Pursuing Users' Satisfaction Versus Real Performance:

A Study on the National Emergencies System 9-1-1 In the North Zone of Dominican Republic and its Subjective and Objective Measures of Performance

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Abstract

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Response time is critical in medical emergencies; in some cases, even a response time higher than 5 minutes can rise significantly the mortality rates (VIJC, 2019). However, the 9-1-1 National System holds as its institutional vision the pursuit of Global Satisfaction that is measured by surveys to the users while authors such Brown and Coulter (1983) discard the relationship between measures of real performance and citizen's perception and (VIJC, 2019) which showed a negative relationship between response time and satisfaction on emergency services. Thus, this study intends evaluate the relationship between the actual performance of the 9-1-1 system measured by the real response times versus the satisfaction that is measured by surveys conducted to the users.

This study is based on secondary data provided by the 9-1-1 system as Surveys are conducted on a daily bases and response time is recorded on the system. The data was analyzed using SAS program utilizing Pearson correlation and regression to evaluate the relationship between the objective and subjective measures. The Global satisfaction was taken as dependent variable while Response time was the independent variable. The type of agency the cases belongs to, Health, Police, Public works, firefighters or transit police played the role of moderating variable for the main model of the study.

As results of the study both Pearson Correlation and Multiple regression showed that there is not significant relationship between the Response time and Global Satisfaction. However, only when using the National Police agency as standard, Public Works showed a negatively significant relationship between response time and Global Satisfaction. In addition, while using Public works a base a significant but positive relationship between response time and Global Satisfaction was found for the agencies Health and Police. However, this relationship being positive goes against the theory and logical thinking of services.

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Chapter 1. Introduction

1.1 The Dominican Republic

The Dominican Republic is a Caribbean country located on the island "La Hispaniola" where territory is shared with the neighbor country of Haiti. The population of the country is around 10.7 million as per 2022. The island was first inhabited by "Taino's" which inhabited other countries such as Cuba and Puerto Rico and later on colonized by European countries; it was the first seat for the Spanish colonial rule and also a site to introduce importations of enslaved Africans to America.

The Country proclaimed its independence from Spain after more than three hundred years on November of 1821 but ended up being annexed to Haiti for other 22 years.

The Dominican Republic is a country with a representative democracy or democratic republic, it has three branches of power that are executive, legislative, and judicial. The president of the country heads the executive branch and executes laws passed by the congress, appoints the cabinet, and is commander in chief of the armed forces. The president and vice-president run for office on the same ticket and are elected by direct vote for four-year terms. The national legislature is bicameral, composed of a senate, which has 32 members, and the Chamber of Deputies, with 178 members.

Regarding the economy of the country, it was previously dependent of exports of sugar, cocoa and coffee but it has turn to depend on: services, composed mainly by tourism, telecommunications and finance and represents a 60% of GDP, manufacturing representing a 22%, agriculture, mining and trade. The GDP of the country is 94.24 billion USD as per 2021 (Worldbank).

1.2 Background. Understanding the 9-1-1 National Emergency System:
1.2.1 History

In September 25th 2013 was published the law 140-13 that creates The National Attention to Emergencies and Security System, but it was not until May 31st 2014 that was launched the first center of the 9-1-1 National Emergency System located in the Capital City of Santo Domingo with the main objective of creating an easier way for citizens to report their emergency cases by implementing a unique phone number to report any kind of emergency situation. Previously, around 40 different phone numbers existed for this same purpose, creating confusion at the moment to call for assistance. In addition, the different institutions did not count with a stablished protocol to assist emergencies, ways to measure given assistance and moreover, the government has improved agencies conditions such as providing more cars and motorcycles and promoting the training of personal in order to implement this system. Before, citizen preferred to use their own transportation methods, affecting the vulnerable population due to high cost that they might not be able to pay, thus, putting in risk the life of the people in need of assistance.

As a coordinator entity, the 9-1-1 System works together with the response institutions that for this context will be called agencies, such as:

- **Health Ministry:** Provides ambulance services for emergencies.

Health Ministry logo:

- **Firefighters:** Provides assistance in case of fire, gas scape, trapped or lost people rescue, among others.

Fire fighters Shield

- **National Police:** Assists every case; as a main actor in robbery and violence situations and as a security support to the other agencies for all other cases.

- **Ministry of Public Works (MOPC):** Assists citizens with broken cars in the main highways of the country.

- **Direction of Secured transit and transport (DIGESETT):** Assists in car accidents and events that creates traffic jam to regulate the flow of traffic. Also called as Traffic Police.

Besides the main response agencies, the 9-1-1 System also stablishes contact with secondary action agencies according to the situation arriving to the scene, these agencies are:

- EDEnorte / EDEeste / EDEsur that are the national electric energy companies and are contacted in cased of the need of energy interruption in a sector when a fire has occurred.
- INACIF: National Forensic Science Institute, contacted in case of a dead body in the scene of the event.
- CONAPE: Contacted in case of homeless elderly, among others.

In January 2015 the 9-1-1 System started including in the catalogue of offered services attention to noise reports in order to deliver comfort and peace to communities and avoid the consequences this might lead to. In August 14th 2014 the Presidency Ministry announces the expansion of the services to the North Zone creating another call center and administrative installations. In December 2016, the institution started its operations also in the provinces of San Cristobal, Haina and Nigua benefiting 425,000 people. As for July 2017, the government published the law 184-17 that updates the law 140-13 to strengthen the legal framework of the 9-1-1 System operations.

Since it was created, the institution kept on growing in the national territory; the last achievement was extending the services to San Jose de Ocoa reaching a 91.7% of National territory coverage.

1.2.2 Response time ranks

Per agency, the institution has stablished internal response ranks standards. Each agency must justify and propose solutions if their response time is on the last rank listed on the table below.

Table 1 Time Ranks from Dispatch to arrival

Agency	Response Time Rank
National Police	- 0-7 min, 7-10 min, 10-15 min, >15 min in Puerto Plata and Santiago Provinces
	- 0-10 min, 10-15 min, 15-20 min, >20 min for the rest provinces
Health Ministry	
Public Works	0-10 min, 10-15 min, 15-20 min, >20 min
Traffic Police	
Fire Fighters	

This response time ranks corresponds to the time Dispatch-arrival time, which is explained in more detail in the methodology section. Therefore, a specific and binding for the agencies real response requirement that contemplates the total time of the service has not been stablished in the institution.

