service delivery. Next to this, a customers' willingness to work together with the service employee makes the customer more likely to express their needs and expectations, making it easier for the employee to uncover and address these needs and expectations. This awareness of the customer's needs and expectations increases the ability to meet the customer's expectations and thus solve the problem. Combined with the increased productivity and efficiency, this results in higher perceived service quality. This leads to the following hypothesis:

H3b: Customer participation positively moderates the relationship between customer-oriented behavior and quality.

Table 10 shows the regression output between the predicting variables and the dependent variable service quality, and the moderating effect of customer participation. The interaction shows a significant effect (p-value < 0.05) with a beta value of 4.965 and a high t-value of 5.774. The adjusted R^2 is 0.298, which gives a higher value than the other models tested with different non-significant moderators. This is an indication that customer participation moderates the effect between customer-oriented behavior and service quality.

Dependent variable = Service quality				
	Estimate	**Std. Error**	**t-value**	**p-value**
Intercept	99.620	4.319	23.064	0.000
Gender	-2.907	1.356	-2.145	0.033
Age	-0.027	0.077	-0.345	0.730
Tenure	0.075	0.057	1.313	0.190
Service climate	1.759	0.816	2.156	0.031
Self-efficacy	0.138	0.723	0.191	0.848
Perceived autonomy	0.270	0.711	0.380	0.704
Customer oriented behavior	2.956	0.818	3.613	0.000
Service delivery behavior	0.712	0.743	0.958	0.339
Engagement	1.882	0.823	2.288	0.023
Moderator customer participation	4.965	0.860	5.774	0.000
Customer participation	2.162	0.699	3.094	0.002
R^2 = 0.327				
Adjusted R^2 = 0.298				

Table 10 - Regression analysis output for service quality

Figure 3 shows that high customer participation is located above the line of low customer participation. In other words, high customer participation is prefered in both situations of low and high customer-oriented behavior. So, when customer participation is present, the relationship between customer-oriented behavior and quality is strengthened by customer participation. Furthermore, this effect is stronger in a situation where customer-oriented behavior is high and is weaker for a situation where it is low. Therefore, as supported by regression analysis shown in Table 10, customer participation positively moderates the relation between customer-oriented behavior and quality (of the service). This finding is in line with hypothesis 3b.

