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ANALYSIS AND MUTUAL IMPACT OF DIGITAL SERVICES QUALITY ELEMENTS

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Abstract: *If there is a wish to attract new users and keep the existing stay, it is necessary to analyze the mutual impact of the elements on digital service quality. To date, numerous authors have conducted various empirical research studies. This study deals with the interstitial influences including reliability, responsiveness, and empathy. This research study has gone a step forward. It is aimed at determining how reliability and responsiveness, both individually and taken together, affect empathy in the Republic of Serbia on a projected sample of 458 small and medium enterprises, namely the manufacturing, service, and ICT activities. On the applied theoretical model, empirical research was conducted: descriptive statistics, correlation analysis and regression analysis, the impact of the independent elements on the dependent element. This research study is intended to help to understand the interdependence and degree of the influence present between said elements; this can provide help to SME owners and their managers with respect to the development of marketing strategies and good business practices in the digital age.*
Keywords: *digital services, reliability, responsiveness, empathy, correlation, regression, service quality*

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1. Introduction

Thanks to the World Wide Web (WEB), which has altered the model of communication from that including a single respondent to that implying multiple respondents, users can establish a contact with service providers in a quicker and easier manner through novel communication channels and make imperative interpersonal respondent collaboration. There is a need for integrated marketing, which involves the harmonization of all the activities carried out in marketing so as to maximize as much as possible individual and collective amenities, according to (Brzaković et al., 2019; Brzaković et al., 2021). The use of modern strategies in (e.g. digital) marketing allows companies to differentiate themselves from their competitors and gain long-term competitive advantage. To survive on the market, companies must continuously improve the quality of the services they render tot their clients and their relationships with

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those using those services. Therefore, it is possible to describe marketing as a cost-effective management of consumer relations, according to (Kotler & Armstrong, 2014). However, it should be noted that research into the impact of the elements of digital marketing on the quality of the service useful to the SME sector has left a void so far. This topic has not been explored enough. The largest number of the studies carried out so far have been based upon researching the elements of service quality, such as reliability – the ability to provide the promised service reliably and accurately; sensitivity – willingness to help consumers and render a service quickly, and empathy – the care, the individual attention the company provides to its customers, according to (Danjum & Rasli, 2012). This research seeks to identify the links between the different dimensions of the perceived service quality in the small and medium-sized enterprises sector by observing the different digital marketing elements and the extent to which the same contribute to customer satisfaction. Based on the SMEs and Entrepreneurship Report for 2018, prepared in May 2020 (Ministry of the Economy of the Republic of Serbia, 2021), the SME sector is a segment of the Serbian economy which is deemed to be extremely important in the year 2018. In 2014, the sector included as much as 99.9 percent of the actively operating businesses, employing nearly 2/3 of its employees in the nonfinancial sector. Determining the relationship between different elements of service quality (reliability, sensitivity, and empathy) is subject to research and the goals related to the extent to which the elements of reliability and sensitivity (as service quality elements) do influence empathy. The research study before you should enable an understanding of the interdependence and degree of the impact between these elements, which may be helpful to the managers of small and medium-sized enterprises in their efforts to create corporate plans and strategies, as well as and corporate resource allocation.

This research is based on the selected dimensions of service quality. Due to the fact that there are many elements on which service quality depends, it was impossible to have all those dimensions included herein. this, however, leaves room for a future further analysis of these factors. Even though this study points to the perceived interdependence between some elements of service quality, plenty of room can still be found for this research field to expand to other issues, especially given rapidly changing methods and strategies in modern marketing practice.

2. Literature Review

Service quality represents a concept that has been accepted with a great interest and has been discussed in the research literature. No consensus on the manner how to define and measure it has been reached, either, according to (Wisniewski, 2001). Service quality can be defined in different ways. Typically, the definitions refer to the extent to which services meet customer needs or customer expectations, as in (Dotchin & Oakland, 1994; Asubonteng et al., 1996). One definition of service quality also refers to the difference between the expectations on the customer's part and the perception of the rendered service; if customer expectations are greater than performance, then the perceived quality is all but satisfactory, leading to customer dissatisfaction, according to (Lewis & Mitchell, 1990).

Quality services are defined by the ten dimensions (the SERVQUAL model), according to (Parasuraman, et al., 1985). The same group of authors (Parasuraman, et al., 1988) reduced the ten dimensions to as few as five a few years later. The reduced dimensions are reliability, assurance, tangibles, empathy, and responsiveness. Exploring the service quality impact on SERVQUAL measurement scale user satisfaction and their loyalty has been a topic addressed by many other scientists, namely (Lehtinen & Lehtinen, 1991; Furrer et al., 2000; Grönroos, 2001;

Arts et al., 2011; Chou et al., 2014; Boon-Itt- 2015; Fernandes & Pedroso, 2017). Notwithstanding the fact that the SERVQUAL model was originally developed to measure the commercial companies' service quality, its use was then extended to other areas such as banking services, IT, telecommunications services, airline services, and so on, according to (Berry, 1986).

