A RELAÇÃO ENTRE OS FATORES CRIADORES DO *TECHNOSTRESS* E A QUALIDADE PERCEBIDA DE SERVIÇOS DE TECNOLOGIA DA INFORMAÇÃO

THE RELATIONSHIP BETWEEN THE TECHNOSTRESS CREATORS FACTORS AND THE PERCEIVED QUALITY OF INFORMATION TECHNOLOGY SERVICES

LA RELACIÓN ENTRE LOS FACTORES CREADORES DE TECNOESTRÉS Y LA CALIDAD PERCEBIDA DE LOS SERVICIOS DE TECNOLOGÍA DE LA INFORMACIÓN

Danilo Magno Marchiori
Doutorando em Gestão pela Universidade da Beira Interior (UBI), Portugal; Secretário de Tecnologia da Informação do Tribunal Regional Eleitoral do Espírito Santo
danilo.marchiori@gmail.com

Emerson Wagner Mainardes
Doutor em Administração pela UBI; Professor Associado da Fundação Instituto Capixaba de Pesquisa em Contabilidade, Economia e Finanças (FUCAPE), Brasil
emerson@fucape.br

Contextus
ISSNe 2178-9258
Organização: Comitê Científico Interinstitucional
Editor Científico: Carlos Adriano Santos Gomes
Avaliação : Double Blind Review pelo SEER/OJS
Revisão: Gramatical, normativa e de formatação
Recebido em 12/02/2016
Aceito em 17/08/2016
2ª versão aceita em 19/09/2016

RESUMO
Esta pesquisa apresenta a relação entre os fatores criadores do *technosstress* e a qualidade percebida de serviços prestados por departamentos internos de tecnologia da informação. Para tanto, foram realizadas regressões lineares múltiplas, a partir de uma amostra contendo 927 respostas de usuários de serviços de TI. Os participantes trabalham em 14 diferentes instituições públicas brasileiras, distribuídas entre as 5 regiões do país e fortemente dependentes de tecnologia da informação para seus processos de negócio. Os resultados mostraram que a entrega do serviço, o produto do serviço e o ambiente do serviço possuem poder explicativo sobre a qualidade geral dos serviços. Adicionalmente, os dados revelaram que a tecnoinvasão, fator criador do *technostress* referente ao sentimento dos usuários de que sua vida pessoal está sendo invadida pela tecnologia da informação, mostrou-se negativamente relacionada à qualidade geral do serviço.
Palavras-chave: Qualidade de serviços. Serviços de Tecnologia da Informação. *Technostress*.

ABSTRACT
This research presents the relationship between the technostress creators factors and the perceived quality of the services provided by internal information technology departments. To this end, multiple linear regressions were performed, from a sample containing 927 responses of IT service users. The participants work in 14 different Brazilian public institutions, allocated throughout the 5 regions of the country and are strongly dependent on information technology in their business processes. The results show that the service delivery, the service product and the service environment have explanatory power on the overall quality of services. In addition, data revealed that techno-invasion, the technostress creator factor referring to users' feeling

that their personal life is being invaded by information technology, was negatively related to the general quality of service.
Keywords: Quality of service. Information technology services. Internal service providers. Technostress.

RESUMEN
Esta investigación muestra la relación entre los factores creadores de tecnoestrés y la calidad percibida de los servicios prestados por los departamentos internos de tecnología de la información. Por lo tanto, se realizaron regresiones lineales múltiples, a partir de una muestra que contiene 927 respuestas de los usuarios de servicios de TI. Los participantes trabajan en 14 diferentes instituciones públicas brasileñas, distribuidos entre las cinco regiones del país y dependiente en gran medida de la tecnología de la información para sus procesos de negocio. Los resultados mostraron que la prestación del servicio, el producto de servicio y el ambiente de servicio tienen poder explicativo sobre la calidad general de los servicios. Además, los datos revelaron que la tecnoinvasión, el factor creador del tecnoestrés en referencia al sentimiento de los usuarios de que su vida personal están siendo invadida por la tecnología de la información, he demostrado estar negativamente relacionado a la calidad global del servicio.
Palabras clave: Calidad de los servicios. Servicios de Tecnología de la Información. Tecnoestrés.

1 INTRODUCTION

Information Technology (IT) is becoming increasingly more important to the operations and the evolution of organizations, whether they are public or private. Besides supporting the main business processes, IT may be used to enable new organizational strategies (DE HAES; VAN GREMBERGEN; DEBRECENY, 2013). However, in order for investments in IT to effectively generate value for the organizations, it is necessary that the IT be used and managed under a perspective of service provision (PEPPARD, 2003). To this extent, as explained by Vargo and Lusch (2008), organizations may benefit themselves through the development and the use of internal structures specialized in the provision of services. Thus, a department dedicating itself to the provision of IT solutions used by an organization must be considered an internal IT service provider (PITT; WATSON; KAVAN, 1995).

Finding an efficient method to measure the quality of the IT services delivered by these internal providers has been the subject of interest of several researchers (IVES; OLSON; BAROUDI, 1983; KETTINGER; LEE, 1994; 2005; MILLER; HARDGRAVE; JONES, 2013). Amongst the several tools already developed or adapted to measure the quality of IT services, the Service Quality (SERVQUAL) has been to one mostly employed by researchers and professionals SETH; DESHMUKH; VRAT, 2005).

However, its use faces resistance. For example, Ladhari (2009) identified and gathered several criticisms to the use of SERVQUAL in studies on the quality of IT services. Amidst them, it emphasizes problems related to the use of different scores, the instability of used dimensions and the conceptualization of customer expectations.

From this context, Miller, Hardgrave and Jones (2013) investigated the topic and proposed the use of a new instrument, specifically developed to measure the quality of IT services delivered by internal providers: the Information Systems Service Quality (ISS-QUAL). According to the authors, the use of the new method is more adequate, for the instrument compares expectations and perceptions from a theoretical model that operationalizes the quality of the service through the three factors of the proposed service encounter by Rust and Oliver (1994): service delivery, service product and service environment. It is considered that service encounter is the moment which the customer and the service provider interact directly, as explained by Shostach (1985).

