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ljimenez@jotmi.org

Universidad Alberto Hurtado
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Mendes Lübeck, Rafael; Wittmann, Milton Luiz; Flores Battistella, Luciana
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Electronic Ticketing System As a Process of Innovation

Rafael Mendes Lübeck¹, Milton Luiz Wittmann², Luciana Flores Battistella³

Abstract

Considering the increased complexity in the competitive landscape, innovation is the keyword of the post-industrial era, and in order to be attained by the enterprises, it requires new strategies, capabilities and competencies. Considering this scenario this study included analysis of improvements achieved with the implementation of the e-ticketing system in a case of public transport in major cities of southern Brazil categorized as cases β and γ . Furthermore, it aimed to ascertain whether the improvements in information management provided by electronic ticketing qualify it as an innovation. The research was based on the theoretical model of innovation described in Tables 1, 2, 3, 4 in order to guide the research activities described. Qualitative data was collected through interviews and document analysis. The collected information was analyzed using content analysis and the amount of vehicles and passengers in the cities covered by the survey were used as secondary data. The characteristic effects of innovation were found to be in line with the results of e-ticketing in the cases analyzed, making this system a way to attain innovation. In accordance with the guidelines set for this study, it is worth emphasizing that the impacts of the e-ticketing system were considered innovative, not the system itself, because electronic billing was a means to achieve innovation and not an innovation per se.

Keywords: Innovation in services; electronic ticketing; public transport.

¹Research collaborator, PPGA/UFSM (Universidade Federal de Santa Maria) Rua Floriano Peixoto, 1184 – CEP 97015-372 Santa Maria/RS
Telefones: 55 55 3220.9258 rafael.lubeck@gmail.com

²Associate Professor, PPGA/UFSM (Universidade Federal de Santa Maria) Rua Floriano Peixoto, 1184 – CEP 97015-372 Santa Maria/RS
Telefones: 55 55 3220.9258 wittmann@profwittmann.com

³Associate Professor, PPGA/UFSM (Universidade Federal de Santa Maria) Rua Floriano Peixoto, 1184 – CEP 97015-372 Santa Maria/RS
Telefones: 55 55 3220.9258 luttibattistella@gmail.com

Introduction

The concept of innovation was strengthened and spread through the classic works of economist Joseph A. Schumpeter in the twentieth century. These studies guided the debate on the theories of economic development which functioned under the theoretical framework of innovation and development. This should highlight the positive effects of management, process and product innovation in view of economic development of nations, institutions and companies (SMITH, 2008; BYKFAVY, 2007; CHESBROUGH and KARDON, 2006; FRANCIS and BESSANT, 2005). In the Schumpeterian view, technology influences economic development resulting in impacts on economic and social dimensions, being verified in the increase of productivity and growth of wealth (SCHUMPETER, 1982; NELSON and WINTER, 2005; BERNSTEIN and SINGH, 2005; KEUPP and GASSMAN, 2009).

Among studies on innovation those related to the service sector are highlighted. Interest in the sector has grown exponentially from findings of its inference in the economic development and integration, both in emerging and developed economies, where the sector represents over 70% of wealth (GALLOUJ and SANSON, 2007). Growth occurs not only by its generative function of employment and income, but also by the importance of the services in the interface, with the industry as a way of enhancing technical progress and creating social wealth owing to new opportunities of economic development (BERNARDES and ANDREASSI, 2007). The service sector is characterized by diversity and stands out in its organization and execution with regard to other sectors (HIPPEL, 2008; DJELLAL and GALLOUJ, 2007 and GALLOUJ and SANSON (2007). It is noted that innovation surveys are relatively recent and the history of innovation research in the service industry is even more recent (HAMDANI, 2007; JACOBY and RODRIGUEZ, 2007). Innovations in services began being evident only in the post-industrial society (SIMMIE and STRAMBACH, 2006; CAMACHO and RODRIGUEZ, 2005).