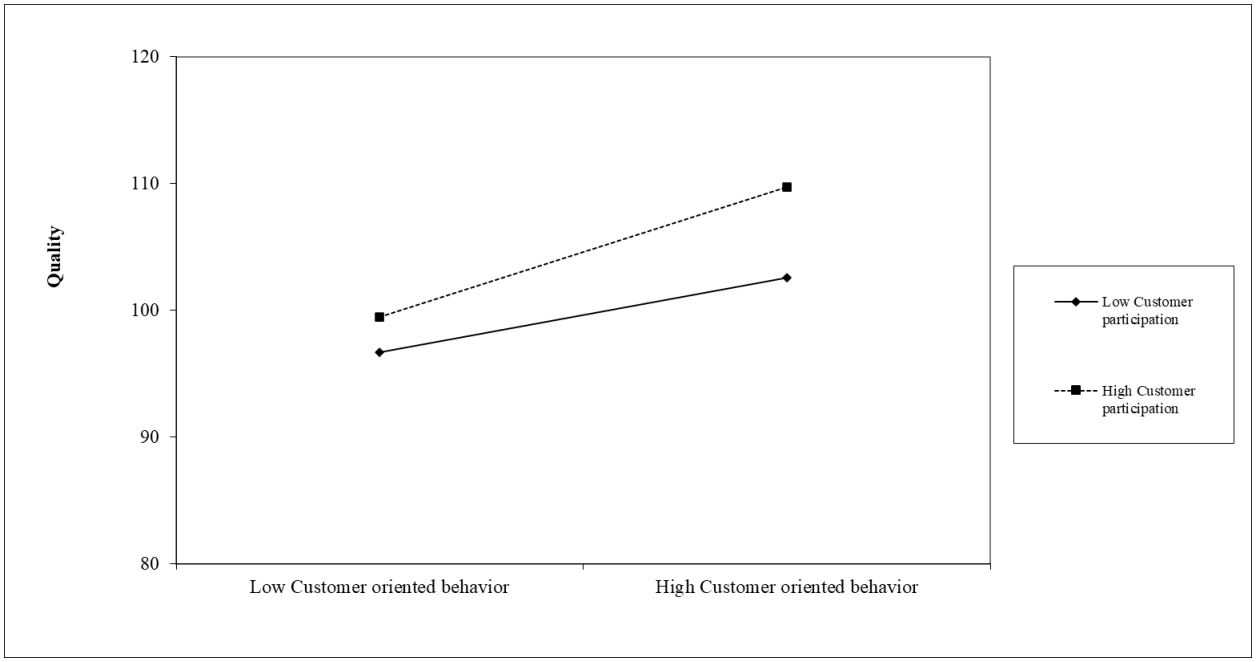

Figure 3 - Graph moderation effect of customer participation

(3) Moderating effect of customer dashboard between customer-oriented behavior and customer satisfaction

Customer-oriented behavior is the amount of help an engineer is willing to give in order to solve the customer problem and to achieve the goal by identifying customer needs (Appendix A). By displaying this behavior through high interaction with the consumer, capturing the needs and expectations of a customer and developing a long term relationship with the customer, employees are able to anticipate the needs of the customer and meet their expectations (de Araújo et al., 2013). Being enabled to meet the customers expectations through customer oriented behavior improves the overall customer satisfaction with a service. Customer dashboard is a percentage of customers that use smart technology offered by GLODODOL in order to show the customer real-time insights about the performance, bottlenecks and potential causes for failures. By having access to real-time information about their operation quality, customers become more aware of failures, downtime and inefficiency. Without a customer dashboard, a service employee would come to the customer to resolve a problem the customer might not even have been aware of. This is perceived as high service quality and thus satisfaction. The presence of a customer dashboard increases the possibility of the customer reporting the problem instead of the service employee detecting and displaying customer oriented behavior towards the problem. This decreases the perceived service quality and thus customer satisfaction, which leads to the following hypothesis:

H3c: Customer dashboard negatively moderates the relationship between

customer-oriented behavior and customer satisfaction.

Table 11 shows the regression output between the predictor customer oriented behavior and the dependent variable customer satisfaction, and the moderating effect of customer dashboard. The moderator shows a significant effect (p-value < 0.05) with a negative beta value of -0.158 and a high t-value of -5.190. The adjusted R^2 is 0.401, which gives a higher value than the other models tested with different non-significant moderators. This is an indication that customer dashboard negatively moderates the effect between customer-oriented behavior and customer satisfaction.

Dependent variable = Customer satisfaction				
	Estimate	**Std. Error**	**t-value**	**p-value**
Intercept	3.253	0.349	9.323	0.000
Gender	0.066	0.108	0.614	0.540
Age	-0.003	0.006	-0.446	0.656
Tenure	-0.002	0.005	-0.376	0.708
Service climate	0.070	0.067	1.047	0.296
Self-efficacy	0.089	0.057	1.553	0.122
Perceived autonomy	0.008	0.056	0.136	0.892
Customer oriented behavior	0.236	0.072	3.286	0.001
Service delivery behavior	-0.014	0.060	-0.235	0.815
Engagement	0.201	0.066	3.049	0.003
Idea generation	0.175	0.067	2.628	0.009
Service speed	0.157	0.058	2.681	0.008
Service quality	0.315	0.064	4.910	0.000
Customer dashboard	-0.480	0.092	-5.190	0.000
Moderator customer dashboard	-0.158	0.069	-2.296	0.022
R^2 = 0.432				
Adjusted R^2 = 0.401				

Table 11 - Regression analysis output for customer satisfaction

In Figure 4, the moderation effect of the variable customer dashboard is given. In comparison to the other two moderator analyses, there is one main difference. The line of the low customer dashboard is higher than the line of the high customer dashboard line. In other words, for the variable customer dashboard, a low value is preferred over a high value. So, a low value of customer dashboard ensures a higher customer satisfaction when there is both a low and high value of customer oriented behavior in comparison to the situation when there is a customer dashboard used. Thus, the moderator effect of the customer dashboard showed a weakened interaction between customer-oriented behavior and customer satisfaction. Therefore, as supported by regression analysis of the moderating effect, it can be concluded that the customer dashboard negatively moderates the relationship between customer-oriented behavior and customer satisfaction. This is in line with hypothesis 3c.