However, working in parallel to the discussion on the best method to measure the quality of IT services, other researchers have devoted their attention to a phenomenon also related to the use of IT in organizations: technostress, which is a problem related to the difficulties that individuals have to adapt to technological changes (BROD, 1994; TARAFDAR et al., 2007; SHU; TU; WANG, 2011). If on one hand there are evidences that the intensification of the use of IT, with the consequent modification of organizational environments and processes, may support business processes and enable new strategies (DE HAES; VAN GREMBERGEN; DEBRECENY, 2013), on the other hand it can be observed that people struggle to adapt to these changes. More specifically, these struggles may be related to the feeling that the use of IT brings greater workload or that it is responsible for the invasion of their personal life. People may also suffer from the fear of being replaced by someone more skilled in IT, with the complexity of the new work environment or with the constant changes in this environment (TARAFDAR et al., 2007; RAGU-NATHAN et al., 2008).

Seen in these terms, despite technostress relating itself to several aspects of the use of IT in organizations, no studies were found which relate the phenomenon to users' perceptions about the quality of IT services being used. Furthermore, the literature on services quality acknowledge that people evaluate quality from various dimensions, including their perceptions of environmental and behavioral conditions

which involve the provision of services (BRADY; CRONIN JR., 2001). Thus, a gap was identified which is examined by the present research. Specifically, the present research's quest is to attain an answer to the following query: what relationship are there between the technostress creators factors and the perceived quality of IT services? In this sense, the objective of the present study was to identify the relationship between the creator factors of the technostress and the perceived quality of IT services provided by internal providers.

This research is an opportunity to connect two constructs previously tested, though not yet disclosed in literature: the perceived quality of IT services and the technostress. With specific concern to the former, since the ISS-QUAL is recent and the studies using the instrument are still rare (MILLER; HARDGRAVE; JONES, 2013), this is an opportunity to test the explanatory power of the model, in a different cultural and demographic environment used in the original research. In addition, the study seeks to widen the explanatory power of the instrument, from the inclusion of variables based on technostress creators factors (TARAFDAR et al., 2007; RAGU-NATHAN et al., 2008).

2 THEORETICAL FRAMEWORK

2.1 The quality of internal providers of it services

Currently, organizations depend so much on their information systems that in many cases, an interruption of its operations would paralyze the affected organization, as explained by Peppard (2003). The author also clarified that, in many organizations, the provision of IT services is the duty of internal departments, specialized for this end. To this same end, Kettinger and Lee (1997) suggested that the provision of IT services to users is an essential aspect of the performance of modern organizations IT departments.

As in other areas, IT field researchers have been devoted to the development of instruments for measuring the perceived quality of services provided by internal providers (IVES; OLSON; BAROUDI, 1983; KETTINGER; LEE, 1994; 1997; 2005; MILLER; HARDGRAVE; JONES, 2013). Therefore, as highlighted by Sylvester, Tate and Johnstone (2007), the instrument mostly used to this end has been SERVQUAL, introduced to the field by Kettinger and Lee (1994). Since then, the use of SERVQUAL and its variations is a practice among researchers and practitioners, in spite of the various academic events regarding the inadequacy

of the model in the IT field (MILLER; HARDGRAVE; JONES, 2013).

It is within this context that, Miller, Hardgrave and Jones (2013) developed a method to measure the perceived quality of IT services to overcome the defects and limitations of SERVQUAL. For this purpose, researchers adopted as a starting point the concept of service encounters proposed by Rust and Oliver (1994), from the "Nordic" perspective introduced by Grönroos (1982; 1984). Under this theoretical lens, the service encounters must be comprehended from three dimensions (or factors): the service delivery, service product and the service environment.

Service delivery involves aspects related to the interaction between the provider and the consumer of services, such as, for example, the perceptions of users about the credibility, honesty, courtesy, skillfulness and the professional appearance of IT service providers' personnel, amongst others. That is to say, service delivery is related to "how" service is provided (MILLER; HARDGRAVE; JONES, 2013).

The service product refers to the result expected by the users when seeking the assistance of the service provider, more specifically the utility of the result of the provision of services. For example, aspects such as the supply, variety and usefulness of the services provided will be evaluated, as well as the degree of innovation present in these services. That is, the product of the service is related to "what" is offered by the service provider. (MILLER, HARDGRAVE, JONES, 2013).

Finally, the service environment captures the aspects of the service encounter that affect the delivery of the service that embrace the "moment of truth", but are not part of the service product. To be more specific, the service environment is what Bitner (1992) referred to as service "atmosphere". Putting it into the IT context, service environment measures the perceptions of users regarding quantity, the ease and the convenience of use of the forms of interaction with the IT department, as well as the efficiency of these means (MILLER; HARDGRAVE; JONES, 2013).

From the concept described, Miller, Hardgrave and Jones (2013) developed and validated a new model to measure the perceived quality of the services delivered by internal providers: ISS-QUAL, or Information Systems Service Quality. The new instrument operates the perceived quality of IT services from the three factors of the service encounter proposed by Rust and Oliver (1994). With the intention of measuring the explanatory power of the model, developed from a relationship of cause and effect, the general perception of users on the quality of services delivered by

IT service providers of organizations was also measured.

An outstanding characteristic of the ISS-QUAL is the fact that the instrument compares expectations and perceptions through a single questionnaire, unlike SERVQUAL, which uses two instruments. For this purpose, the questions relating to the overall quality of the service are presented in the form of statements on which users indicate their level of agreement. On the questions relating to the delivery of service though, to the service product and the service environment, users inform whether their perceptions are above or below their expectations. Therefore, the disconfirmation between expectations and perceptions is captured directly, according to solution originally proposed by Carman (1990). Thus, problems attributed to SERVQUAL are avoided related to differences in scores (Miller and Hardgrave and Jones, 2013). Therefore, the fact that the ISS-QUAL is applied through a single and shorter questionnaire brings a practical advantage over SERVQUAL, a longer and more tiresome questionnaire.

Furthermore, the outcomes of Miller, Hardgrave and Jones (2013) suggest that the ISS-QUAL is a more effective model to measure the perceived quality by clients of the internal providers of IT services, bearing in mind that it was designed specifically to this end. To briefly summarize, based on the evidence found in the literature (RUST; OLIVER, 1994; MILLER; HARDGRAVE; JONES, 2013), developed the following hypotheses which were tested in this present study.

H1: The perception of users regarding the service delivery is positively related to the perceived quality of IT services.
H2: The perception of users regarding the service product is positively related to the perceived quality of IT services.
H3: The perception of users regarding the service environment is positively related to the perceived quality of IT services.