1.2.3 Operational Processes Details

Figure 1. Flow Chart of the 9-1-1 National System Processes

Reception of the call	• Calltaker recieves users' calls.
Capture information	• The Calltaker captures the event type, address information and creates the case.Minimum time for case creation: 120 secs.
Assignation of case	• The system automatically assigns a case number to the event and sends it to the corresponding Dispatcher of the agency
Dispatch Case	• The dispatcher contacts the nearest unit and send it to the captured address. Giving follow up to the unit until it arrives
Receive case report	• Response Unit reports case details and actions taken to the dispatcher who writes its report as a comment in the system case.
Close the case in the system	• After assistance is given dispatcher inputs in the system all the information of the event and assigns a corresponding finalization code to the case

> In parallel, if the user agrees, it is transfer to medical regulation or a psychologist to assist via telephone while the units arrive

According to the previous chart, the institution's directly offered services to society are to receive the emergency call and contact and send the agency that corresponds according to the type of the reported event. Despite of being able to measure the response time through their system and constantly give follow up to all the stakeholders involved in the process, it is not the purpose stated by law and commitment letter of the institution to provide fast assistance. However, it has been impossible to detach the population perception of the agencies performance and the perception of the performance of the 9-1-1 System.

1.3 Purpose of study and research question.

Since the New public Management movement begun, innovations in the public sector regarding service-users turned public service into more responsive to the needs of people who used them (Kaul, M. 1997). As Kaul, M (1997) stated, the new public Management system started implementing techniques that were first used in the private sector organizations. The Dominican Republic government is not an exception, quality models such as the International Standard Organization (ISO 9001), EFQM The European Foundation for Quality Management (EFQM), The Common Assessment Framework (CAF) among others are the regulations that the Public Management Ministry uses to measure the institutions performance. However, not all services count with the same characteristics or are offered under the same circumstances. Some services are needed in life threat situations and a clear evaluation of the quality of services through users' opinion and perceptions becomes a hard task and according to Baumgarten, et al (1972) satisfaction levels might get affected by the circumstances the person is in.

Response time is critical in medical emergencies; in some cases, even a response time higher than 5 minutes can rise significantly the mortality rates (VIJC, 2019); thus, this study intends evaluate the relationship between the actual performance of the 9-1-1 system measured by the real response times versus the satisfaction that is measured by surveys conducted to the users. By evaluating this relationship, the institution can determine how much relevance should be given to users' Satisfaction when speaking about their performance and improvement of their quality levels.

Currently, The National emergency services 9-1-1 has stated as their institutional vision: "to be the institution with the best rated services of the country…" meaning that their efforts of improving or their goal to achieve are focused on the performance measure of rates by users which does not involve the real response time but the survey's results. As stated on section 1.2.2, the institution has only stablished response time ranks for the services considering only a part of the response time but not the measure as a whole. In addition, there is no consequence or requirement of action plans to take actions to improve agencies belated response time.

Thus, after examining the relationship between response time and global satisfaction the institution can determine if it is really worth to keep pursing satisfaction as it is stated in their vision over other relevant objective indicators such as response time which is a key factor when speaking about saving lives. Pursuing an answer to the research question of whether users' satisfaction (subjective performance) is related to the response time (real performance) would provide real data evidence on whether the institution should adjust their vision and improve their performance evaluation methods or continue as it is in order to protect and save citizens lives.

Chapter 2. Theoretical Background and literature review

2.1 Theoretical background

2.1.1- 9-1-1 Systems Concepts

The National Emergency Numbers Association (NENA, 2021) defines the 9-1-1 System as "the set of networks, software applications, databases, components and operations & management procedures required to provide 9-1-1 service. This may include commercial, governmental and human resources".

Another important concept that might be visible in the data analysis section is "PSAP" (Public Safety Answering Point), "it is an entity responsible for receiving 9-1-1 calls and processing those calls according to a specific operational policy" (NENA, 2021). For better understanding, PSAP refers to the physical call center where the calls and administrative process are executed. In the case of the 9-1-1 National System of the Dominican Republic there are two PSAPS, PSAP-N and PSAP-M, N referring from north and M from Metropolitan/capital city. However, the acronym of PSAP is only seen in data, the frequently use given by the institutions is North Zone and Metro/South zone.

The system used to operate 9-1-1 systems is called CAD acronym from Computed Aided Dispatch "is a computer-based system, which aids PSAP

Telecommunicators by automating selected dispatching and record keeping activities" (NENA, 2021)

2.1.2 Satisfaction concepts

Satisfaction is a complex term which includes that goals and desires or motivations are fulfilled Zaltman et al (1973). The pioneer on satisfaction theories was Abraham Maslow (1954) who stablished the hierarchy of needs of human motivation, expressing that human have specific priorities that have to be fulfilled before aiming to other factors such as social, emotional and self-actualizing needs Maslow (1954), therefore, it is consider that all the actions or motivation of Human beings are attempts to reach Satisfaction. (Czpiel, Rosenber, 1977).

Moreover, satisfaction can be classified depending its context, in purpose of this study the term Customer Satisfaction should be also considered. For economists, it is related on how customers appreciate a certain good, Bennet and Kassarjian (1972). Howard and Sheth (1969) also defined customer satisfaction as the level of similarity between expectation of the customer and what they actually receive in reality which is a very similar definition to how ISO 9001:2015 defines quality: "the grade of fulfillment between the service or goods and the customer requirements" and this might imply that a satisfied customer received a high-quality service or good.

Czpiel, Rosenber, (1977) expressed different attributes of satisfaction, such as purchase processes, decision, functional, aesthetic, service and environmental

attributes, however, the theoretical base for this concept explained by Rosenberg is focused on customers who purchases a product or service they want to obtain, being the opposite of the 9-1-1 and other emergency systems case were the services are unwanted and unplanned. Thus, not enough theory was found regarding the satisfaction in emergency situation services, instead, several studies had been conducted and will be explained in the following sections of this document.

2.1.3 Response Time

As the satisfaction concept the response time becomes too specific when speaking about emergency services but perhaps it can be compared to some Queuing theory concepts. Queuing theory examines every component of waiting in line to be served, including the arrival process, service process, number of servers, number of system places and the number of customers (which might be people, data packets, cars, etc.) Joan, R. (2014). This theory counts with performance measures where "service time" is categorized, and defined as the average time each customer spends in the service system. Therefore, when we analyzed that Response is measure from the moment a call is received until the moment the response unit arrives to the scene the two concepts share the same logic. However, as the satisfaction, this response time becomes affected by other factors such as ambulance availability, type and complexity of the attended event among others issues that might arise during the call attention making the concepts of the queuing theory unpliable for emergency systems.