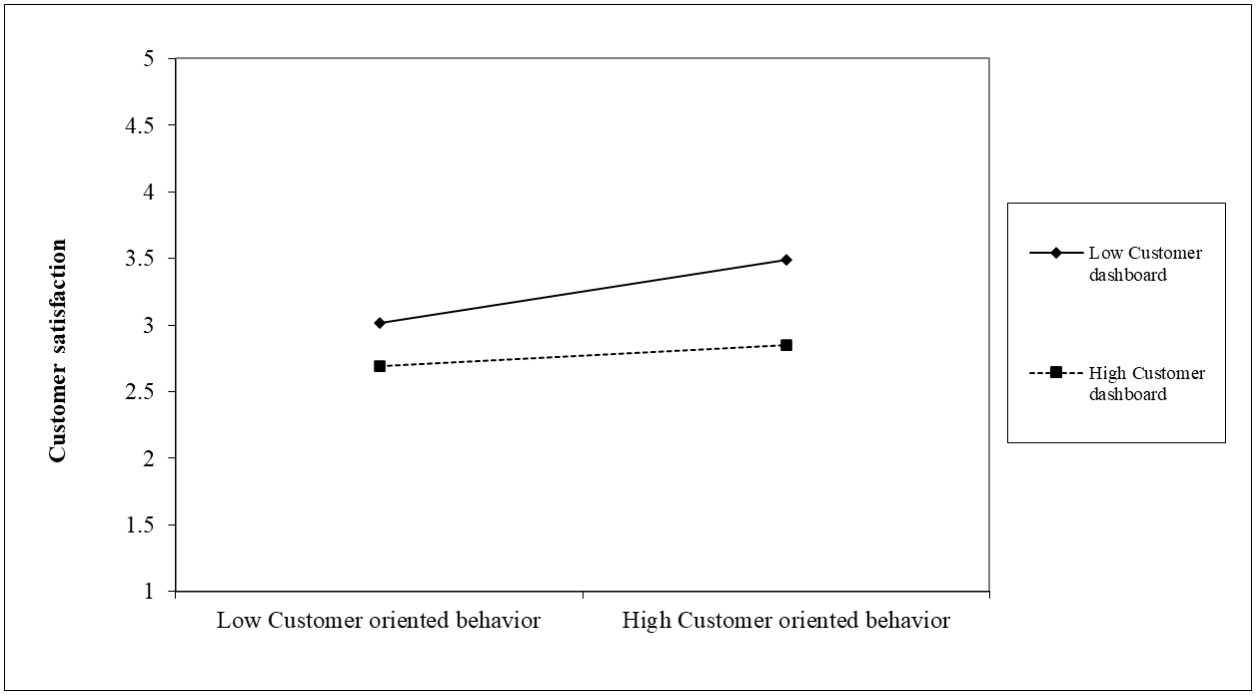

Figure 4 - Graph moderation effect of customer dashboard

Conclusion

Hypothesis 3a stated that tech support media richness positively moderates the relationship between service climate and engagement and the findings from the first moderator analysis are consistent with this hypothesis. The practical implication of the finding that tech support media richness positively moderates the relationship between service climate and engagement, is that in order for managers to increase the positive effect that a high service climate has on engagement, it is important to train the technology experts to offer more support to the engineers in the form of video calls and less in the form of emails.

The findings from the second moderator analysis are in line with hypothesis 3b, which stated that customer participation positively moderates the relationship between customer-oriented behavior and quality. This implies that in order to increase service quality, GLODOSOL could try to increase customer participation, since increasing their willingness to work together could have a positive effect on service quality. This increase could be obtained by for example shifting some of the small service activities and responsibilities onto the consumer, and acknowledging customer resources such as tangible resources, information, knowledge and their competencies. This way the customer can be considered a partial employee and thus co-producer of the service (Mustak et al., 2013). This potentially increases the feeling of shared production and goods and thus willingness to participate.

The findings from the last moderator analysis were consistent with hypothesis 3c, which stated that customer dashboard negatively moderates the relationship between customer-oriented behavior and customer satisfaction. A practical implication of this finding would be to suggest GLODOSOL to focus more on the improvements and the quality of the installed solution rather than the bottlenecks and potential causes for failure. This way GLODOSOL still allows customer real-time insights into the performance of the installed solution.