The study examines the impact of elements of the service quality dimensions and how reliability affects empathy, how empathy affects empathy, and how reliability and empathy together affect empathy. A quality dimension is one of the most essential elements in defining modern companies' business strategies, as in (Karabasevic et al., 2020).

3. Theoretical Research Model

For the research purposes in this paper, a theoretical research model was designed. The original theoretical research model (*Figure 1*) consists of the "empathy" dependent variable and the "reliability" and "responsiveness" independent variables.

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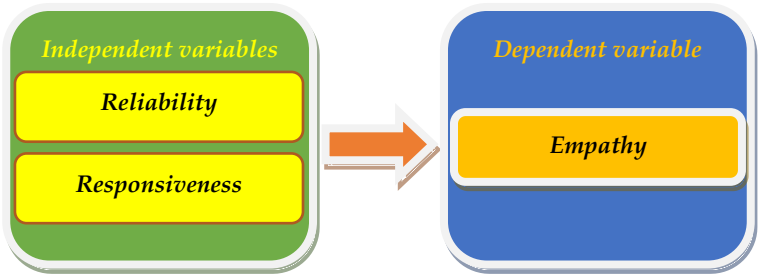


Figure 1. The theoretical research model
Source: Authors

The initial system model elaboration formed a new subsystem theoretical model and (*Figures 2, 3 and 4*) made up of the nondependent succulents: reliability and responsiveness, and the dependent empathy variables.

a) The reliability and empathy subsystem models (*Figure 2*).

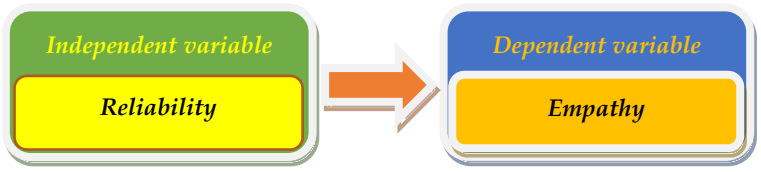


Figure 2. The reliability and empathy subsystem model
Source: Authors

b) The responsiveness and empathy subsystem models (*Figure 3*).

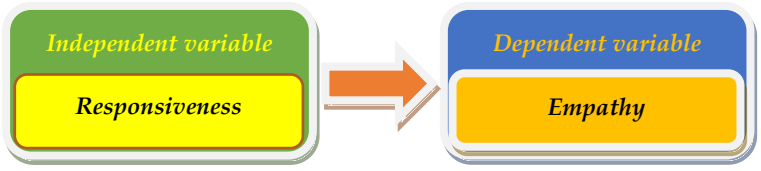


Figure 3. The responsiveness and empathy subsystem model
Source: Authors

c) The reliability, responsiveness, and empathy subsystem models (*Figure 4*).

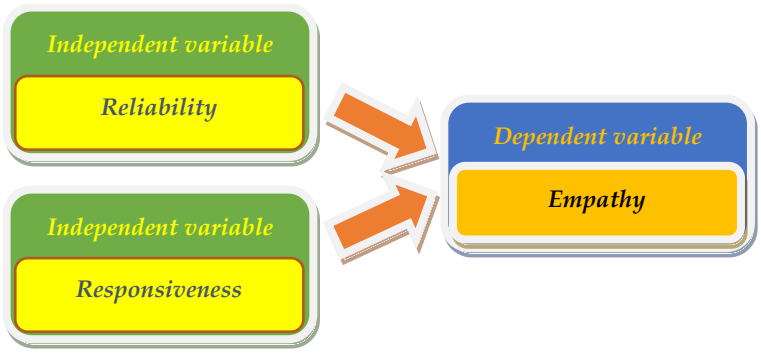


Figure 4. The reliability, responsiveness, and empathy subsystem model
Source: Authors

4. Research Methodology

In the empirical section of the paper, the e-technique-based polling method was used. The processing of the results obtained by the empirical statistical research was performed in accordance with the following mathematical and statistical methods: descriptive statistics, correlational analysis, regression analysis, linear regression, the ANOVA test and multiple linear correlation and regression analysis. The data collected were processed and displayed as a text, table, and graphic. The SAS JMP v. 16 statistical software was used.