VIJ (2019) defines the response time as the time between the call coming in and responders arriving to scene. Based on this definition, the variable Response time in this study will also comprehend the same stages of the service. VIJ (2019) also stated that, response time is critical in medical emergencies since a 2002 study showed that mortality rates in medical emergencies rose beyond a response time of 5 minutes. Cabral et. all (2018) complements stating that the response time of Emergency services is a fundamental factor for prehospital care to be successful that must be controlled in order to increase the chances of survival for patients. They also highlighted that   Response time is the main indicator of prehospital emergency services and as VIJ (2019) defined as the time between notification of an occurrence and the ambulance arrival at the scene.

In spite of the purpose of the study is also important to consider that according to the WHO, an ideal response time is equivalent to less than 8 minutes.

2.1.4 Global Satisfaction and response time as Subjective and objective measures of performance:

Boyne, & Boyne, George A. (2006), stated that subjective measures are usually a judgement made by both internal and/or external stake holders such as consumers and managers about the offered services. Brudney & Englan, (1982) expressed that in order to balance between organizations goals and what citizen desired of their service the need of subjective measures or public opinion aroused and tagged both subjective and objective measures as "hard" and "soft". Brown and Coulter (1983) defined both objective and subjective measures as independent modes of research of the urban service delivery area. For the subjective measured

they defined as a mode that involves measuring a sample of citizens' and clients' attitudes about the service delivery through surveys. Based on this definition, we can classify our dependent variable, Global Satisfaction, as a subjective measure of performance in order to deepen on the research of its relations with the response time.

Regarding the objective measures of performance Boyne, & Boyne, George A. (2006) explains that these measures reflect what is accurately the real world when speaking of performance and are thus impartial and independent of the unit of analysis that in these cases are the users. Brown and Coulter (1983) also defined objective measures as service delivery characteristics based on data from official archives of public agencies. Based on this literature the variable response time can be classified as an objective measure of performance.

2.2.2 Literature review

2.2.1- Relationship between objective and subjective measures of performance.

Brown and Coulter (1983) addressed questions such as to what extent do citizen subjective evaluations reflects objective service conditions and identified that citizens' satisfaction is related with specific aspects; in the case of police performance their satisfaction was highly related to response time, police treatment and perceived equity of police service. However, satisfaction levels of the response time showed to be unrelated to the actual mean response time. Thus, author concluded that there is no evidence to support that citizens' satisfaction with services reflect the quality and quantity of the service actually provided but seem to be totally independent. In the same orientation as the results shown by the previous study, Even Shingler, van Loon, Alter, and Bridger (2008, p. 1110) considered that public evaluators should take in consideration that citizens' perception and objective data are two different types of information.

Kelly & Swindell (2002) evaluate the correlation between performance measurements and citizens satisfaction between some jurisdictions, among them, in police services. As a result, most of the analyzed measurement showed weak correlation in any direction. However, some factors did show a negative relation such as violent and property crime and satisfaction with the city as a place to live authors explained that this relationship direction was not expected because, higher number of reports for evaluators means a higher trust in the police department. This

leads us to believe that the citizens' perception is not aligned with how objective measures are evaluated. As an example, Brudney & England (1982) expressed that subjective indicator are criticized, first, because they do not match objective measures results as shown in studies in Los Angeles and Kansas cities and even authors argued that this might be due to the lack of knowledge about local government and public affairs and second, because citizens might base their satisfaction level on other factors that differ from the quality of the provided services. Alexander, E.R., & Wilkins, R.D. (1982) concluded that there is no relationship between objective and subjective measures of performance while studying measures for vocational/ rehabilitation counserlors.

Shingler, J. (2008) did also analyze the Importance of Subjective Data for Public Agency Performance Evaluation and concluded that the perceived resolution time by users even though has a significant impact in the rating given to the services does not show an impact regarding the real case resolution time. These finding led the author to underscore the importance that subjective data holds as a source to evaluate agencies performance and instead provides reliability for the objective measures.

Other studies about Subjective and objective measures focus not only about citizen but about internal departments of an organization such as human resources. Bommer, W. (1995) concluded that employee performance subjective and objective measures cannot be used interchangeably.

Moreover, recent studies such as Singh, S., Darwish, T., & Potočnik, K. (2016), compared both subjective and objective measure and stated that both, with

the adequate planning, can be successfully employed to asses organizational performance.

2.2.2 Previous Studies on Satisfaction and response time.

VIJ (2019) also mentions that from previous studies in Baltimore 2017, response time has a weak correlation with likelihood to arrest in criminal cases but regarding satisfaction, in studies conducted by Kansas Police department was identified that user's satisfaction was more related to expectation and the perception of the response time in an emergency situation than to the real response time recorded in the system.

This study turns to be a main backup for the hypothesis since it compiles several studies that have study the relationship between response time and satisfaction. A study conducted on1984 attempted to link objective and subjective measures of performance to determine which they could use to set policing goals. This study used data from Los Angeles, California, Tuscaloosa and Alabama and the results were inconclusive. However, authors noted that only conceptually and not in practice response time is linked to subjective measures of performance.

In a study conducted by Jannet M. Kelly in 2003 titled citizen satisfaction and administrative performance measures is there really a link? the researcher tried to prove the existence of a link between administrative performance measures and citizen satisfaction in the United States by using available data from 50 cities, even thought that this study was based just in police and firefighter department, separately, it still matches the interest of this research as the mentioned agencies form part of the 9-1-1 Services in the Dominican Republic. As for the results of

this study, the hypothesis "there is no relationship between the measurements of fire and police services and citizen satisfaction with those services" could not be rejected.

Out of the context of health and emergency services, Tobin, et al (2006) highlighted that customer satisfaction is influenced by many factors that varies per individual. As an example of this factors and how easily Satisfaction can be influenced Pruyn, et al (1998) identified that for customers the attractiveness of the waiting environment can improve their satisfaction more than shortening the objective time of the service.

Therefore, it is first hypothesized that:

H1= There is no relationship between Global Satisfaction and Response Time

On the other hand, as Baumgarten, et al (1972) stated; satisfaction levels might get affected by the circumstances the person is in. Therefore, is it the same situation if a person is witnessing or is involved in a car accident than a person witnessing a fire or watching a relative having a health issue? This leads the researcher to stablish a second hypothesis based on the type of agency that assisted the event:

H2= The relationship between response time and global satisfaction varies across agency type (Health, Police, Traffic police, Public Works or Firefighter)

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Chapter 3. Research Design

With the purpose of understanding the research design, details about its elaboration will be listed on this section.