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Appendices

Appendix A - Survey

Items from the engineer survey

Customer oriented behaviour		
	During my service visits in the last 6 months …	
cob1	I try to get to discuss the customers' needs.	1 (never) to 5 (always)
cob2	I always have the customers' best interest in mind.	
cob3	I try to help the customers to achieve their goals.	
cob4	I do not consider myself to be very customer-oriented	

Service delivery behaviour		
	During my service visits in the last 6 months, how well were you, compared to your colleagues…	
sdb1	handling the responsibilities and daily demands of your work?	1 (not at all well) to 5 (very well)
sdb2	making the right decisions?	
sdb3	performing without mistakes?	
sdb4	Getting things done on time? (e.g., meeting deadlines)	

Self-efficacy		
se1	I am confident that I master the upcoming service jobs well.	1 (completely disagree) to 5 (completely agree)
se2	I have confidence in my ability to solve technical service issues.	
se3	I am convinced that I will do well in all service jobs.	

Engagement		
eng1	At my work, I feel bursting with energy.	1 (completely disagree) to 5 (completely agree)
eng2	At my job, I feel strong and vigorous.	
eng3	My job inspires me.	
eng4	I feel unhappy when I have to work intensively.	
eng5	I am immersed in my work.	

Perceived autonomy		
	My firm allows me to…	
pa1	work independently.	1 (completely disagree) to 5 (completely agree)
pa2	determine what happens in my work.	
pa3	have a lot of freedom to act in my job.	

Extraversion		
ev1	I am sociable	1 (completely disagree) to 5 (completely agree)
ev2	I am assertive and like talking to others	
ev3	I am very communicative and active	

Ideas for improvement		
	To what extent have you generated ideas in the last 6 months about the following?	
ideas1	New methods to achieve quality and efficiency goals.	1 (completely disagree) to 5 (completely agree)
ideas2	Ways to improve the company's service and accompanying products.	
ideas3	New work procedures.	

Transformational leadership		
tfl1	My manager is charismatic	1 (completely disagree) to 5 (completely agree)
tfl2	My manager does not consider my personal situation and treats me as a number	
tfl3	My manager challenges me to see things from different perspective.	
tfl4	My manager has an inspiring vision for my work.	

Service climate		
	How would you rate…	
sc1	the job knowledge and skills of employees in your business to deliver superior quality work and service?	1 (very poor) to 5 (excellent)
sc2	efforts to measure and track the quality of the work and service in your business?	
sc3	the recognition and rewards employees receive for the delivery of superior work and service?	
sc4	effectiveness of our communications efforts to both employees and customers?	
sc5	the tools, technology, and other resources provided to employees to support the delivery of superior quality work and service?	

Items from the customer survey

Customer satisfaction		
csat1	Overall, how satisfied or unsatisfied are you with GLODOSOL's services?	1 (very dissatisfied) to 5 (very satisfied)
csat2	To what degree does GLODOSOL's service fall short of or exceed your overall expectations?	1 (falls short of expectations) to 5 (exceeds expectations)
csat3	How close is the performance of GLODOSOL's to an ideas service performance?	1 (far from ideal) to 5 (very close to ideal)

Constructs from machine data

speed	Index that indicates the extent to which service jobs on this solution were completed slower or faster than the norm. The statistic comes in standardised values where 100 = the norm, lower values indicate that service jobs are on average slower than the norm, higher values indicate that service jobs are on average faster than the norm. Hence, higher values indicate faster service
quality	Index that indicates the extent to which service jobs led this solution to perform better or worse than the norm in terms of uptime, copy quality, bug reports, etcetera. The statistic comes in standardized values where 100 = the norm, lower values indicate that service jobs led to poorer quality than the norm, higher values indicate that service jobs led to better quality than the norm. Hence, higher values indicate higher quality.

Constructs from the personnel database

gender	Gender of the engineer; 0 = female, 1 = male
age	Age of the engineer in years
tenure	Months the engineer has been in this service function