2.2 Technostress

The term technostress was originally proposed by psychologist Craig Brod, from his perception on people's incapacity to deal with IT in a healthy way (Brod, 1984). Subsequently, Amtez and Wihom (1997) detected that some people were experiencing changes in their mental and physiological state due to the heavy dependence on computers in their professional lives. In that same year, technostress was conceptualized as being "any negative impact on attitudes, thoughts, behaviors or body caused directly or indirectly by the usage of technology" (Weil; Rosen, 1997, p. 5). Tarafdar et al. (2007) though, demonstrate that, in an

organizational environment, technostress is a problem related to the difficulties that individuals have in order to adapt to technological changes, causing fatigue, dissatisfaction, anxiety and hence reduced productivity.

In a quest to better comprehend the phenomenon, Tarafdar et al. (2007) performed a study with IT users and identified that technostress is composed by 5 factors: **techno-overload**, which is associated to situations where users are forced to work harder and faster because of the use of IT; **techno-invasion**, which refers to the invasive effect of IT, in that mechanisms are created so that employees are always connected to work and find it hard to separate personal from professional life; **techno-insecurity**, refers to the users' feeling of fear of being substituted by others who have greater skills; **techno-complexity**, refers to situations of which the users feel they lack sufficient abilities for the use of IT, as well as their efforts seeking out such capacitation; and at last, **techno-uncertainty**, which refers to the constant changes within organizations' technological environment, forcing users into a continuous process in search of new knowledge (Tarafdar et al., 2007). In a following study, Ragu-Nathan et al. (2008) presented a conceptual model that identified the five elements above as being the "technostress creators factors".

From this referential, technostress creators factors have been measured by using the instrument presented by Tarafdar et al., (20027) and Ragu-Nathan et al. (2008). The questionnaire operates a construct through the possibility of the user evincing their level of agreement in relation to the statement distributed among the 5 technostress creators factors. With this instrument, several researchers studied technostress from different perspectives and relating it to important aspects of organizational life. For example, Tarafdar et al. (2007) identified that technostress negatively impacts individual productivity and increases the stress related to the roles of individuals in organizations (role stress). Ragu-Nathan et al. (2008) though, suggest that technostress decreases job satisfaction, which deteriorates workers' commitment. The negative effect of technostress on organizational commitment (more specifically from techno-overload and from techno-uncertainty) was also identified by Ahmad, Amin and Ismail (2013). Technostress levels are inversely related to job satisfaction and to end users' performance (TARAFDAR; TU; RAGU-NATHAN, 2010). The phenomenon also has a strong negative relationship with users' satisfaction with the use of IT and with the intent of these to extend the use of IT in organizations (FUGLSETH; SØREBØ, 2014).

All the studies cited have one common characteristic: the use of questionnaires to measure levels of technostress. However, with researchers from various fields having demonstrated interest on the phenomenon, Rield et al. (2012) innovated by adopting a neurobiological research approach: researchers found that the levels of the cortisol hormone rise before the occurrence of failures in information systems utilized by users to perform tasks. Cortisol is the hormone most related to stress in humans (RIELD et al., 2012).

To summarize, aiming to achieve the objective of this research, hypotheses were developed directly related to the effects of technostress creators factors regarding the perception of IT users with respect to the quality of the services received. Considering the present evidences in literature (TARAFDAR; TU; RAGU-NATHAN, 2010; FUGLSETH; SØREBØ, 2014) indicating that the technostress creators factors impact negatively on the performance and satisfaction with the use of IT, as well as reducing their compliance to expand the use of IT in organizations, this study adopted the proposition that technostress creators factors also negatively affect the perceived quality of IT services.

More specifically, bearing in mind that Techno-overload captures the negative effect reported by users of the potential that IT has in order to make them work harder and faster, it is noticeable that it is possible for this problem to interfere on users perception regarding the quality of received IT services. Thus, the following hypothesis was proposed:

H4: Levels of technostress amongst IT users are negatively related to the perceived quality of IT services.

Subsequently, seeing that techno-invasion is related to the users' feeling of dedicating part of their personal life to work, remaining connected to organizations through technological means made available by the internal IT department (web portals, e-mail, mobile devices, notepads etc.) the following hypothesis was developed:

H5: Levels of techno-invasion among IT users are negatively related to the perceived quality of IT services.

Following, bearing in mind that techno-complexity measures users' difficulties to deal with the complexity of technological environments surrounding them, being this environment provided and sustained by the IT department, the following hypothesis was elaborated:

H6: Levels of techno-complexity among IT users are negatively related to the perceived quality of IT services.

At last, considering that techno-uncertainty is related to the constant changes occurring in organizations' technological environment and seeing that changes are planned and operated by IT departments, the following hypothesis was introduced:

H7: Levels of techno-uncertainty among IT users are negatively related to the perceived quality of IT services.

Therefore, the 4 hypothesis above evaluate the relationship of technostress creators factors with the perceived quality of IT services. It should be also noted that, in order to adapt the research to the context, the study did not test the impact of the fear experienced by users of being substituted by someone with greater IT skills (techno-insecurity) on the service quality. The reason being is that the surveyed users, as civil servants, enjoy job security according to Brazilian law. Taking that into account, a hypothesis evaluating techno-insecurity does not make sense.

3 METHODOLOGY

For the present study, a quantitative approach was adopted, descriptive and with the use of a cross-section. Data can be classified as primary and subjective. To achieve the research's objective 27 public agencies linked to the judiciary were invited to participate, one for each Brazilian state. The choice was motivated by the intensive use of IT on processes of these institutions and for the fact that all of them use internal departments to provide IT services. Fourteen agencies agreed to participate, with representatives from the 5 regions of the country and forming a population of approximately 4.500 users of IT services. These users are spread among the headquarter of each agency, located in the capital of each respective state, and 1.593 administrative units located in inland municipalities.

The sample is constituted by 927 users who filled up the instrument of research completely, which means a response rate of 20.3%. As participation was deliberate, it is important to highlight that sampling was non-probabilistic and accessibility criterion HAIR JR et al., 2005).