The sector of public transport in major cities has been impelled by the pursuit of innovation from available technological means and by impacts caused by changes in commuter demand, growing requirements of users and Granting Authority (corresponds to government agencies which regulate urban and inter-city transport services represented by Municipal Transportation Offices; a

public company designed to regulate urban and inter-city transport services and/or regulatory agency). Also noteworthy are changes in the configuration of cities with job opportunities in locations outside of the traditional economic centers, home offices, increased and easier access to vehicle purchases for private transport, growth of the displacements on foot, traffic jams, environmental and social responsibility, which are considered to be the modus operandi of the public transport (COSTA, LUBECK and JUNIOR-LADEIRA, 2008). These factors allow us to infer the need for gain in operational efficiency and effectiveness in a sector which had a relatively stable situation. Nowadays, ticket purchase, sale and use control systems represented by electronic ticketing are gaining prominence.

In the state of Rio Grande do Sul – Brazil, the electronic ticketing system began to be implemented in the late 90's. Its beginning was in a city of the Serra Gaúcha, northeastern region of the state, and later in 2006 electronic ticketing began being implemented in the metropolitan area, according to regulatory requirements of the Granting Authority. Implementation of the ticketing was determined in view of the need to enhance information management to ensure the Granting Authority, better control of the public transport operations by transport companies and improvements in services for users.

Electronic ticketing has been developed as an evolution of credit cards with magnetic stripe due to concerns of inefficiency in information management and control of the operations. The technological platform registers users, controls ticket sale, loads credits on board the bus and issues management reports allowing accurate monitoring of data. With the implementation of this system, paper tickets or plastic chips no longer exist, only credits in Reals (R\$) to be used in any of the companies that operate on the same platform. After the credits are used on the buses, they are sent to the transport companies where the money was spent via bank payment by the central control system. The card keeps users' information stored and its reading is done on specific equipment called validators, which unlock the ticket gate installed beside it. These electronic ticketing systems aim to reduce inefficiencies of the traditional system of transport vouchers (LUBECK, WITTMANN and JUNIOR-LADEIRA, 2009).

The implementation of the electronic ticketing system was mandatory in several cities and required the establishment of consortia managers for the system among transport companies because of the dimension of the investment and common difficulties to all companies involved in the process of ticketing implementation and management. Consortia managers were responsible for developing the system which then supported the ticketing operation associated to the control equipment. The technological platform registers users, controls operations of credit sale, loads cards onboard and sends information and management reports.

This study aimed to investigate, in cases of public transport, the impacts of implementing technological solutions such as electronic ticketing in cities where the adoption of electronic ticketing was mandatory. Thus, it is intended to advance in the understanding of the effects of new technologies in management, especially in regard to information management. This factor is especially relevant because it is part of the social and economic dynamics of the public transport sector and urban commuting, contributing to academic, scientific and business debate to qualify these services in major cities in view of the development of the state and country. Considering the scenario and factors mentioned, this present research was conducted in a city and in a metropolitan region of the state of Rio Grande do Sul, located to the south of Brazil, to verify whether the improvements in information management provided by the electronic ticketing have characteristics to define it as an innovation.

Innovation

The world economies need to focus on products and services that add value through innovation by creating markets and processes (SIMMIE and STRAMBACH, 2006). In the transport sector, the introduction of new technologies associated to the nature of this segment becomes a factor of recreation of the segment itself by developing new market opportunities and improvement of services offered.

Innovation in services is often associated with the adoption of technical systems (called computerized systems) originating from the inventiveness of the industrial sectors over other less tangible or specular forms of innovation (GALLOUJ and SANSON, 2007). Technology leads to efficiency and operational effectiveness by making companies improve the quality of their products and services (GALLAUGHER, 2007) in which innovation becomes the key to productivity.