This study will collect quantitative data for both of the variables. For the subjective measure, global satisfaction, the data is based on monthly surveys conducted by the institution, this data is turned into an average with the name of Global Satisfaction and it is also measured by agency. For the objective measure, response time, it will be automatically recorded values by the CAD system under the name of Response time.

3.1- Analytical Framework:

As concluded at the end of previous chapter, the analytical framework indicates that response time influences global satisfaction. (Figure 2)

Figure 2. Analytical Framework
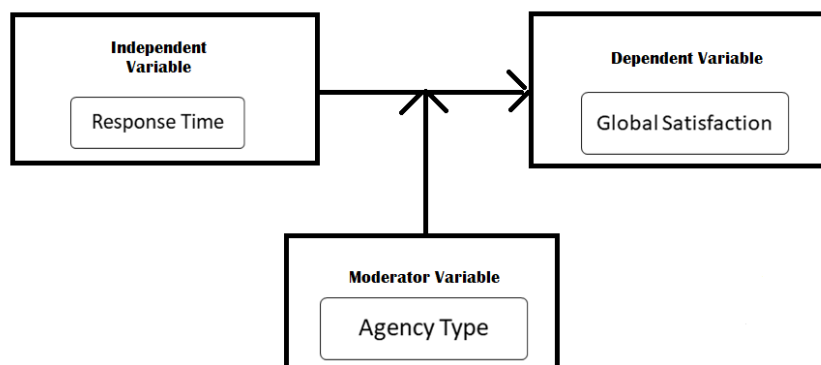
3.2- Research Methodology

The Data used to conduct this study was provided by the institution and/or found on their transparency open portal webpage. The 9-1-1 National System, conducts surveys (Appendix 1) on a daily frequency but based on a monthly sample from the total of cases attended in order to measure the global satisfaction. For the response time and agency type it is automatically recorded on the CAD system. Regarding the control variables, the quality department conducts evaluations of performance based on standards previously stablished by call center regulations.

On this study data corresponding to the cases of the North Zone 9-1-1 System of the year 2021 will be analyzed and the unit of analysis is cases.

3.3- Variable measurement:
3.3.1- Dependent Variable:

Global Satisfaction is the dependent variable in this study. As explained in chapter two, the concept of satisfaction varies for emergency services, thus, on this study it will be called as global satisfaction as it is an averaged percentage measure of the rates given by the users on the following components:

- Call taker performance
  - o Satisfaction with Call taker Knowledge: evaluates the knowledge shown by the call taker handling the call. It is evaluated in a scale from 1-5 through surveys.

- o Satisfaction with the Treatment of Call taker: evaluates how satisfied is the user with the empathy showed by the call taker. It is evaluated in a scale from 1-5 through surveys.

- o Satisfaction with the handling time of the call: evaluates how satisfied is the user with the duration of the telephonic assistance. It is evaluated in a scale from 1-5 through surveys.

- Response unit/Agency performance
    - o Knowledge of the response unit: This is the result of users' satisfaction with the response unit knowledge of their action protocols obtained through surveys with a 1-5 scale.

    - o Satisfaction with response time: This is the result of users' satisfaction with the response unit arrival time obtained through surveys with a 1-5 scale

    - o Satisfaction with Treatment offered by the response unit agents: This is the result of users' satisfaction with the response unit agents empathetic treatment obtained through surveys with a 1-5 scale.

- General satisfaction with the 9-1-1 services
    - o Graded from 1-5 this component asks the users in general how do they grade the services received by the 9-1-1 services.

3.3.2- Independent Variable:

<u>Response time:</u> the response time is the total time that it takes the 9-1-1 to process the call until the response unit arrives at the scene in minutes. Thus, the components of this variable are the following:

- o Creation time: Time measured by the system that represents the handling time by the call taker until the case is created.

- o Unit Assignation Time**:** This is a monthly average time expressed in minutes and seconds. It is defined as the registered time in the system taken by the dispatchers.

- o Dispatch-arrival Time**:** This is a monthly average time expressed in minutes and seconds. It is defined as the registered time in the system taken by the response unit to arrive to the event.

It is important to highlight that besides creation time, the other components of response time are under the responsibility of the unit assisting the event and the dispatcher: Once the unit to assist the event is contacted by the dispatcher, the former has to update the state of the unit on the system and same goes to the other measures, when the unit arrives to the event is their responsibility to contact the dispatch center to inform their arrival in order for the dispatcher update their state on the system as arrived.

3.3.3- Moderator variable

The agency type will be considered as a moderator variable. Whether it is police, ambulance, public works, transit police or fight fighter who assist to the event scene it might impact the satisfaction perception of the users.

3.4 Data structure and analytical techniques

The data structure will be represented as in table 1 and is intended to be analyzed as a quantitative study through a multiple regression model based on secondary data. The software used for this analysis is SAS.

Table 2. Data structure

Agency (moderating variable)	Response time IV	Global Satisfaction DV
Health	1411	1411
Police	1640	1640
Public Works ministry	232	232
Traffic Police	384	384
Firefighters	401	401
Total	**4068**	**4068**

Chapter 4. Results and analysis

This chapter presents findings of the study, summarize the descriptive statistics of the data, show the hypothesis testing results and discuss about the interpretations of it.

4.1. Descriptive analysis
4.1.1 Type of cases statistics:

From the sample of 4068 the distribution respecting type of cases is as follows:

Table 3. Type of cases distribution

Type of Case	Quantity	Percentage
ABDOMINAL PAIN	158	4%
AGRESSION	653	16%
CAR ACCIDENT	387	10%
CHEST PAIN	121	3%
DOLORES AGUDOS	129	3%
EMERG OBSTETR	117	3%
FALLING	179	4%
FIRE	362	9%
INVESTIGATION	166	4%
PERSON IN DANGER	576	14%
RESPIRTORY DISTRESS	187	5%
THEFT	117	3%
UNCONSCIOUSNESS/FAINT	126	3%
VIAL ASSISTANCE	229	6%
OTHERS	561	14%
TOTAL	**4068**	**100%**

As described in table 2, a 16% of the cases in the collected data were cases where aggression was reported, followed by person in danger 14% and others

which is a conglomerate of various reports, and car accident with a 10% of the total evaluate cases.

Table 4 Service Recommendations grade by citizens

"Would you recommend the services to other people?" 0-10	Quantity of people who graded	Percentage
0	22	1%
1	35	1%
2	5	0%
3	4	0%
4	6	0%
5	28	1%
6	16	0%
7	59	1%
8	131	3%
9	417	10%
10	3345	82%
TOTAL	**4068**	**100%**

Despite the results of this studies, during the survey respondents were asked If they would recommend the use of the 9-1-1 services during emergency situations and 82% graded as 10 the possibility of recommending.