The data research were collected through a digital questionnaire, structured and non-disguised, made available by e-mail. The instrument has four parts. The first one, containing 6 questions, is committed to collect the following essential information to characterize the sample: the organization (ORG), gender (GEN), age (AGE), level of education (EDU), time experience in the organization (EXP) and workplace (WPL). The second section, measures the perceived quality of IT services, being based on the ISS-QUAL

instrument (MILLER, HARDGRAVE and JONES, 2013), built from the 3 service encounter factors proposed by Rust and Oliver (1994). For this purpose, 7 questions were inserted to measure the variable service delivery (SED). A further 4 questions are committed to capture the service product (SEP). At last, 5 questions measure the variable service environment (SEE). Through each one of these 16 questions, users were requested to expose their evaluation regarding the services received. To this end, they were able to select their answer from a 5-point Likert scale, which ranges from "much lower than expected" to "much higher than expected". Thus, according to Miller, Hardgrave and Jones (2013), it is possible to directly capture the disconfirmation between expectations and perceptions. In the third part of the instrument, again we resorted to Miller, Hardgrave and Jones (2013). Formed by 3 questions, this section was committed to the formation of the dependent variable of the model: the overall services quality (OSQ).

Finally, the fourth part of the questionnaire captured 4 technostress creators factors considered in the present research, adapting itself to the questionnaire introduced by Tarafdar et al. (2007) and Ragu-Nathan et al. (2008). The variable techno-overload (TOV) was measured through 5 questions. For techno-invasion (TIV), 4 questions were used. Techno-complexity (TCO) though, was measured with 5 questions. Lastly, 4 questions captured the techno-uncertainty (TUC). In all cases, a 5-point Likert scale was used, ranging from "totally disagree" to "totally agree". Thus, the applied questionnaire contained a total of 43 questions, wherein for parts 2 to 4 it was also offered the response option "do not know" or "does not apply". Before being applied, the questionnaires were submitted to a group of 6 users to verify the understanding of the questions, with no problems being registered (HAIR JR et al., 2005).

To answer the objective of the research, a multiple liner regression was performed between the dependent variable (OSQ) and the 7 chosen regressors for this study (SED, SEP, SEE, TOV, TIV, TCO, TUC), making use of the step forward selection method. This allowed to find the variables that explain the variation of users' opinions regarding the quality of IT services received, with significance level at 5%. In the same line, the validity of the sample was checked with multicollinearity, randomness, distribution for normality, homoscedasticity and analysis of variance tests. No problems were detected and the sample was considered valid.

4 DATA ANALYSIS AND DISCUSSION

In order to allow the characterization of the sample, the survey captured information about users, summarized in Table 1.

Table 1 - Summary of the sample characterization

Distribution of Organizations by Country Region	North and Northeast	32.90%
	Southeast and Midwest	29.02%
	South	38.08%
Gender	Male	56.96%
	Female	43.04%
Age	From 20 to 29 years	7.44%
	From 30 to39 years	40.67%
	From 40 to 49 years	34.41%
	Over 50 years	17.48%
Level of Education	High School	6.15%
	Graduate	29.02%
	Specialization	58.58%
	Masters and Doctorate	5.83%
	Other	0.43%
Time of Experience in the Organization	Up to 5 years	17.37%
	From 6 to 10 years	48.54%
	From 11 to 15 years	6.47%
	From 16 to 20 years	18.23%
	Over 20 years	9.39%
Users Location in the Organization	Organization's Headquarter	40.78%
	Decentralized Unit	59.22%

Source: Research data

By observing Table 1, it is noticeable that users are spread across the Brazilian territory. Despite the predominance of respondents being crowded in states members of the South region (38.08%), the research captured the opinion of users belonging to all regions of the country, increasing the heterogeneity of the sample and allowing the achievement of a more general analysis of the results. This conclusion is also supported by the finding that most of the participants (59.02%) work in administrative units located in various municipalities of each state.

The data on the gender and age of participants permitted to determine that the respondent of the research is the typical user of the organization, not having observed biases or tendencies that may undermine the representativeness of the sample. Table 2 presents the means (M) and the standard deviation (SD) of the studied variables. In order to simplify the presentation of the results, the variables and their items were converted into codes (HAIR JR et al., 2005).

Table 2 - Descriptive statistics

Code	Description	M	SD
SED1	The credibility/capacity to provide services delivered by the employees of the IT department.	3.93	0.75
SED2	The willingness of employees of the IT department to provide services.	3.95	0.86
SED3	The courtesy of the IT department employees.	4.08	0.78
SED4	The honesty/reliability of employees of the IT department.	4.18	0.68
SED5	The personalized service offered by employees of the IT department.	3.95	0.83
SED6	The ability of the IT department employees to communicate comprehensibly.	3.80	0.88
SED7	The professional appearance of IT department employees.	3.67	0.75
SED	**Service Delivery (Mean)**	**3.94**	**0.62**
SEP1	The offer of services provided by the IT department.	3.70	0.90
SEP2	The variety of services provided by the IT department.	3.68	0.91
SEP3	The usefulness of the services provided by the IT department.	4.07	0.77
SEP4	The degree of innovation of the services provided by the IT department.	3.50	1.01
SEP	**Service Product (Mean)**	**3.74**	**0.79**
SEE1	The number of ways to interact with the IT department (phone, email, service center, etc.).	3.80	0.91
SEE2	The ease of interaction with the IT department via phone, e-mail, service center, etc..	3.76	0.96
SEE3	The convenience in the interaction with the IT department via phone, e-mail, service center, etc..	3.79	0.87
SEE4	The efficient use of phone, email, service center, etc., to interact with the IT department.	3.78	0.92
SEE5	The variety of ways to interact with the IT department (phone, email, service center, etc.).	3.74	0.91
SEE	**Service Environment (Mean)**	**3.77**	**0.83**
OSQ1	I would rate our IT department as an excellent service provider.	3.98	0.97
OSQ2	I am very satisfied with the services provided by our IT department.	3.94	1.00
OSQ3	Overall, our IT department offers a service of excellent quality.	4.01	0.99
OSQ	**Overall Service Quality (Mean)**	**3.98**	**0.96**
TOV1	I am forced to work faster because of information technology used at work	2.47	1.31
TOV2	I am forced to work more than I can because of information technology used at work	2.00	1.20
TOV3	I am forced to work with very tight schedules because of information technology used at work	2.29	1.27
TOV4	I am forced change my work habits to adapt to new technologies	2.65	1.36
TOV5	I have a bigger workload due to increased technological complexity	2.12	1.31
TOV	**Techno-Overload (Mean)**	**2.31**	**1.04**
TIV1	I spend less time with my family because of information technology used at work	1.61	1.02
TIV2	I am in contact with work even during vacation because of information technology used at work	1.96	1.24
TIV3	I have to sacrifice my vacation time and weekends to keep myself updated with new technologies	1.50	0.89
TIV4	I feel that my personal life is being invaded because of information technology used at work	1.51	0.90
TIV	**Techno-Invasion (Mean)**	**1.65**	**0.78**
TCO1	I do not know enough about information technology to deal satisfactorily with my work	1.91	1.09

Table 2 - Descriptive statistics (cont.)