Innovation can be seen as a process which occurs in several phases starting with specific problems that go through the systematization of the existing difficulties, perception of innovative practices and political processes which involve acceptance of innovation by those involved (LOUNSBURY and CRUMLEY, 2007). Considering these arguments, establishing the benchmark on innovation to address the four factors highlighted was sought in seminal studies: forces that influence innovation (F1), definition of innovation (F2), the intensity of innovation (F3) and innovation in services (F4).

The first factor defined involves the forces that influence innovation (Table I). Evidence that allowed the identification of internal and external forms of how these forces act in the process of innovation and the understanding of each is pursued.

F1 FORCES THAT INFLUENCE INNOVATION	Author
Modes of distribution and circulation of information in the companies	<i>Coriat e Weinstein, (2002)</i>
Relations between research and innovation processes	
Trajectory forces: professional, managerial, technological, institutional and social	<i>Sundbo e Gallouj (1998)</i>
External forces: customers, competitors, government and suppliers	
Expertise, processes, resources, legislation and regulation, new markets	<i>Sheth e Ram, (1987)</i>

Table I: Forces that influence innovation/ Source: Authors cited

The second factor considered in this study refers to the definition of innovation which has been applied in the

analysis of data collected to determine if the characteristics found are consistent with other related theories.

F2 DDEFINITION OF INNOVATION	Author
Introduction of a new product or production method	<i>Schumpeter, (1982, 1942)</i>
Opening of a new market	
New sources of raw materials	
Establishing of a new organization in any industry	
Innovation itself does not exist as it foresees development and implementation of something	<i>Tether, (2005)</i> <i>Jong e Vermeulen, (2003)</i>
Activity or action that creates value in products, services and processes	<i>Smith, (2008)</i>
Idea which is available but that was not recognized or applied	
New application of something already existing	

Table 2: Definition of innovation/ Source: Authors cited

The third factor considered is the intensity of innovation, which has been equally applied in the analysis of data collected in order to verify the validity of the empirical data compared to the concepts of the highlighted matter. The

intensity of innovation stresses the degree of importance of innovation for the area in which it is undertaken, as well as its relevance to science and society.

F3 DINTENSITY OF INNOVATION	Author
Maximum: new to the world	<i>Oslo Manual, (2004)</i>
Intermediate: new to a country or region	
Minimum: new to a business	

Table 3: Intensity of innovation/ Source: Authors cited

Finally, as the fourth factor, concepts of innovation in services were taken into account to specify whether

evidence collected allows electronic ticketing to be considered in the role of innovation agent.

F4 DINNOVATION IN SERVICES	Author
Adoption of computerized technical systems	<i>Gallouj e Sanson, (2007)</i>
Change in the way a product or service is performed	<i>Davenport, (1992)</i>
Directly associated to innovation in processes	<i>Tether, (2005)</i>
Application of new technology to increase efficiency and effectiveness in the pre-existing services	<i>Barras (1986)</i>
Innovations in processes improve service quality	
Innovations that create new services or transform existing services	
Introduction of methods or procedures within the organization	<i>Tarafdar e Gordon, (2007)</i>
Product, process, organizational, market, ad hoc innovation	<i>Sundbo e Gallouj (1998)</i>

Table 4: Innovation in services/ Source: Authors cited

The aspects of innovation reviewed in this paper allow elaboration of the analysis framework for the proposed objectives, as well as to insert information management which complements the analytical framework.

Methodological Issues

The research is of an exploratory and qualitative nature. The definition of this model is indicated by the fact that the exploratory character is appropriate for a deeper understanding of the aspects that make up the organizational setting, which is the stage of the interactions studied (HAIR, et al., 2005). The exploratory approach is critical to identify variables that are not known or fully defined (COOPER and SCHINDLER, 2003). There was such a low occurrence of scientific papers in the cases studied that allowed an a priori definition of the intervening variables, thus it was necessary to collect primary and secondary data to identify the intervening and explanatory variables for the proposed objectives.