4.1.2 Dependent, in dependent and moderating variable descriptive statistics

Table 5. Variables descriptive statistics

Agency	variable	N	mean	SD	min	max
TRAFFIC	Response Time	384	14.46	9.54	0.90	65.65
POLICE	Global satisfaction	384	95.53	9.18	20.00	100.00
FIREF	Response Time	401	16.43	12.65	1.30	152.42
	Global satisfaction	401	95.85	8.47	33.33	100.00
Health	Response Time	1411	23.53	15.57	1.38	162.02
	Global satisfaction	1411	96.84	6.63	28.89	100.00
Public works	Response Time	232	20.21	11.27	1.38	66.92
	Global satisfaction	232	96.63	7.18	46.67	100.00
PN	Response Time	1640	2l3.75	20.73	1.10	274.00
	Global satisfaction	1640	93.67	11.61	20.00	100.00
Total	Response Time	4068	21.88	17.30	0.90	274.00
	Global satisfaction	4068	95.33	9.46	20.00	100.00

As for the descriptive data for the dependent and independent variables, we can see on table 4 that in general the average response time is 21.88 minutes which if we compare to the internal standards were the maximum rank is 20 minutes only from dispatch to arrival, it can conclude that in general the agencies are below this rank. In addition, users seem to be satisfied as the average for global satisfaction is 95.33%.

If these numbers are break down by the moderating variable, the agency DIGESSET, which assists in car accidents, shows a lower response time with an average of 14.46 minutes, followed by the firefighters with 16.43, MOPC with 20.21, ambulances with 23.53 and finally the National Police with 23.75.

Regarding the dependent variable, global satisfaction, it is observable that no significant changes occur among agencies since it goes from 95.33%-96.83%.

4.2. Hypothesis tests

4.2.1 Correlation analysis

After conducting the correlation analysis between independent and dependent variable the results on table 5 shows that there is very low correlation between the variables with a coefficient of 0.0031, besides, the p-value resulted in 0.8327 leading to a failure to reject the null hypothesis H0. Thus, there is no relationship between Global Satisfaction and response time, leading to reject the Hypothesis 1 that sustains the relationship of the variables is negative.

Table 6. Correlation Analysis

N = 4068

Under the assumption of Prob > |r|, H0: Rho=0

	Response Time	**Global satisfaction**
Response Time	1	0.00331
		0.8327
Global satisfaction	0.00331	1
	0.8327	

4.2.2 Multiple Regression Results

Table 7. Multiple regression results- Based in National Police Cases

Source	DF	Sum of Squares	Mean Square	F Value	Pr > F
Model	9	8592.3812	954.709	10.89	<.0001
Error	4058	355720.9976	87.6592		
Corrected Total	4067	364313.3787			

R-Square	Coeff Var	Root MSE	Global satisfaction Mean
0.023585	9.821478	9.362649	95.32831

On table 7 it is shown that the value of R square equaled to 0.023585, meaning that the response time accounts for 2.36% of the variance in global satisfaction. However, since the P-value of F test is smaller than 0.05 it can be concluded that the model well explains the dependent variable Global Satisfaction.

On Table 8 can be observed that while moderating by the agency the cases correspond to, response time continues to be not significant related to the global satisfaction with a p value of 0.5263.   As for the agencies, compared to National Police cases, public works cases have higher satisfaction by 2.29, Health cases by 3.07, Firefighter cases by 2.30 and Traffic police cases by 2.29. at a 95% confidence level.

A negative relationship between response time and Global Satisfaction resulted in the cases of the agencies Traffic police, Firefighters and public works. However, this relationship is only significant for the agency of public works at a 90%

confidence level with a p-value of 0.0977. Meaning that on these cases the longer the response time satisfaction would decrease.

Table 8. Multiple regression results- based in National Police Cases

Parameter	Estimate	Standard Error	t Value	Pr > |t|
Intercept	93.49869473	0.35171044	265.84	<.0001
Response Time	0.00707109	0.01115761	0.63	0.5263
Traffic Police	2.29410853	0.93680171	2.45	0.0144
Firefighters	2.30109589	0.84371962	2.73	0.0064
Health/Ambulance	3.07202616	0.57264317	5.36	<.0001
Public Works	4.85464704	1.3122292	3.7	0.0002
ResponseTime* Traffic Police	-0.02548154	0.05137041	-0.5	0.6199
ResponseTime* Firefighters	-0.00405912	0.03865427	-0.11	0.9164
ResponseTime* Health/Ambulance	0.00453541	0.01952157	0.23	0.8163
ResponseTime* Public Works	-0.09242471	0.05578935	-1.66	0.0977
ResponseTime* National Police	-	.	.	.

In conclusion, as for the results shown on this chapter the hypothesis of no relationship between response time and global satisfaction failed to be rejected. The hypothesis 2, that states this relationship varies depending on the agency type can be proven correct as for agency MOPC this relationship between the variables is significant at a 90% confidence level while in the others it is not.

4.3 Understanding Global Satisfaction

In order to better understand global satisfaction, after observing the obtained results, the researcher ran other model involving two additional control variables. First, provinces; on the provinces that are more rural the 9-1-1 has shown higher response time in average but also less cases, these differences lead the researcher to evaluate the existence of a different results for the variables under study. Second, day of the week the case is reported in; from Fridays to Sunday the number of cases reported to the 9-1-1 ascend up to two times, causing many situations such as delays on response time or not assistance at all for some events, thus, the researcher intends to identify any difference from previous results on the relationship between response time and satisfaction when controlling this variable.

Figure 3 Analytical Framework test 2
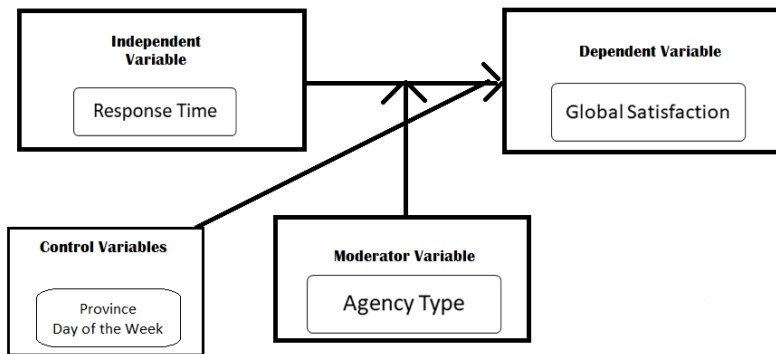
As expected, after adding more control variables to the model a small increment of the R-square can be seen on this model from 0.02 to 0.03, however it

is not a significant change. The F test continued to be significant in this case. (Table 9).