4.1. Research tasks

The research tasks to do are as follows:

a) determine whether the level of reliability affects the level of empathy in small and medium-sized enterprises or not;

b) determine whether the level of empathy affects the level of empathy in small and medium-sized enterprises or not, and

c) determine whether the levels of reliability and responsiveness affect the level of empathy in small and medium-sized enterprises or not.

4.2. Research hypotheses

The following research hypotheses were formed:

H_{01}: The reliability level affects the level of empathy in the small and medium-sized enterprises.

H_{02}: The responsiveness level affects the level of empathy in the small and medium-sized enterprises.

H_0: The reliability and responsiveness levels affect the level of empathy in small and medium-sized enterprises.

5. Empirical Research

In the empirical section of the paper, the e-technique-based polling method was used. The processing of the results obtained by the empirical statistical research was performed in accordance with the following mathematical and statistical methods: descriptive statistics, correlational analysis, regression analysis, linear regression, the ANOVA test and multiple

linear correlation and regression analysis. The data collected were processed and displayed as a text, table, and graphic. The SAS JMP v. 16 statistical software was used.

5.1. The respondent profile basic analysis

An e-questionnaire was used in the paper, in which assertions with possible attitudes were made (defined in the following manner: 1 – I completely disagree, 2 – I disagree, 3 – I cannot decide, 4 – I agree, and 5 – I fully agree). The fundamental statistical indicators pertaining to the structure of the 458 samples subjected to observation, the frequencies and the percentage representation of the respondents expressed at different levels: according to the company's basic activity (manufacturing and services, and ICT), according to the respondents' respective positions in the company (the owner, a director/manager), are shown in *Table 1*. The survey sample included 458 respondents. Most respondents were from the manufacturing industry (228), which accounts for 49.34% of the total number of the respondents, whereas the largest number of the respondents were in the positions of company owners (235), which accounts for 51.31% of the total number of the respondents.

Table 1. The frequency and the percentage representation of the respondents according to the different levels

Level	Sub-Level	Size	Probability	Total
The company's basic activities	**Manufacturing**	226	0.49345	458
	Services	128	0.27948	
	ICT	104	0.22707	
The respondents' positions in the company	**Owner**	235	0.51310	
	Director/Manager	223	0.48690	

Source: Authors

In order to analyze and display it in an easier fashion, the *reliability* level is marked below with a the letter *(A)* with the following assertions (*Table 2*):

- A_1 – Products and services are delivered at the agreed time.
- A_2 – Products and services are of a high quality.
- A_3 – The information given to customers is correct.
- A_4 – The management and the employees have a necessary expertise.

Table 2. The name and assertion values for the reliability level

	Mean	Standard Deviation
A_1	3.68	1.03
A_2	3.97	0.93
A_3	3.90	1.09
A_4	3.87	1.16

Source: Authors

The *responsiveness* level below is the letter *(B)* with the following assertions (*Table 3*):

- B_1 – Customers receive all the necessary information about products/services.
- B_2 – There is willingness to meet user demands.
- B_3 – There is an interaction between the bidder and the user of a product/service.
- B_4 – There is readiness to improve products/services.
- B_5 – The management encourages the employees' improvement in order to improve the quality of products/services.

Table 3. The name and assertion values for the responsiveness level

	Mean	Standard Deviation
B_1	3.83	0.94
B_2	3.75	0.98
B_3	3.94	0.92
B_4	3.85	1.07
B_5	3.78	1.13

Source: Authors

The *empathy* level below is the letter *(C)* with the following assertions (*Table 4.*):

- C_1 – Customers buying products and service users are respected.
- C_2 – A satisfied customer is one of the most important business goals.
- C_3 – Respecting the professional code of conduct is one of the priorities.

Table 4. The name and assertion values for the empathy level

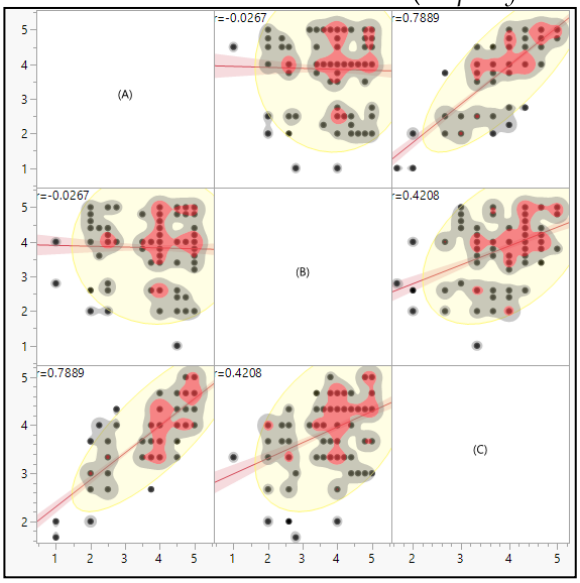
	Mean	Standard Deviation
C_1	4.00	0.96
C_2	3.81	1.05
C_3	3.90	1.14

Source: Authors

5.2. Correlation analysis

In *Table 5*, the correlation coefficient size is presented. The largest evident correlation is the one between the independent element (A) and the dependent element (C), being 0.7889. The smallest-size correlation is evident between the independent elements (A) and (B). It is but slight, totaling -0.0267. The biggest influence on the dependent element (C) is that made by the independent element (A) at 0.800703 or 80.07%, whereas the smallest influence is that of the the independent element (B) at 0.442175 or 44.21%.