Another reason for the use of an exploratory nature research is due to the theme being endowed with intangibility, which makes it difficult to formulate accurate and actionable hypotheses about the same a priori (GIL, 2002). Qualitative data combined with secondary data exceed boundaries rigidly delineated by quantitative tools for data collection, allowing the deepening of the studies and the discovery of new variables and intangible aspects that can be reported from the combination of methodological approaches (HAIR, et al., 2005).

This study consisted of a multiple case study, which was conducted in two different analysis units in the state of Rio Grande do Sul. Therefore, primary and secondary data represented by interviews, document analysis, number of vehicles in circulation and number of commuters

were collected, organized and analyzed. The units of analysis were entitled cases β and γ in order to protect the identities of the interviewees, companies and public bodies examined.

The logic behind the use of multiple case studies is similar to a single case and both must be carefully selected so as to: (a) predict similar results (a literal replication); or (b) produce contrasting results only for predictable reasons (a theoretical replication). Conclusive evidence of multiple cases is considered more compelling and comprehensive and the overall study is seen, therefore, as being most robust (YIN, 2001). Content analysis was used to facilitate the collection of qualitative data in order to identify and classify the information for the evaluation of the proposed theme and multiple cases. The research and study method used in the study was content analysis, considering that this methodology allows for description and interpretation of content of all text classes (BARDIN, 1977).

The steps for implementing content analysis of interviews, documents and secondary data (interpreted and described in text form) were classified in selected categories in order to enable verification of the innovation factors in the selected cases. Based on work by Bardin (1977), Bauer and Gaskel (2002), Godoy (1995), Moraes (1999), Richardson (1999) and Simões (1991) content analysis was performed in five steps: a) Design: using theories on the subject, in which analysis categories were composed; b) Pre-analysis: preliminary review of the collected information; c) data analysis: categorizing the data; d) Treatment of data: keywords representing text content were extracted; e) Validity Trial: the analysis were validated by theory versus empirical data generating considerations about the research; and f) Grouping: information collected from the three case studies were grouped by category.

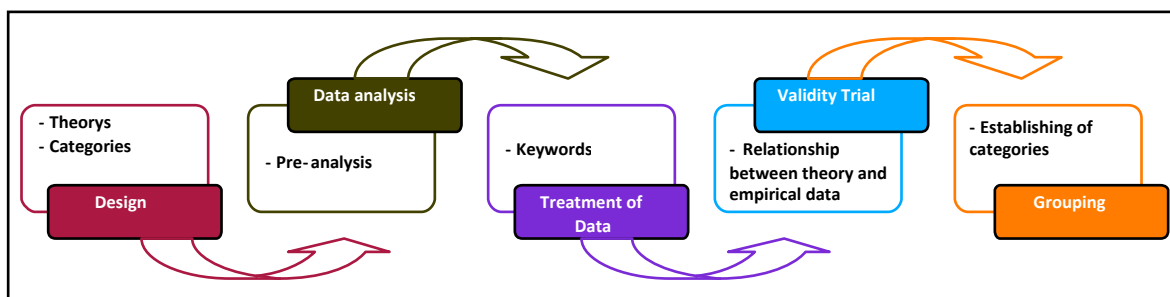


Figure 1: Steps of content analysis carried out in the research

This study was developed based on the associations that combine transport companies of the selected cases. To better qualify the analysis, managers of the associations,

affiliates and Granting Authority representatives were interviewed. Table 5 outlines the interviewees respectively.

Item	Interviewees	Total
Case β	<ol style="list-style-type: none"> 1. Executive Manager of the Transport Company Association 2. IT Manager of the Management Consortium 3. Management Consortium Manager 4. Operations Manager of Transport Company 1 5. Operations Manager of Transport Company 2 6. Executive Director of Transport Company 2 7. Granting Authority Director 	7
Case γ	<ol style="list-style-type: none"> a) Executive Manager of the Transport Company Association; b) Operations Manager of Transport Company 1; c) Operations Manager of Transport Company 2; d) Operations Manager of Transport Company 3; e) Granting Authority Director. 	5

Table 5: Units of analysis/ Source: research

Table 6 describes cases examined in this study. It is emphasized that these are tumultuous cities with similar reality and are governed by separate legislation under which both Granting Authorities are composed of

unrelated public bodies. This factor serves one of the principles of Yin (2001) in multiple case studies in making the study a literal replication.