TCO2	I need a long time to understand and use new technologies	1.79	1.03
TCO3	I do not find enough time to study and catch up with technology	2,31	1,22
TCO4	I think the newcomers of this organization know more about technology than I	2.27	1.27
TCO5	I often find it very complex to understand and use new technologies	1.82	1.02
TCO	**Techno-complexity (Mean)**	**2.02**	**0.86**
TUC1	The technologies used in our organization are always evolving	3.62	1.13
TUC2	There are constant changes in software (programs, systems, applications, etc.) in our organization	3.19	1.10
TUC3	There are constant changes in equipment (computers, printers, scanners, etc.) in our organization	2.93	1.15
TUC4	There are frequent changes in computer network used in our organization.	2.56	1.06
TUC	**Techno-Uncertainty (Mean)**	**3.07**	**0.88**

Source: Research data.

By analyzing Table 2, it was initially determined that the three derived variables of the instrument ISS-QUAL (MILLER; HARDGRAVE; JONES, 2013), service delivery (SED) service product (SEP) and service environment (SEE) obtained the highest means e lowest standard deviations, indicating a high level of users' satisfaction and a good level of agreement about it. These evidences are met by the findings that a dependent variable, overall service quality (OSQ), reached a mean of 3.98, which represents 73.25% of best possible score, and it was accompanied by a reasonable level of agreement of opinions (SD = 0.96).

In this regard, the highest mean (M=3.94) was observed in variable service delivery (SED), which is related to the way in which the service is delivered. This was also the variable that obtained the highest consensus among respondents (SD=0.62). Among its components the items related to honesty\reliability (M = 4.18) and courtesy of IT department employees (M=4.08) stood out positively. On the other hand, the results were partially jeopardized by an opinion slightly more restrained from users regarding the professional appearance of staff (M = 3.67) and on the ability of these professionals to clearly communicate (M = 3.80). However, it is important to highlight that all the service delivery items reached higher levels to neutrality and with a high degree of agreement of opinions, because in any case the standard deviation surpassed the mark of 0.88.

The second highest mean (M=3.77) was found in the variable service environment (SEE), which is related to the atmosphere surrounding the provision of the service, including the virtual environment. A detailed analysis of its items reveals that all that obtained means very close, without the existence of highlights. The level of agreement among respondents was also high (SD=0.833).

Completing the analysis of the variables derived from the ISS-QUAL, the service product (SEP) presented an approximate mean, though slightly inferior to the two variables cited above (M=3.74). In this construct, which captures the opinion of users regarding the effective result of service delivery, it was also detected a high level of agreement in opinions (SD = 0.79). The positive highlight was the good assessment of the usefulness of the services provided (M = 4.07). On the other hand, the item service innovation obtained an evaluation slightly lower (M = 3.5), being closer to neutrality. This was also the only item of the construct to overcome the mark of 1 for the standard deviation (SD=1.1).

By comparing these data with the findings by Miller, Hardgrave and Jones (2013), a strong similarity of the results is noticeable. Table 3 presents the indicator which reflects the obtained mean in each service encounter factor on a percentage on the highest score possible. The objective is to allow the information comparison to be performed between the researches, bearing in mind that different scales were used. Similarly, the standard deviations found are presented, and can also be compared the Cronbach's alpha (**α**) of each construct. The results indicate that users evaluate very positively the analyzed aspects in both investigations. However, the standard deviations found in this study were significantly lower, which suggest a higher level of agreement among participants. One of the possible explanations is the fact that this study was performed only in public organizations, from the same activity segment. Finally, reliability indicators found in the constructs in the two studies are high (greater than 0.90), which suggests an excellent level of internal consistency between the items of the construct.

Table 3 - Comparative of the service encounter factors

Variable	Miller, Hardgrave and Jones (2013)			Present research data		
	%	SD	α	%	SD	A
Service Delivery	71.87	1.01	0.93	73.50	0.62	0.90
Service Product	71.90	1.13	0.93	68.50	0.79	0.90
Service environment	69.15	1.39	0.97	69.25	0.83	0.94

Source: Own elaboration.

On the other hand, the assessment of the variables related to technostress (TARAFDAR et al., 2007; RAGU-NATHAN et al., 2008) presented a very distinct picture. Overall, the means found were low, suggesting that this problem does not manifest itself in a relevant way in the perception of the population studied.

For example, the lowest mean among the variables of the research (M=1.65) was detected in the techno-invasion construct (TIV). That is, the users surveyed estimate that their personal lives are not being heavily invaded by the use of IT in their organizations. And this appears to be a homogeneous opinion (SD = 0.78). Despite all items of the variable presenting low means, some users stated to keep in touch with work, even during their vacation periods, due to the use of IT in organizations. This statement is based on the fact that this item had presented the highest mean of the construct (M=1.96) and a high degree of disagreement in the responses (SD=1.24).

Similarly, users reported not facing many difficulties with the complexity of the technological environment they use in their work. It is suggested by the mean 2.02 identified in the variable techno-complexity (TCO), as well as the standard deviation of 0.86. Among the items that compose the construct, it was made noticeable the users' feeling of not having enough time to study and to keep up to date with technology (M=2.31), anon-consensual view (SD=1.22). On the other hand, the item of lesser impact was the view that the users find it complex to understand and use new technologies (M = 1.82).

A little more present, but still discordant, was the position of the result of the variable techno-overload (TOV), with a 2.31 mean. The data suggest that most users do not realize how important the difficulties they face related to the increased volume of work provided by the use of IT in their organizations. However, this is not a homogenous opinion, in view of the detection of a 1.04 standard deviation, the highest among the researched variables. Thus, the data indicate that the users reported being subject to this problem, which can be explained by the use different technological solutions by internal agency departments, as well as by the uneven distribution of the workload among the areas of the organization.