Table 5. The system model correlation coefficients (*Empathy Sensitivity Reliability*)



Source: Authors

5.3. Regression analysis for the *reliability* and *empathy* variables

In Figure 5, the *reliability* and *empathy* theoretical system model consisting of the independent element (A) and the dependent element (C) is presented.

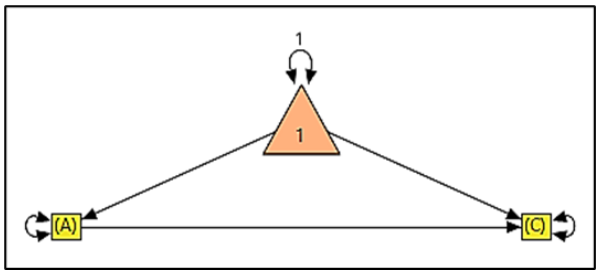


Figure 5. The *reliability* and *empathy* theoretical system model
Source: Authors

Figure 6 below accounts for the system model basic standard evaluation, with the determination ratio 0.622384. Accordingly, the dependent element (C) can be explained by the independent element (A) with 62.23%, based upon which a conclusion can be drawn that there is a 0.7889134 correlation coefficient between these two elements and that they strongly correlated (i.e. they are strongly interconnected). The mean for the independent element (A) is 3.9421735.

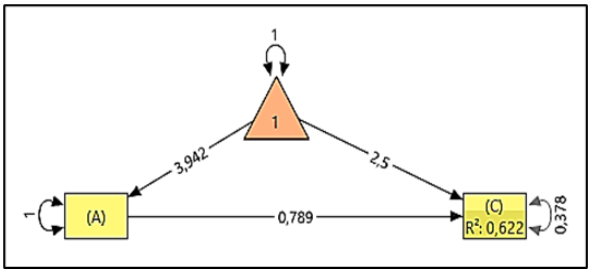


Figure 6. The standard contribution sizes of the *reliability* and *empathy* system model
Source: Authors

The standard contribution values are presented in detail in *Table 6*.

Table 6. The contribution standard values

Mean/Intercept	Size	standard error	Wald Z	Rehearsal>| Z|
Constant → (reliability)	3.9421735	0.1383809	28.487846	<0.0001
Constant → (empathy)	2.5000476	0.1824342	13.703835	<.0.0001
Regression	**Size**	**standard error**	**Wald Z**	**Rehearsal>| Z|**
(reliability) → (empathy)	0.7889134	0.0176448	44.71076	<0.0001
Variance	**Size**	**standard error**	**Wald Z**	**Rehearsal>| Z|**
(reliability) ↔ reliability	1	4.219e-17	2.37e+16	<0.0001
(empathy) ↔ empathy	0.3776157	0.0278405	13.563551	<0.0001

Source: Authors

The statistical significance score is given in T*able 7* (ANOVA) and is [F(1,456)=751.5770, p<0.0001].

Table 7. ANOVA

Source	DF	Sum of squares	Square mean	F Ratio
Model	1	138.29268	138.293	751.5770
Error	456	83.90552	0.184	**Prob > F**
C. Total	457	222.19820		<0.0001

Source: Authors

According to Figure 7, the nonstandard contribution sizes were made for the system model. The average rating for the independent element (A) is 3.8591703. The variance size for the independent element (A) is 0.9583329, and the variance for the dependent element (C) is 0.1831998.

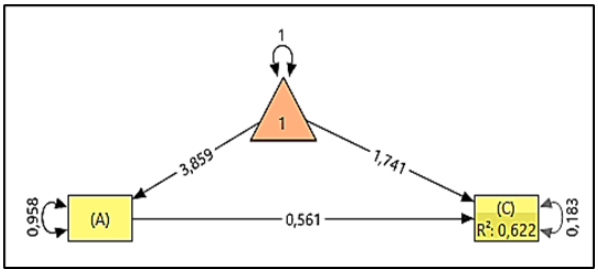


Figure 7. The nonstandard sizes of the *reliability* and *empathy* system model contributions
Source: Authors

The nonstandard contribution values are given in detail in *Table 8*.