Case	Description
β	It covers over 20 counties surrounding the capital of the state of Rio Grande do Sul of Brazil (there are discrepancies in the counting of the counties depending on the source of inquiry) which concentrates an approximate population of 1,500,000 inhabitants and diversified economy. The public transport companies selected for this study provide services in their counties and also from the counties to the state capital. This study analyzed a consortium of companies through a transport company association and implemented the system both for transport within the counties and also to the state capital.
γ	Is a city with the largest population of the state of Rio Grande do Sul of Brazil with approximately 1,400,000 inhabitants and prevailing economy in the retail industry and services. The city's transport companies provide service within the city and operate in a consortium since the late 1990s. Three consortia cover the south, north, southeast and southwest regions and another public company connects these regions.

Table 6: Description of the cases/ Source: research

Qualitative data were analyzed by taking the following steps: a) developing of theoretical reference to deepen the issues involving the cases studied; b) a priori definition of the categories; c) development of the data collection instrument; d) completion of fieldwork; e) data analysis; f) comparison of data collected with the benchmark of innovation. Secondary data represented by number of commuters (per year and type of commuter) and the increase in the number of vehicles circulating in the state of Rio Grande do Sul was analyzed after qualitative data analysis. Qualitative and secondary data were compiled developing a cross-case report (Yin, 2001) and afterwards, data analysis, which consisted of a comparison with theories of innovation, was performed.

The combination of different sources of empirical data made it possible to describe a cross-case report and compare it to the characteristics of innovation highlighted in the theoretical framework in order to adequately answer the research question. The factors listed were distributed as follows: F1) forces that influence innovation: its aim is the observation of scenarios in which innovation is developed and how it occurs; F2) definition of innovation: describes the basic characteristics for the attribute of the adjective innovation to a specific phenomenon or organizational practice; F3) intensity of innovation: describes the importance of innovation regarding its transformative capacity; F4) process innovation: provides understanding of typical characteristics of less tangible innovations; F5) service innovation: a compilation of the most important characteristics attributed to innovations in the economic sector studied. After the completion of qualitative and secondary data analysis, a comparison between factors related to innovation and empirical research results was made, in order to meet the proposed objectives. This stage of the research was carried out by comparing each factor with the obtained results. From this comparison, analysis and considerations were done.

Results

Initially, data which categorizes the two regions is presented. Data regarding the number of vehicles circulating in the state of Rio Grande do Sul in the period of 2001 to 2010 was collected in order to demonstrate the expansion of private transport in relation to public transport. This data was consequently related to data generated by the Granting Authority of cases β and γ concerning the number of commuters carried per year and by the type of commuter (free users, discount ticket users and full-ticket paying users) with the purpose of demonstrating the qualification of the data ex-ante and ex-post electronic ticketing. Data from 2005 to 2009 was used due to data prior to this period being deemed inaccurate by the Granting Authority and the lack of data for 2010.

The increase in the number of vehicles shows arithmetic growth of private transport in the state of Rio Grande do Sul, because the number of vehicles in the state (minus extinct vehicle registrations) grew 45.56% from 2001 to 2010. In the same period, the last census showed a disproportionate population growth in the state compared to the growth in the number of vehicles. The population has grown only 0.87% since the last census in 2000 (IBGE, 2011). Although this distribution is at a state level, it demonstrates prioritization of private transport over public transport, especially in the locational units studied. These units constitute regions where traffic presents complicating evidences due to the increased flow of private vehicles. The alleged decline in the number of commuters using public transport should be reflected in the user data. However, the data gathered shows a different situation ex-post electronic ticketing in the cases studied (in both cases ticketing began being implemented in 2007). Data from case β (Chart 1) shows that in 2008 there was a reduction in the total number of commuters carried, a reduction of free and school discount commuters and a increase in paying commuters. In 2009, there was a substantial increase in total number of commuters carried, free and paying commuters and a substantial decrease in school commuters.