Finally, the variable techno-uncertainty (TUC) was the one that presented the highest mean among the four variables related to technostress, reaching a value slightly above neutrality (M=3.07), as well as a high degree of convergence of views (SD = 0.88). In this construct, which is related to the constant changes in the technological environment of the organization, the highlight was the item on the constantly evolving technological environment utilized by users (M=3.62, SD=1.13). It is interesting to notice that the values found were very similar to those obtained by the item that measured the

degree of innovation of services provided by the IT department (M=3.50 and SD=1.01), present in the product service construct.

By comparing the results obtained in this research with data from investigations by Tarafdar et al. (2007) and Ragu-Nathan et al. (2008), several similarities were also identified (Table 4). In general, technostress levels detected in all three searches were low, and that in all three cases the techno-complexity variable was the one that achieved the highest score. Likewise, the variable techno-invasion obtained the lowest mean in the three studies. The standard deviations also approximated and generally indicated a reasonable level of agreement among the participants. Finally, the reliability indicators of the construct were located at similar levels, a little below those found in the 3 variables of the service encounter, but with an adequate degree of consistency.

Table 4 - Comparison of the technostress creators factors

Variable	Tarafdar et al. (2007)			Ragu-Nathan et al. (2008)			Present research data		
	%	DP	A	%	DP	α	%	DP	α
Techno-Overload	49.25	1.00	0.89	50.00	0.91	0.82	32.75	1.04	0.86
Techno-Invasion	22.75	0.77	0.81	30.25	0.83	0.80	16.25	0.78	0.77
Techno-Complexity	38.50	0.83	0.84	42.75	0.75	0.77	25.50	0.86	0.82
Techno-Uncertainty	53.75	0.80	0.82	58.25	0.76	0.83	51.75	0.88	0.80

Source: Own elaboration.

Despite the similarities between the results, it was noticeable that the levels of technostress detected in this study were lower compared to other studies presented in Table 4. In addition to differences related to the technological environment of the surveyed organizations, a possible explanation to the observed reduction of technostress, the four factors studied, may be the fact that seven years have passed since the completion of the previous studies. Over this period, users intensely experienced the use of IT in their professional and personal lives, so that technology is already part of their lives. Thus, the data suggest that users may have become accustomed to the use of IT, which may have caused a reduction in technostress levels.

Finally, descriptive statistics indicate that, in general, the variables related to the factors of the service encounter achieved higher levels, indicating a good level of satisfaction with IT services provided by evaluated internal providers. On the other hand, the creators factors of technostress, although present, achieved means near or below the neutrality. Finally, the analysis of Cronbach's alphas indicates the internal consistency reliability of the

instrument used in the research, whereas all found values were situated between 0.77 and 0.94, higher than the minimum recommended value of 0.70 (HAIR JR et al., 2005).

In order to answer the problem that motivates this research, that is, to identify the relation between the creators factors of technostress and the perceived quality of IT services, a multiple linear regression was performed between the dependent variable overall service quality (OSQ) and 7 other variables. The first three, service delivery (SED), service product (SEP) and service environment (SEE), already have their influence on the perception of quality of services attributed in the literature (MILLER, HARDGRAVE and JONES, 2013). The other four, derived form the creators factors of technostress (RAGU-NATHAN et al., 2008), despite it being tested already by the academe, they had not yet been linked to the quality of services. They are: techno-overload (TOV), techno-invasion (TIV), techno-complexity (TCO), and techno-uncertainty (TUC). This way, Table 8 presents the linear regression model obtained through the stepwise method.

Table 5 - model summary

Model	R	R^2	R^2 Adjusted	Standard error estimator	Change Statistics					Durbin-Watson
					R^2 Change	F	df1	df2	Sig. F	
4	0.843	.710	**.709**	.51553	.001	4.178	1	922	.041	1.987

Note. Validity tests:
Anova: significant
Randomness test: supports the hypothesis randomness
Kolmogorov-Smirnov's Adhesion Test: it supports the adhesion hypothesis to normal distribution
Homoscedasticity test: supports the homoscedasticity hypothesis.
Source: Research data.

After analyzing Table 5, it was determined that the resulting model has an adjusted R^2 of 0.709, that is, 70.9% of the variation on the perception of users regarding the overall service quality (OSQ) is explained by the model. The explanatory power of the tested model was slightly lower than that found in the model proposed by Miller, Hardgrave and Jones (2013), who explained 77% of the variation of the overall service quality from the three variables from the service encounter. However, it was noticed that the R^2 adjusted of 0.709 was significantly higher than that found from the use of the SERVQUAL instrument, whose explanatory power was 58% (MILLER, HARDGRAVE and JONES, 2013). Similarly, Brandon-Jones and Sylvestro (2010), when comparing models based on gap measurement approaches with instruments that measure the perception of

users, reached R^2 adjusted of 0.549 and 0.665 respectively. Following the data analysis, Table 6 shows, highlighting, the significant variables to the model.

Table 6 - Estimated coefficient of the dependent variable "Overall service quality"

Model	Non-standardized coefficients		Standardized coefficients	*T*	Sig.	95,0% Confidence interval for B		Correlation			Collinearity statistics	
	B	Standard error	Beta			Lower Lim.	Upper Lim.	Zero Order	Partial	Part	Toler.	VIF
(Constant)	-.758	.122		-6.222	.000	-.997	-.519					
SEDM	.636	.044	.414	14.630	**.000**	.551	.722	.785	.434	.259	.393	2.547
SEPM	.428	.032	.355	13.372	**.000**	.365	.491	.759	.403	.237	.447	2.238
SEEM	.187	.030	.161	6.239	**.000**	.128	.245	.682	.201	.111	.470	2.129
TIVM	-.045	.022	-.037	-2.044	**.041**	-.088	-.002	-.167	-.067	-.036	.968	1.033

Note. Dependent Variable: overall service quality.
Source: Data research.

From these information, it was identified that the variables that are associated with the overall service quality (OSQ) were: service delivery (SED), service product (SEP), service environment (SEE) and techno-invasion (TIV). In contrast, the other studied variables, techno-overload (TOV), techno-complexity (TCO) and techno-uncertainty (TUC) did not present significant explanatory power over the dependent variable.