Table 7. Multiple regression results based in Firefighter cases

Source	DF	Sum of Squares	Mean Square	F Value	Pr > F
Model	39	11577.0896	296.8485	3.39	<.0001
Error	4027	352252.3913	87.4727		
Corrected Total	4066	363829.4809			

R-Square	Coeff Var	Root MSE	Global satisfaction Mean
0.03182	9.810466	9.352682	95.33372

Table 8. Multiple Regression results model 2

Parameter	Estimate	Standard Error	t Value	Pr > |t|
Intercept	99.673	1.617	61.650	<.0001
Response Time	-0.084	0.055	-1.530	0.127
Agency DIGESETT	-2.405	1.543	-1.560	0.119
Agency FIREF	-2.430	1.490	-1.630	0.103
Agency Health	-1.683	1.354	-1.240	0.214
Agency PN	-4.683	1.323	-3.540	0.000
PROVINCE UNIDENTIFIED	2.236	6.697	0.330	0.739
PROVINCE AZUA	0.905	1.106	0.820	0.413
PROVINCE BARAHONA	0.276	1.183	0.230	0.816
PROVINCE DISTRITO NACIONAL	0.962	4.295	0.220	0.823
PROVINCE DUARTE	0.393	1.084	0.360	0.717
PROVINCE EL SEIBO	-1.373	1.574	-0.870	0.383
PROVINCE ENRRIQUILLO	4.111	4.771	0.860	0.389
PROVINCE ESPAILLAT	-0.343	1.115	-0.310	0.758
PROVINCE HATO MAYOR	2.644	6.688	0.400	0.693
PROVINCE HERMANAS MIRABAL	0.734	1.353	0.540	0.587
PROVINCE LA VEGA	-0.122	1.054	-0.120	0.908
PROVINCE MARIA TRINIDAD SANCH	2.338	5.495	0.430	0.671
PROVINCE MARIA TRINIDAD SANCHEZ	0.332	1.367	0.240	0.808
PROVINCE MONSEÑOR NOUEL	-0.520	1.132	-0.460	0.646
PROVINCE MONTE PLATA	-0.607	2.054	-0.300	0.768

Parameter	Estimate	Standard Error	t Value	Pr > |t|
PROVINCE PERAVIA	1.159	4.779	0.240	0.809
PROVINCE PUERTO PLATA	-0.544	1.005	-0.540	0.589
PROVINCE SAMANA	-2.253	1.441	-1.560	0.118
PROVINCE SAN CRISTOBAL	3.130	4.787	0.650	0.513
PROVINCE SAN JOSE DE OCOA	1.860	1.846	1.010	0.314
PROVINCE SAN JUAN	-0.646	1.103	-0.590	0.558
PROVINCE SANCHEZ RAMIREZ	0.659	1.192	0.550	0.580
PROVINCE SANTIAGO	-0.466	0.940	-0.500	0.620
PROVINCE SANTIAGO RODRIGUEZ	0.684	3.100	0.220	0.825
DAYOFWEEK Friday	-2.392	0.710	-3.370	0.001
DAYOFWEEK Monday	-1.041	0.580	-1.790	0.073
DAYOFWEEK Saturday	-1.207	0.595	-2.030	0.043
DAYOFWEEK Sunday	-1.619	0.552	-2.930	0.003
DAYOFWEEK Thursday	-1.455	0.709	-2.050	0.040
DAYOFWEEK Tuesday	-0.729	0.605	-1.200	0.229
ResponseTime*Agency DIGESETT	0.062	0.075	0.830	0.404
ResponseTime*Agency FIREF	0.081	0.067	1.220	0.222
ResponseTime*Agency Health	0.094	0.057	1.630	0.103
ResponseTime*Agency PN	0.091	0.056	1.620	0.104
ResponseTime*Agency MOPC	0	.	.	

On table 8 no new significant result can be found that was not found on the previous models except that Fridays Satisfactions levels are 2.4 lower than Wednesday, followed by Sunday 1.6 less and Thursday 1.5 all at a significance level of 95%. Satisfaction seems to be not affected by the province as no P-value meets the requirements.

The researcher also run this model contemplating all interaction results between categories and response time but instead, none of the components of the model turned to be significant.

4.4 Discussion

This study aimed to determine the relationship between Response time as an objective measure of performance and Global satisfaction as a subjective measure of performance of the 9-1-1 Emergency and security system of The Dominican Republic North Zone in order to identify if objective and subjective measures of performance do lead decision makers in the same path for emergency service system as the 9-1-1 system is.

As for the results from this study we can conclude that response time as an objective measure of performance does not affect the global satisfaction (subjective measure of performance) matching with what was cited on the literature review section from authors such as Brown and Coulter (1983) and Even Shingler, van Loon, Alter, and Bridger (2008, p. 1110) which stated, after analysis, that citizen perceptions and objective performance measures are not the same thing and should be treated as independent information and data.

Kelly & Swindell (2002) also expressed in their studies the weak correlation in any direction between performance measurements and citizens satisfactions. This leads to the need of further research on what are the reasons behind this weak relation. These further studies should follow what Brudney & England (1982) expressed; conditions such as the lack of knowledge of citizens regarding local government and public affairs and what factors do citizen really value when it comes to satisfaction with a specific service might have an impact on the results of this relationship.

As Shingler, J. (2008) stated, what users perceived about how was the resolution time of the services it has no impact on the real case resolution time. The researcher of this study agrees with Shingler as they underscore the importance of subjective data as a reliable measure just by itself after observing the multiple regressions results of the 9-1-1 services data explained on this chapter. For emergency system, where response time should be the first priority to save lives, subjective measures should not form part of the main measures to evaluate the performance of the institution or be the only one specified on the institution vision.

In the same direction of this argument, VIJ (2019) highlighted the user's satisfaction of emergency services might be more related to the expectation and perception during an emergency than the real response time, meaning that this could be another explanation on why the relationship between the variables under analysis shown to be not significant; during an emergency situation the perception of time might be altered by the circumstances the affected person who called is on or by the relative that made the call to report a situation (Baumgarten, et al 1972) .