Table 8. The nonstandard contribution values

Mean/Intercept	Size	standard error	Wald Z	Rehearsal>| Z|
Constant → (reliability)	3.8591703	0.0457431	84.366198	<0.0001
Constant → (empathy)	1.741349	0.0813406	21.408126	<0.0001
Regression	**Size**	**standard error**	**Wald Z**	**Rehearsal>| Z|**
(reliability) → (empathy)	0.5613176	0.0204302	27.474959	<0.0001
Variance	**Size**	**standard error**	**Wald Z**	**Rehearsal>| Z|**
(reliability) ↔ reliability	0.9583329	0.0633284	15.132746	<0.0001
(empathy) ↔ empathy	0.1831998	0.0121062	15.132746	<0.0001

Source: Authors

Based upon this data, the first secondary hypothesis ***H*$_{01}$*: The reliability level affects the level of empathy in small and medium-sized enterprises***. is confirmed in that an increase in reliability leads to an increase in empathy.

Based on the presented data, the multiple regression equations (*the formulas 1 and 2*) can also be formed, reading as follows:

$$y=1.741349+0.5613176 \cdot x_1 \quad (1)$$

$$empathy=1.741349+0.5613176 \cdot reliability \quad (2)$$

Figure 8 is given as a multi-regression equation diagram for the *reliability* and *empathy* variables.

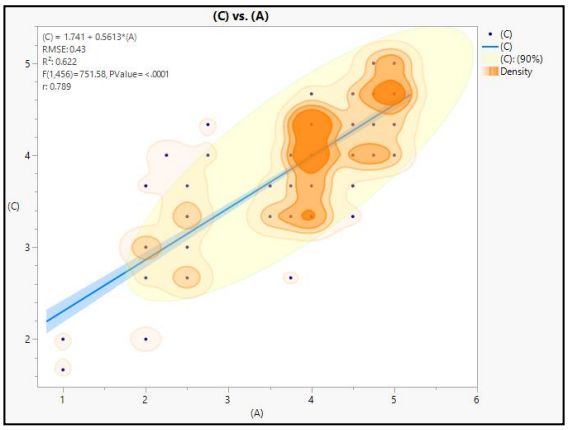


Figure 8. The regression equation diagram for the *reliability* and *empathy* variables
Source: Authors

5.4. Regression analysis for the *responsiveness* and *empathy* variables

In figure 9, the *responsiveness* and *empathy* theoretical system model consisting of the independent element (B) and the dependent element (C).

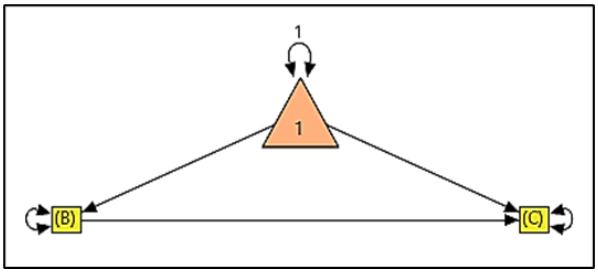


Figure 9. The *responsiveness* and *empathy* theoretical system model
Source: Authors

Figure 10 shows the performed system model basic standard evaluation, with the determination ratio 0.180154, which means that the dependent element (C) can be explained by the independent element (B) at 18.01%. Based upon said, a conclusion can be drawn that there is a 0.4244457 correlation coefficient between the independent element (B) and the dependent element (C), which reveals a relatively weak correlation between the two elements, i.e. the two elements are relatively weakly interconnected. The mean for the independent element (B) is 4.2335885.

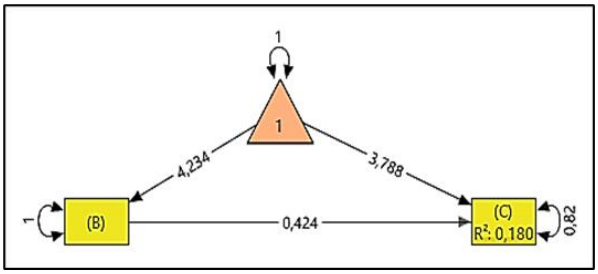


Figure 10. The standard contribution sizes of the *responsiveness* and *empathy* system model
Source: Authors

The standard contribution values are given in detail in *Table 9*.