The first hypothesis (H1) investigated in this study proposed that users' perception regarding service delivery, service encounter dimension derived from the Functional Quality proposed by Grönroos (1982, 1984), is positively related to the evaluation of the overall service quality. The regression results support this hypothesis. Thus, the data suggest that the better the perception of users on "how" the service is provided, the better his overall assessment of the service provider.

The second hypothesis (H2) contend that users' perception on the service product, which corresponds to the Technical Quality dimension by Grönroos (1982, 1984), is positively related to the overall service quality. Again the results supported the hypothesis. Therefore, the higher the evaluation of users regarding the final result of the provision of services, the better their perception of the overall service quality received.

On the third hypothesis (H3), in turn, it was proposed that the perception of users about the service environment, that is, on aspects involving the service encounter, impacts positively the overall perception of quality. Once more, the results did not reject the hypothesis. This suggests that the better the "atmosphere" which involves the

provision of services, as described by Bitner (1992), the better the users' perception of the overall service quality provided by organizations' internal IT department.

The finding that the three hypotheses related to the service encounter were supported by the present research corroborates the findings by Miller, Hardgrave and Jones (2013). Researchers presented a model for measuring the overall service quality, the ISS-QUAL, built only with elaborate questions to identify the perceptions of users. The results of this study corroborate the applicability of the model.

However, the outcome of the fifth hypothesis test (H5), which proposed that the levels of techno-invasion among IT users will be negatively related to the evaluation of the overall service quality, add a scale to the model proposed by Miller, Hardgrave and Jones (2013). The results did not reject the hypothesis. Therefore, it is possible to suggest that the greater the feeling of users that their personal life is being invaded by IT used at work, the lower their assessment on the overall service quality provided by the internal IT department of the organization will be. One possible explanation for this is the fact that IT has led to the expansion of normal working hours (KENNY; COOPER, 2003). Currently, users keep themselves connected to work through mobile devices, even during their free time, producing the feeling of invasion of his private life by IT and reducing job satisfaction (RAGU-NATHAN *et al.*, 2008). Thus, it is possible for users to associate this negative feeling towards technology, to the provider of IT services, responsible for the development and maintenance of these technological tools.

Finally, hypothesis H4, H6, and H7, which proposed that techno-overload, techno-complexity and techno-invasion, respectively, were negatively related to the overall service quality were rejected. Thus, data indicate that these three technostress creators factors were not significantly associated to users' perception of the service quality.

5 CONCLUSION

The objective of this study was to identify the relationship between technostress creators factors and the perceived quality of IT services delivered by internal providers. The results indicated that the overall service quality can be explained by the service encounter factors (service delivery, product delivery and service environment), corroborating the study by Miller, Hardgrave and Jones (2013). Going beyond, the results also suggest that techno-invasion, that is, the users' perception that his personal life is

being invaded by the use of IT, has a negative association with the perception of services quality delivered by internal IT providers. Possibly, users who presented difficulties in adapting with respect to this specific aspect of technostress tend to partially direct to the IT service provider their dissatisfaction, in view that this is the responsible sector for the supply and maintenance of technological mechanisms that make users sometimes devote their spare time to work.

Seen in these terms, the results of the study suggest that the quality of the IT service is not perceived only by the variables from the service itself (delivery, product and environment). As was the case with techno-invasion in this study, there may be other perceptual viable affecting the perceived quality of the IT service, and may be related to oneself or to the organizational environment.

As academic implications, this study contributes to the IT service quality literature insofar as its results, obtained from a cultural and demographic environment different from the original, support the most recent model presented by Miller, Hardgrave and Jones (2013), the ISS-QUAL. Moreover, it was detected that the explanatory power of the instrument may be expanded with the addition of users' perception with regard to the perceived invasion of their personal lives by IT (techno-invasion). This finding gains importance given the possibility that the problem causes an increasing impact on the lives of users, for organizations tend to expand the use of mobile devices, leading workers to widen contact with work during their time off work (KENNY; COOPER, 2003). The study also helps organizations enhance IT services provided and consumed internally, for it supplies elements to managers to expand their understanding about the quality of IT services and technostress. Furthermore, in describing the conditions under which the research was conducted, as well as a detailed overview of its stages and methods applied, the present study may be a guide to the IT departments to conduct internal investigations on service quality and on technostress.

However, the work has limitations that must be highlighted. Primarily, it is important to highlight that the study was performed only in public institutions, which have distinct characteristics from the private sector, especially job security (RAINEY; CHUN, 2005; BAARSPUL; WILDEROM, 2011). Another limitation refers to the use of a non-probabilistic method. Thus, it is not possible to generalize the findings of this study, but only to evidence behaviors and perceptions.

Finally, as a suggestion for future studies, it is indicated the possibility of this

study being reproduced within the private sector, with the inclusion of the technostress creator factor excluded from this study: techno-insecurity. This construct captures IT users' difficulties combined with the fear of being replaced by someone more knowledgeable. Another suggestion is to research the role of technostress inhibitors on the quality of IT service. According to Ragu-Nathan *et al.* (2008), the alphabetization in IT (literacy facilitation), technical support provision and the users' involvement facilitation produce a positive effect on the reduction of technostress effects, rendering this research specially relevant.

REFERENCES

AHMAD, Ungku Norulkamar Ungku; AMIN, Salmiah Mohamad; ISMAIL, Wan Khairuzzaman Wan. Moderating Effect of Technostress Inhibitors on the Relationship between Technostress Creators and Organisational Commitment. **Jurnal Teknologi**, v. 67, n. 1, 2014.

ARNETZ, Bengt B.; WIHOLM, Clairy. Technological stress: Psychophysiological symptoms in modern offices. **Journal of psychosomatic research**, v. 43, n. 1, p. 35-42, 1997.

BAARSPUL, Hayo C.; WILDEROM, Celeste PM. Do employees behave differently in public-vs private-sector organizations? A state-of-the-art review. **Public management review**, v. 13, n. 7, p. 967-1002, 2011.

BRANDON-JONES, Alistair; SILVESTRO, Rhian. Measuring internal service quality: comparing the gap-based and perceptions-only approaches. **International Journal of Operations & Production Management**, v. 30, n. 12, p. 1291-1318, 2010.