In the Case of the Dominican Republic, the 9-1-1 system is recognized as a big achievement and one of the best projects implemented by the government since it is the only free emergency services given to citizens, other emergency services in the country are way expensive for middle and lower class and cannot be used in remote areas as the 9-1-1 can be. Thus, this might lead citizen to rate high values in the satisfaction surveys even though the response time might not be in the required standards for emergencies, altering the relationship between the variables. In countries such as United States, 911 emergency services do have a fee and citizens

can chose between private or public emergency services, therefore, studies such as VIJ (2019) that was conducted in United States might be impacted by these factors when conducting satisfaction surveys and obtaining results as a significant relation between satisfaction and response time.

Even thought that a logical thinking has led the 9-1-1 system to stablish global satisfaction as a main measure of their performance and included it in their institutional vision, many studies and the results of this research itself have shown an opposite conclusion.

However, while considering a moderating variable as in this case the Agency type of the cases reported, following what Baumgarten, et al (1972) named as conditional satisfaction, results shown that for some agencies such as Ministry of public works, which is in charge of assisting people who needs mechanical assistance for their cars on highways, when based on the national police and Health cases this negative relationship is proven at a 90% confidence level but many factors might have affected these results such as a really small sample of 232 cases compared to the other agencies with bigger sample as health and police which has more than 1000 cases. In addition, the sample of surveys conducted for this agency might be biased since the statistics department usually shares specific cases to give priority to conduct the surveys with the survey team, based on a previous analysis.

Moreover, the previously explained positive perception of the 9-1-1 national services might also led to this results that goes against logical thinking. However, other studies in different services areas have obtained similar results such as the report of higher satisfaction with slower clerks than with faster clerks

on a supermarket, (Tobin, et al 2006). These conclusions open an opportunity for future research regarding 9-1-1 services to evaluate which are those factors that influence users' satisfaction but precisely, because of these unknown issues that satisfaction involves, the main point of this research, that pursuing a higher satisfaction should not be the focus of an emergency service is proven as it was explained by the VIJ (2019).

From both approaches, general, as objective and subjective measures of performance and specific as satisfaction and response time of services, findings seem to be aligned according to the theory; there is no significant relationship between them. Authors such as, Tobin, et al (2006), have make clear how satisfaction can be easily affected by other non-relevant to the performance factors such as the environment of the waiting space. In addition, as external subjective measure, satisfaction, when measured by surveys, is also flawed by the common-method bias caused by the informants, in this case users, predilection to give similar responses to separate responses in a survey (Boyne, & Boyne, George A. 2006).

In the case of the 9-1-1 service surveys (appendix 1) where the questions have the same structure just changing minimum words on the sentence, the phenomenon mentioned by Boyne, & Boyne, George A. (2006) might be evident to happen altering thus, the measures of the satisfaction leading to the results found on the study.

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As per the results when involving days of the week and province in the model, Satisfaction seems to be affected on weekends perhaps because that is when a peak of cases occurs due to more people on the streets for recreational reasons according to the statistical data provided by the 9-1-1 System. Agencies such as National Police and Health use to close cases without assistance due to the lack of units to send to assist, giving more sense to the decrease on levels of satisfaction on these days.

Empirically, while the researcher worked in the quality assurance department, the survey team has documented before having struggles making the user understand the scale for the measures of satisfaction (from 1-5) mistaking the 1 as the highest and vice versa, affecting the satisfaction measure results. This and other reliability and validity issues proper of survey research, makes the satisfaction measure by itself not a precise indicator to measure the institutional performance. The authors Boyne, & Boyne, George A. (2006) suggested that the best solution for the reliability threats of these type of measures is to mix both types of measurements, objectives and subjective when it comes to evaluate the general performance of the institutions which the results of this research work as support of their suggestions.

In summary, this study has shown same results as most of the authors cited in the literature review had conclude based on their studies; in general objective measures of performance do not hold relationship with subjective measures of performance. A high Users' and citizen perception of a service does not mean that

the institution performance is also high or according to the standards that the service requires.

Chapter 5. Conclusions

This Chapter summarize the results and limitations of the study and shows recommendations for the institution.

5.1 Conclusions

This study showed that there is no relationship between Response Time and global satisfaction. Therefore, an answer to the research question whether satisfaction and response time are related can also be conclude: only for the agency of Public Works this relationship showed to happen. However, issues such as low sample, compare to other agencies, and bias on the sample selection for public works agency might have impacted these results.

By these results it can be concluded that pursuing only Subjective measures (measures based on users' opinions) might not be the best choice when dealing with emergency services. As stated in the section 1.2, Response time represents a critical point when speaking about emergency cases and saving lives, and it should be one of the main focuses for institutions to improve. Users' perception grades about emergency service might lack many factors to be considered as valid and whole measure of the service such as knowledge of public administration and knowledge of medical attentions.

Moreover, a person going through an emergency case might experience a miss perception of the time taken by the emergency service to arrive and give attention altering the results of the satisfaction measures.

The positive relationship between response time and satisfaction shown in the results of this study is the best example on how distorted this perception can be. It goes out of theory frame and logical thinking to say that when the service takes longer people is more satisfied when speaking about emergency services or even all services.

With these conclusions the researcher does not intend to discard as a whole the use of Surveys to measure Satisfaction or other aspect but to promote a better use of this results and include more the measures that really matters when auto evaluation their performance as institution in order to save lives.

5.2 Recommendations

According to the conclusions, a high level of satisfaction does not mean a lower response time. Therefore, the 9-1-1 National system should re-structure their vision in order to include instead Response time as main measure of performance according to the type of service they offer to citizens.

Global Satisfaction should not be an indicator to consider by itself but instead to be complemented with other objective information that sheds light on how are they really performing for their type of service.

In addition, the 9-1-1 has stablished standards only for the Dispatch-Arrival time in order to regulate the agencies individual performance. However, response time involves more stages from the perspective of users; from the call reception to the arrival, thus, it is highly recommended to stablished internal own standards about the total response time and give continuous follow up to the results obtained in order to take measures when this time goes out of the range such as action plans.

The researcher also recommends to improve the randomness of the samples in order to have a more trustful data. In additions, other objective measures of performance such as internal evaluations of call taker and dispatcher should be linked to the same sample (currently two different random samples are taken to obtain the results) of cases that are survey in order to conduct deepest analysis and compare the perception of user with the internal standards that the institutions have stablished to evaluate their employees. This type of analysis might bring more clarity to determine what users really value from the call taker and dispatcher performance.