Table 9. The contribution standard values

Mean/Intercept	Size	standard error	Wald Z	Rehearsal>| Z|
Constant →	4.2335885	0.1492834	28.359402	<0.0001
Constant → (empathy)	3.787623	0.2751737	13.76448	<0.0001
Regression	**Size**	**standard error**	**Wald Z**	**Rehearsal>| Z|**
(responsiveness) → (empathy)	0.4244457	0.0387774	10.945705	<0.0001
Variance	**Size**	**standard error**	**Wald Z**	**Rehearsal>| Z|**
(responsiveness) ↔ responsiveness	1	3,645e-17	2.744e+16	<0.0001
(empathy) ↔ **empathy**	0.8198458	0.0329178	24.905863	<0.0001

Source: Authors

The statistical significance score is given in *Table 10* (ANOVA), and is [F(1,456)=98.1339, p<0.0001].

Table 10. ANOVA

Source	DF	Sum of squares	Square mean	F Ratio
Model	1	39.35001	39.3500	98.1339
Error	456	182.84819	0.4010	**Prob > F**
C. Total	457	222.19820		<0.0001

Source: Authors

In *Figure 11*, nonstandard contribution sizes were made for the system model. The rating mean for the independent element (B) is 3.8290828. The variance size for the independent element (B) is 0.8180356, and the variance for the dependent element (C) is 0.4013845.

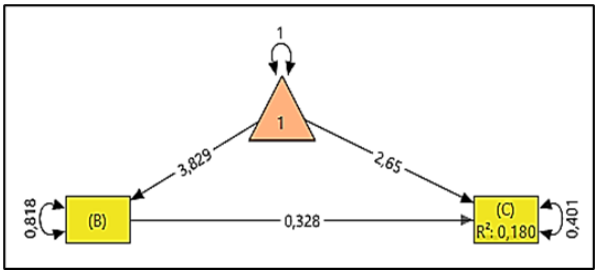


Figure 11. The nonstandard sizes of the *responsiveness* and *empathy* system model contribution
Source: Authors

The nonstandard contribution values are accounted for in detail in *Table 11*.

Table 11. The contribution standard values

Mean/Intercept	Size	standard error	Wald Z	Rehearsal>| Z|
Constant →	3.8290828	0.0427792	89.508114	<0.0001
Constant → (empathy)	2.650214	0.1303541	20.330886	<0.0001
Regression	**Size**	**standard error**	**Wald Z**	**Rehearsal>| Z|**
(responsiveness) → (empathy)	0.32836	0.0331314	9.9108259	<0.0001
Variance	**Size**	**standard error**	**Wald Z**	**Rehearsal>| Z|**
(responsiveness) ↔ responsiveness	0.8180356	0.0547184	14.949916	<0.0001
(empathy) ↔ **empathy**	0.4013845	0.0268486	14.949916	<0.0001

Source: Authors

Based upon this data, the third auxiliary hypothesis ***H02: The responsiveness level affects the level of empathy in small and medium-sized enterprises***. is confirmed since an increase in empathy also increases empathy.

Based upon the presented data, a multiple regression equation (*the formulas 3 and 4*) can also be formed, reading as follows:

$$y=2.650214+0.32836 \cdot x_2 \tag{3}$$

$$empathy=2.650214+0.32836 \cdot responsiveness \tag{4}$$

Figure 12 shows a multi-regression equation diagram for the responsiveness and empathy variables.

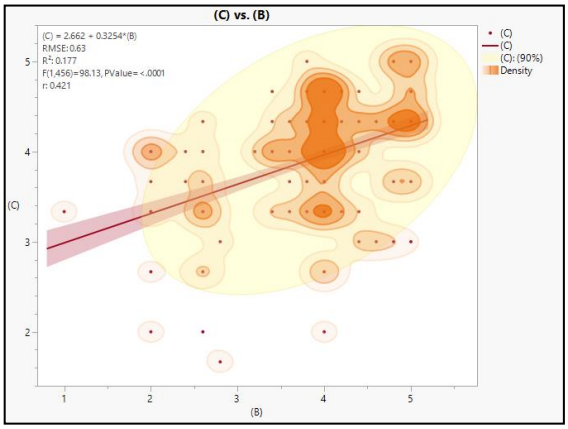


Figure 12. The regression equation diagram for the *responsiveness and empathy* variables
Source: Authors

5.5. Multiple regression analysis for the *reliability, responsiveness* and *empathy* variables

Figure 13 shows the reliability, responsiveness and empathy theoretical system model, which consists of the independent elements (A) and (B) and the dependent element (C).