Constructs from the service and marketing departments

Tech_support_media_richness	Whenever an engineer stumbles upon a problem that he/she cannot directly solve, he/she can ask for second-line support. This support consists of technology experts in the headquarters. Support is offered through different media that differ in richness. For instance, email (1) is a medium low in richness, because it does not allow the receiver to capture voice intonation or physical gestures. A phone call (2) is richer and a video call (3) is the most media rich option. This variable thus takes a number between 1 and 3, indicating the average richness of support internations between an employee and technology experts over the last 6 months.
Customer_participation	The service department rates each customer on their willingness to work together with service engineers to solve problems. Higher values indicate that customers are more actively participating in the service. This variable takes a number between 1 and 5, indicating the average participation of customers of a single employee over the last 6 months.
Customer_dashboard	Indicates the percentage of customers (of a single employee over the last 6 months) that may use the smart technology dashboard offered by GLODOSOL. This dashboard allows the customer real-time insights into the performance of the installed solutions, and thus provides insights into bottlenecks and potential causes for failures
Customer_relationship_length	Indicates the average length of the relationship between GLODOSOL and the customers of a single employee over the last 6 months. This variable is coded in years

Appendix B - General Framework

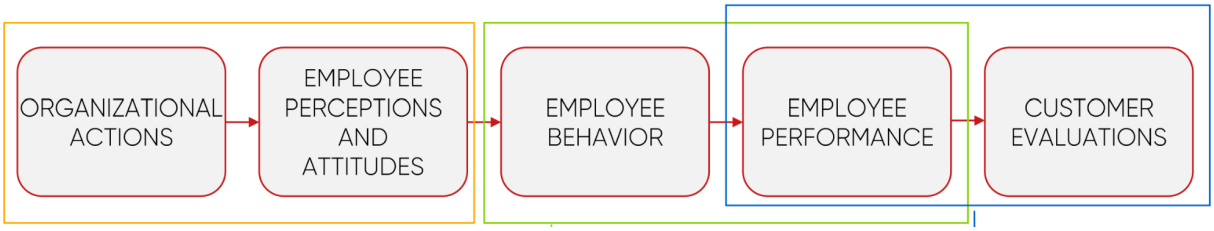

Figure 1: General Framework for Studying Frontline Employee Performance

Appendix C - Tables Moderation Effects

Effect on Engagement

Dependent variable = Engagement				
	Estimate	**Std. Error**	**t-value**	**p-value**
Intercept	2.842	0.246	11.575	0.000
Gender	-0.039	0.077	-0.503	0.615
Age	0.002	0.004	0.456	0.649
Tenure	0.003	0.003	0.843	0.400
Service climate	0.245	0.041	5.977	0.000
Self-efficacy	0.108	0.041	2.641	0.009
Perceived autonomy	0.135	0.040	3.396	0.001
Moderator customer participation	0.004	0.043	0.092	0.927
Customer participation	0.025	0.041	0.609	0.543
R^2 = 0.250				

Table C1 - Non-significant moderator customer participation

Dependent variable = Engagement				
	Estimate	**Std. Error**	**t-value**	**p-value**
Intercept	2.830	0.243	11.652	0.000
Gender	-0.019	0.076	-0.242	0.809
Age	0.002	0.004	0.455	0.650
Tenure	0.003	0.003	0.908	0.365
Service climate	0.233	0.041	5.651	0.000
Self-efficacy	0.102	0.041	2.516	0.012
Perceived autonomy	0.131	0.039	3.340	0.001
Customer dashboard	0.074	0.044	1.683	0.094
Moderator customer dashboard	-0.025	0.042	-0.600	0.549
R^2 = 0.264				

Table C2 - Non-significant moderator customer dashboard

Dependent variable = Engagement				
	Estimate	**Std. Error**	**t-value**	**p-value**
Intercept	2.842	0.245	11.583	0.000
Gender	-0.019	0.077	-0.456	0.649
Age	0.002	0.004	0.467	0.641
Tenure	0.003	0.003	0.817	0.415
Service climate	0.233	0.041	6.019	0.000
Self-efficacy	0.102	0.041	2.661	0.008
Perceived autonomy	0.131	0.040	3.418	0.001
Customer relationship length	0.074	0.038	-0.322	0.748
Moderator customer relationship length	0.007	0.038	0.181	0.857
R^2 = 0.250				

Table C3 - Non-significant moderator customer relationship length

Effect on Service quality

Dependent variable = Service quality				
	Estimate	**Std. Error**	**t-value**	**p-value**
Intercept	99.938	4.606	21.697	0.000
Gender	-2.714	1.452	-1.869	0.063
Age	-0.005	0.082	-0.065	0.948
Tenure	0.047	0.061	0.772	0.441
Service climate	2.439	0.995	2.450	0.015
Self-efficacy	0.066	0.769	0.086	0.931
Perceived autonomy	0.345	0.760	0.454	0.650
Customer oriented behavior	3.063	0.867	3.534	0.000
Service delivery behavior	0.674	0.794	0.850	0.396
Engagement	1.629	0.944	1.727	0.085
Moderator tech support media richness	0.203	0.754	0.269	0.788
Tech support media richness	0.938	0.927	1.012	0.312
R^2 = 0.243				