Moreover, it is highly recommended for the Ministry of Public Administration to adequate the standards on how are institutions evaluated according to the type of services that are offered by such institution. The 9-1-1 system is a very unique institution where even the working schedules differ from other organizations and priorities, objectives and mission are different, thus, in order to evaluate real institutional performance based on their individual standards it would be more accurate to measure performance accordingly.

After stablishing a proper indicators system of performance, an equally relevant follow up and consequence system should be stablished both internal (regarding the agencies performance) and external (regarding the institution performance). As explained in section 1.2.2, no binding standards are stablished for the agencies performance, the response times are just measured but no action plans are required from agencies when the results are not up to the standards, thus, there is no current way to measure improvement of this relevant indicator for emergency system.

Moreover, the standards for response time should also respond to the type of emergency assisted; for instance, standards related to health emergencies should be based on information for medical emergencies such as those standards that the WHO states. The 9-1-1 emergency should also research on data depending the type of emergency such as fire, accidents and others to be able to stablish proper standards for the response time.

As stated in section 1.2.3, the legal purpose and commitment letter of the 9-1-1 services just states for them to be a coordinator institution. However, nor the agencies by themselves or the 9-1-1 is stablished as fully responsible for the response times and its improvement. This is a concern that goes up to structural issues and requires revision both by the presidency ministry, which is in charge of the 9-1-1 and the Public Ministry of Public Administration which regulates institutions performance. An officially assignment of this responsibility would give a higher priority when speaking about the most relevant indicator in emergency cases; Response time.

5.3 Limitations of the study

As per the limitations of this study, the restrictions on data collection as it is based on secondary data did not allow the inclusion of sufficient control variables. The 9-1-1 system does not collect demographic data from the surveys such as age, gender, or if the person who called is the affected person or a relative. The researcher understands that these details could have helped creating a stronger model where the variance on the dependent variable can be better explained.

This study is also limited in terms of the survey sample selection, since it is common that from emergency services some delicate cases are reported and some other lives cannot be saved; cases such as, rape, death or cases where minors are involved, the surveyors have to research the cases details to see what happened and if one of these situations is identified the case is discarded to be surveyed to respect the citizens grieve or situation, thus randomization is also weakened by this action.

Regarding the variable response time, this variable is recorded in the system after the unit on scene report their status and then the dispatcher updates on the system by manually clicking after receiving the information. Therefore, if there is a delay by the unit on the event or by the dispatcher to input this information, a precise measure cannot be obtained or identified. Since it is not an automatic registry by the system, precision does thread this variable measurement.

5.4 Implications of the study

This study helps public administration to contemplate the different services offered to citizen as independent. Not all techniques can fit all type of services when speaking about public sector. This study rises a flag for the Dominican Public Administration Ministry, which stablished as a main indicator for public institutions the performance of surveys to measure the services. Even though, most public institutions share the same values, by the nature of the services some indicators should be re adapted and modify for each case. Besides, the 9-1-1 System can be aware that Satisfaction should not be a main indicator to pursue as an institutional mission.

5.4.1. Theoretical Implication of Study

Studies conducted about 9-1-1 service are quite unique and limited, this study will add another perspective when analyzing satisfaction of this type of service; under undesired situations. It also will add theory concepts that apply on developing countries since previous studies where mainly conducted in developed countries with a more robust health care, and various emergency systems operating.

Regarding objective and subjective measures of performance, this study supports previous authors perspectives and results such as Brown and Coulter (1983), Even Shingler, van Loon, Alter, and Bridger (2008, p. 1110), Kelly & Swindell (2002) and Brudney & England (1982)o, as they advocate for the independence of these two types of measures.

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Appendix

1- 9-1-1 Survey questions

- On scale from 1-5
    1- In general, how satisfied are you with the 9-1-1 services?

    2- How satisfied are you with the time took to pick up the call?

    3- How satisfied are you with the time take to collect information from you?

    4- How satisfied are you with the call taker knowledge?

    5- How satisfied are you with the call taker treatment?

    6- How satisfied are you with the response time?

    7- How satisfied are you with the Unit Knowledge?

    8- How satisfied are you with the Unit treatment?

    9- How satisfied are you with the coordination between agencies?

    10- Would you recommend the 9-1-1 services with friends and relatives?

    (From 1-10)

국문초록

실제 성능 대비 사용자의 만족도 추구

도미니카공화국 북부지역 9-1-1
국가비상사태체계와

주관적·객관적 성과측정에 관한 연구

Itzel Angelika Vargas Serrata

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글로벌행정전공

의료 응급 상황에서 응답 시간은 매우 중요하다. 경우에 따라 응답이 5 분보다 늦어질 경우 사망률을 크게 높일 수 있다(VIJC, 2019). 그러나 9-1-1 국가 체계는 사용자에 대한 설문조사를 통해 측정되는 전체적 만족도 추구를 제도적 비전으로 제시하는 반면, 브라운과 콜터(1983)와 같은 저자들은 실제 성과 측정과 시민 인식 간의 관계를 폐기하고 (VIJC, 2019) 응답 시간 간의 부정적인 관계를 보여주었다. 따라서 본 연구에서는 실제 응답시간으로 측정한 9-1-1 체계의 실제 성능 대비 사용자를 대상으로 설문조사를 통해 측정한 만족도 간의 관계를 평가하고자 한다.

본 연구는 설문조사가 매일 실시되고 응답시간이 시스템에 기록됨에 따라 9-1-1 체계에서 제공하는 2 차 자료를 기반으로 한다. 자료는 Pearson 상관관계와 회귀분석을 활용하여 SAS 프로그램을 통해 분석하여 객관측량과 주관측량의 관계를 평가하였다. 응답 시간이 독립 변수인 반면, 전체적 만족도는 종속 변수로 간주되었다. 사례가 속한 기관의 유형은 보건, 경찰, 공공사업, 소방관 또는 교통경찰이 연구의 주요 모형에 대한 변수를 조절하는 역할을 했다.

연구 결과 Pearson Correlation 과 Multiple regression 모두 응답 시간과 글로벌 만족도 사이에는 유의한 관계가 없는 것으로 나타났다. 그러나 5 개의 서로 다른 모델에서 5 개의 기관을 표준으로 사용한 후, 기관 중

하나인 공공사업이 기반으로 사용된 모델에서만 응답 시간과 전체적 만족도 사이에 부정적으로 유의한 관계를 보였다. 또한 공공사업을 기반으로 사용하는 동안 응답 시간과 전체적 만족도 사이에는 긍정적으로 유의미한 관계가 보건 및 경찰 기관에서 발견되었다. 그러나, 이러한 긍정적인 관계는 서비스의 이론과 논리적 사고에 위배된다.