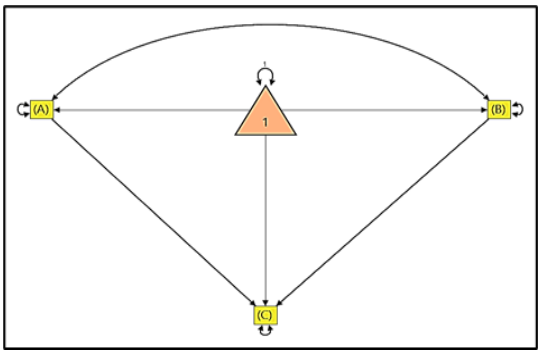


Figure 13. The *reliability, responsiveness,* and *empathy* theoretical system model
Source: Authors

In *Table 12*, the system model basic standard evaluation is performed, the determination ratio being 0.817764, which means that the dependent element (C) can be explained by the other independent elements with an 81.77% variability. The connection between the elements is strong.

Table 12. The basic *reliability, responsiveness,* and *empathy* model evaluation

RSquare	0.778703
RSquare Adj	0.777731
Root Mean Square Error	0.462033
Mean of Response	3.85917
Observations (or Sum Wgts)	458

Source: Authors

Figure 14 is a presentation of the system model basic standard evaluation, where the determination coefficient is 0.817764, which means that the dependent element (C) can be explained by the independent elements (A) and (B) at 81.77 per cent. Based on this, a conclusion can be drawn that the correlation coefficient between the independent elements (A) and (B) and the dependent element (C) is 0. 904303, which supports the fact that these elements are strongly intercorrelated.

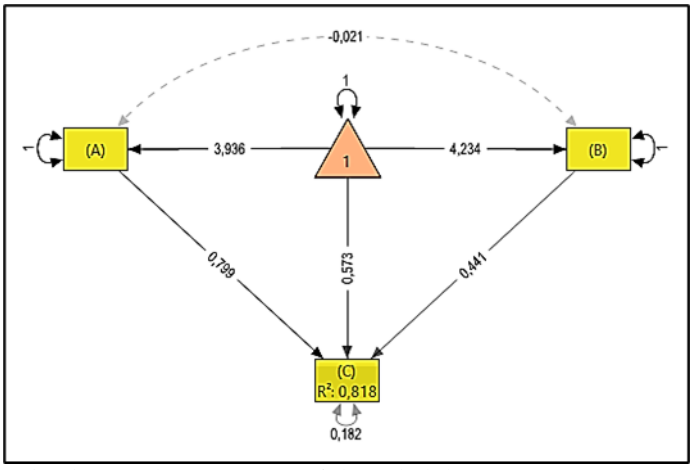


Figure 14. The standard contribution sizes of the *reliability, responsiveness,* and *empathy* system model

Source: Authors

The statistical significance score is given in *Table 13* (ANOVA), and the same is [F(2,455)= 1020,882, p<0.0001].

Table 13. ANOVA for the *reliability, responsiveness* and *empathy* variables

Source	DF	Sum of Squares	Mean Square	F Ratio
Model	2	181.70570	90.8529	1020.882
Error	455	40.49250	0.0890	**Prob > F**
C. Total	457	222.19820		<0.0001

Source: Authors

The nonstandard contribution values are given in detail in *Table 14* below.

Table 14. The nonstandard contribution values

Mean/Intercept	Size	standard error	Wald Z	Rehearsal>| Z|
Constant → (reliability)	3.936	0.1398811	28.138687	<0.0001
Constant →	4.234	0.1492834	28.359402	<0.0001
Constant → (empathy)	0.573	0.1304989	4.3934843	<0.0001
Regression	**Size**	**standard error**	**Wald Z**	**Rehearsal>| Z|**
(reliability) → (empathy)	0.799	0.0206242	38.725601	<0.0001
(responsiveness) → (empathy)	0.441	0.0246187	17.918086	<0.0001
Variance	**Size**	**standard error**	**Wald Z**	**Rehearsal>| Z|**
(reliability) ↔ (reliability)	1.000	5,699e-17	1,755e+16	<0.0001
(responsiveness) ↔ responsiveness	1.000	4.86e-17	2.058e+16	<0.0001
(empathy) ↔ (empathy)	0.182	0.0155883	11.689788	<0.0001
Covariance	**Size**	**standard error**	**Wald Z**	**Rehearsal>| Z|**
(reliability) ↔ responsiveness	-0.021	0.0472778	-0.441585	0.6588

Source: Authors

Figure 15 presents the nonstandard contribution sizes for the system model. The highest mean of the score is that for the independent element (A) at 3.8591703, whereas the lowest is that for the independent element (B) at 3.8283843. The largest size for the variance is the size of the independent element (A) 0.959, whereas the smallest variance is that for the dependent element (C) 0.089. The connivance between the independent elements (A) and (B) is -0.018.