BRADY, Michael K.; CRONIN JR., J. Joseph. Some new thoughts on conceptualizing perceived service quality: a hierarchical approach. **Journal of marketing**, v. 65, n. 3, p. 34-49, 2001.

BITNER, Mary Jo. Servicescapes: the impact of physical surroundings on customers and employees. **The Journal of Marketing**, p. 57-71, 1992.

BOGG, Janet; COOPER, Cary. Job satisfaction, mental health, and occupational stress among senior civil servants. **Human Relations**, v. 48, n. 3, p. 327-341, 1995.

BROD, Craig. **Technostress: The human cost of the computer revolution**. Addison Wesley Publishing Company, 1984.

CARMAN, James M. Consumer perceptions of service quality: An assessment of the SERVQUAL dimensions. **Journal of retailing**, 1990.

DE HAES, Steven; VAN GREMBERGEN, Wim; DEBRECENY, Roger S. COBIT 5 and enterprise governance of information technology: Building blocks and research opportunities. **Journal of Information Systems**, v. 27, n. 1, p. 307-324, 2013.

FUGLSETH, Anna Mette; SØREBØ, Øystein. The effects of technostress within the context of employee use of ICT. **Computers in Human Behavior**, v. 40, p. 161-170, 2014.

GIANESI, Irineu G.N.; CORRÊA, Luis H. **Administração e estratégica de serviços**. São Paulo: Atlas, 1994.

GRÖNROOS, Christian., **Strategic Management and marketing in the service sector**, Helsinki/Helsingfors: Swedish School of Economics, Finlândia, 1982.

_____. A service quality model and its marketing implications. **European Journal of Marketing**, v. 18, n. 4, p. 36-45, 1984.

HAIR JR, J. F., BABIN, B., MONEY, A. H., SAMOUEL, P. **Fundamentos de métodos de pesquisa em administração**. Porto Alegre: Bookman, 2005.

IVES, Blake; OLSON, Margrethe H.; BAROUDI, Jack J. The measurement of user information satisfaction. **Communications of the ACM**, v. 26, n. 10, p. 785-793, 1983.

KENNY, Dianna T.; COOPER, Cary L. Introduction: Occupational stress and its management. **International Journal of Stress Management**, v. 10, n. 4, p. 275, 2003.

KETTINGER, William J.; LEE, Choong C. Perceived service quality and user satisfaction with the information services function*. **Decision sciences**, v. 25, n. 5-6, p. 737-766, 1994.

_____; _____. Pragmatic perspectives on the measurement of information systems service quality. **Mis Quarterly**, p. 223-240, 1997.

KETTINGER, William J.; LEE, Choong C. Zones of tolerance: alternative scales for measuring information systems service quality. **Mis Quarterly**, p. 607-623, 2005.

LADHARI, Riadh. A review of twenty years of SERVQUAL research. **International Journal of Quality and Service Sciences**, v. 1, n. 2, p. 172-198, 2009.

MILLER, Robert E.; HARDGRAVE, Bill C.; JONES, Thomas W. ISS-QUAL: A Measure of Service Quality for the Information Systems Function. **Information Systems Management**, v. 30, n. 3, p. 250-262, 2013.

PEPPARD, Joe. Managing IT as a Portfolio of Services. European **Management Journal**, v. 21, n. 4, p. 467-483, 2003.

PEREIRA, Veridiana Rotondaro; CARVALHO, Marly Monteiro de; ROTONDARO, Roberto Giglioli. Um estudo bibliométrico sobre a evolução da pesquisa da qualidade em serviço. **Production Journal**, v. 23, n. 2, p. 312-328, 2013.

PITT, Leyland F.; WATSON, Richard T.; KAVAN, C. Bruce. Service quality: a measure of information systems effectiveness. **MIS quarterly**, p. 173-187, 1995.

RAGU-NATHAN, T. S.; TARAFDAR, Monideepa; RAGU-NATHAN, Bhanu S.; TU, Qiang. The consequences of technostress for end users in organizations: Conceptual development and empirical validation. **Information Systems Research**, v. 19, n. 4, p. 417-433, 2008.

RAINEY, Hal G.; CHUN, Young Han. Public and private management compared**.** **The Oxford handbook of public management**, v. 72, p. 102, 2005.

RIEDL, René. On the biology of technostress: literature review and research agenda. **ACM SIGMIS Database**, v. 44, n. 1, p. 18-55, 2012.

RUST, Roland T.; OLIVER, Richard L.; Service quality: Insights and managerial implications from the frontier. In R. T. Rust & R. L. Oliver (Eds.), **Service quality: New dimensions in theory and practice** (pp. 1–19). Thousand Oaks, CA: Sage, 1994.

SETH, Nitin; DESHMUKH, S. G.; VRAT, Prem. Service quality models: a review. **International journal of quality & reliability management**, v. 22, n. 9, p. 913-949, 2005.

SHOSTACK, G. Lynn. Planning the services encounter. In: CZEPIEL, J.; SOLOMON, M.; SURPRENANT, C. **The service encounter**. Lexington: Lexington Books, 1985.

SHU, Qin; TU, Qiang; WANG, Kanliang. The impact of computer self-efficacy and technology dependence on computer-related technostress: A social cognitive theory perspective. **International Journal of Human-Computer Interaction**, v. 27, n. 10, p. 923-939, 2011.

SYLVESTER, Allan; TATE, Mary; JOHNSTONE, David. Re-presenting the literature review: a rich picture of service quality research in information systems. **PACIS 2007 Proceedings**, p. 113, 2007.

TARAFDAR, Monideepa; TU, Qiang; RAGU-NATHAN, Bhanu S.; RAGU-NATHAN, T. S.. The impact of technostress on role stress and productivity. **Journal of Management Information Systems**, v. 24, n. 1, p. 301-328, 2007.

TARAFDAR, Monideepa; TU, Qiang; RAGU-NATHAN, T. S. Impact of technostress on end-user satisfaction and performance. **Journal of Management Information Systems**, v. 27, n. 3, p. 303-334, 2010.

VARGO, Stephen L.; LUSCH, Robert F. Why "service"?. **Journal of the Academy of marketing Science**, v. 36, n. 1, p. 25-38, 2008.

WEIL, Michelle M.; ROSEN, Larry D. **Technostress: Coping with technology@ work@ home@ play**. Wiley, 1997.