Table C4 - Non-significant moderator tech support media richness

Dependent variable = Service quality				
	Estimate	**Std. Error**	**t-value**	**p-value**
Intercept	99.430	4.666	21.308	0.000
Gender	-3.042	1.433	-2.124	0.035
Age	0.006	0.082	0.079	0.937
Tenure	0.049	0.061	0.805	0.422
Service climate	1.949	0.866	2.252	0.025
Self-efficacy	0.052	0.770	0.067	0.946
Perceived autonomy	0.444	0.758	0.586	0.558
Customer oriented behavior	3.122	0.941	3.318	0.001
Service delivery behavior	0.754	0.789	0.955	0.340
Engagement	2.007	0.874	2.296	0.022
Customer dashboard	-0.219	1.236	-0.177	0.859
Moderator customer dashboard	0.144	0.925	0.156	0.876
R^2 = 0.240				

Table C5 - Non-significant moderator customer dashboard

Dependent variable = Service quality				
	Estimate	**Std. Error**	**t-value**	**p-value**
Intercept	99.373	4.563	21.777	0.000
Gender	-3.110	1.422	-2.187	0.030
Age	0.015	0.081	0.185	0.854
Tenure	0.043	0.060	0.716	0.475
Service climate	1.883	0.862	2.185	0.030
Self-efficacy	-0.058	0.768	-0.075	0.940
Perceived autonomy	0.433	0.750	0.578	0.564
Customer oriented behavior	3.123	0.869	3.595	0.000
Service delivery behavior	0.837	0.785	1.066	0.288
Engagement	1.977	0.869	2.275	0.024
Customer relationship length	1.278	0.710	1.799	0.073
Moderator customer relationship length	0.071	0.685	0.103	0.918
R^2 = 0.249				

Table C6 - Non-significant moderator customer relationship length

Effect on Customer satisfaction

Dependent variable = Customer satisfaction				
	Estimate	**Std. Error**	**t-value**	**p-value**
Intercept	3.100	0.369	8.410	0.000
Gender	0.115	0.116	0.987	0.325
Age	-0.001	0.007	-0.221	0.825
Tenure	-0.002	0.005	-0.326	0.745
Service climate	0.053	0.081	0.651	0.515
Self-efficacy	0.101	0.061	1.650	0.100
Perceived autonomy	0.030	0.060	0.495	0.621
Customer oriented behavior	0.079	0.071	1.120	0.264
Service delivery behavior	-0.021	0.065	-0.317	0.751
Engagement	0.184	0.076	2.440	0.015
Idea generation	0.212	0.071	2.990	0.003
Service speed	0.203	0.062	3.76	0.001
Service quality	0.329	0.068	4.822	0.000
Tech support media richness	0.005	0.074	0.065	0.948
Moderator tech support media richness	-0.021	0.060	-0.356	0.722
R^2 = 0.355				

Table C7 - Non-significant moderator tech support media richness

Dependent variable = Customer satisfaction				
	Estimate	**Std. Error**	**t-value**	**p-value**
Intercept	3.100	0.365	8.499	0.000
Gender	0.093	0.115	0.813	0.417
Age	-0.001	0.006	-0.158	0.875
Tenure	-0.002	0.005	-0.323	0.747
Service climate	0.053	0.071	0.747	0.456
Self-efficacy	0.100	0.061	1.650	0.100
Perceived autonomy	0.034	0.059	0.574	0.566
Customer oriented behavior	0.070	0.071	0.987	0.325
Service delivery behavior	-0.027	0.064	-0.416	0.678
Engagement	0.187	0.070	2.678	0.008
Idea generation	0.215	0.071	3.051	0.003
Service speed	0.210	0.062	3.395	0.001
Service quality	0.336	0.073	4.628	0.000
Customer participation	-0.029	0.077	-0.371	0.711
Moderator customer participation	-0.082	0.060	-1.364	0.174
R^2 = 0.360				

Table C8 - Non-significant moderator customer participation