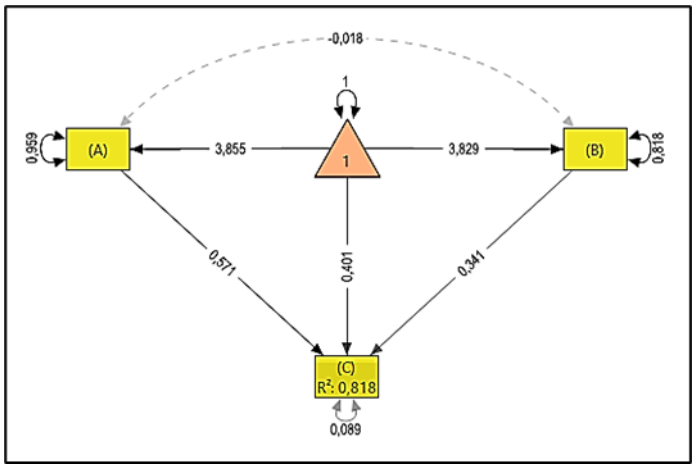


Figure 15. The nonstandard sizes of the *reliability*, *responsiveness*, and *empathy* system model contributions

Source: Authors

Based upon this data, the main zero hypothesis ***H₀: The reliability and responsiveness levels affect the level of empathy in small and medium-sized enterprises***. is thus confirmed in that an increase in reliability and responsiveness leads to an increase in empathy.

Based on the data presented in *Figure 15*, the following multiple regression equations (*the formulas 5 and 6*) can also be formed, reading:

$$y=0.401+0.571\cdot x_1+0.341\cdot x_2 \quad (5)$$

$$empathy=0.401+0.571\cdot reliability+0.341\cdot responsiveness \quad (6)$$

Figure 16 shows a multi-regression equation diagram for the *reliability*, *responsiveness*, and *empathy* variables.

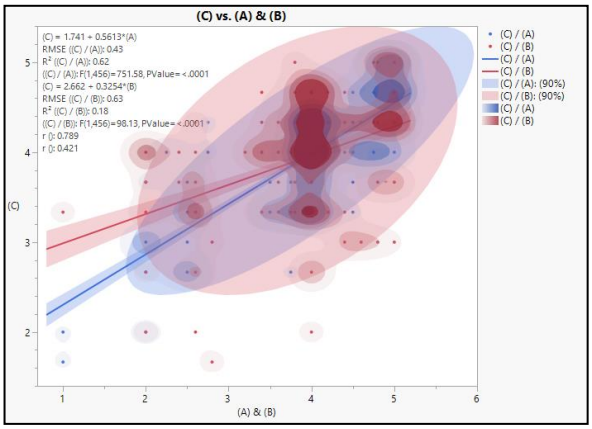


Figure 16. The regressive equation diagram for the *reliability*, *responsiveness*, and *empathy* variables
Source: Authors

Conclusion

It is imperative that companies should continuously be improving the quality of the services they offer and render to and the relationships they establish with their respective service users in order to survive on the market. Service quality is a term that has sparked a lot of interest and debate in the research literature notwithstanding the fact that no consensus on the definition of the term has been reached yet. When exploring service quality, the commonest assessment pertains to the extent to which services meet the needs or expectations on the user's part, i.e. whether such services do (or do not) meet customer needs or expectations, or the difference between what users expect and the perception of the service rendered. The importance of research in and the empirical analysis of the mutual impact of certain service quality elements has been demonstrated and highlighted by some researchers, such as (Du Plessis, 2017; Du Plessis, 2015; Mei et al., 2021; Liu et al., 2021).

This research study has met its goal and answered the question: To what extent do certain service quality elements (such as reliability and empathy, both individually and taken as a group) affect service quality empathy? The research study may provide quite a lot of help in looking at the interdependence and degree of the influence between these elements, which may ultimately help SME executives to prepare strategies, plans, actions and resource distributions of their own, thus increasing customer satisfaction and their loyalty.

While it is clear that greatest number of companies have limited funding to provide services, it is yet important that SME managers should accept the importance of properly understanding and measuring customer expectations. In addition to this, it is imperative that the user should identify deficiencies in service quality. In this way, the perceived service quality can be managed, and gap occurrences can be reduced, according to (Ramlugun, 2012).

Therefore, it may be possible to apply the same methodology and include the factors and variables not included in this research study. For the reason of this fact, it may further be analyzed in the future. To add, there is still plenty of room for this research area to expand by including other issues, especially so given the fact that methods and strategies are rapidly changing in contemporary marketing practice. Additional research and testing need be done in a number of different activities conducted by companies and results need be compared,

similarities and differences simultaneously being determined. An increase in reliability leads to an increase in empathy. An increase in empathy leads to an increase in empathy increases. An increase in reliability and responsiveness leads to an increase in empathy.

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