Commuters carried per year and type of commuter: Case β				
Year	Paying	School	Free	Total
2005	108.463.366	7.584.473	1.131.326	117.179.165
2006	106.422.549	7.681.472	1.995.207	116.099.228
2007	104.443.242	6.733.945	1.679.971	112.857.158
2008	105.143.443	6.146.286	1.331.495	112.621.224
2009	115.207.828	1.602.802	5.630.702	122.441.332

Table 7: Commuters per year and type of commuters: Case β

It is observed that data in Case γ (Chart 2) shows that in 2008 there was a substantial increase in the total number of commuters, paying and free commuters and a decrease

in school commuters. In 2009, there was an increase of paying and decrease in free and elderly and also small negative variation in total commuters.

Commuters carried per year and type of commuters: Case γ				
Year	Paying	School	Free	Total
2005	223.572.891	44.452.676	8.964.178	276.989.745
2006	218.987.013	41.884.822	8.689.969	269.561.804
2007	213.736.374	41.090.925	8.117.897	262.945.196
2008	224.654.162	34.704.005	55.942.396	315.300.563
2009	229.098.698	31.291.137	54.373.596	314.763.431

Table 8: Commuters carried per year and type of commuters: Case γ / Source: Case γ Granting Authority (2011)

Discussion: innovation versus data collected

In this section, collected and analyzed data was compared to the innovation benchmark as described in the methodology and ex-post factors concerning cases β and γ were observed.

a) F1 Analysis: forces that influence innovation: it was observed that information management in transportation companies was affected by the insertion of new strategies. The implementation of the technological solution changed the modus operandi of the companies and relationships with the users and the Granting Authority. The new scenario allowed for a more transparent relationship between transport companies and their users, as the relationship and interaction between users and transport companies were affected and changed in consequence of the need to adapt to new technology. It is inferred that with the disappearance of illegal ticket trade, the use of tickets changed, thus hindering the misuse of benefits. The legislation and rules dictated by the Granting Authority meant that transport companies implement ticketing, which decisively affected the modes of distribution and circulation of information in the businesses, enabling more transparent and effective controls.

b) F2 Analysis: definition of innovation: electronic ticketing can be considered innovative as it constitutes a new manner of managing information in the public transport sector. From the results analyzed, it was possible to infer existence of opportunities to introduce new ways of commercializing credit, possibility of integration between the lines and users, reorganization of processes of the transport companies that

resulted in improvement of the data flow and improvements in the quantity and availability, as well as greater accuracy of data and information. In other words, innovation caused by ticketing is perceived as an effect of the introduction of a technological tool in public transport.

c) F3 Analysis: intensity of innovation: Ticketing can be considered an innovation of intermediate intensity as it constituted new practices and improvements in the regions and cities in which it was applied, transforming the dynamics of the operations of use and management of public transport. Although it is not new in the world, it is still considered new in Brazil, as the first initiatives of ticketing go back to the late 1990s. The use of the computerized system caused social and economic impacts such as:

1) Illegal trade restrictions made it difficult to counterfeit tickets: traditional ticket trading was the sales channel for counterfeit travel vouchers and discount school tickets. This model was also used by employees to sell vouchers received from their employers. Workers contribute only a small portion of the voucher price (6%) and the employer pays the greater part of the costs (94%). Due to this factor, ticketing also had an impact on all businesses as there was a reduction in staff costs, once transport vouchers no longer supplemented their income. Although this study did not propose to measure this volume of the sale of travel vouchers by employees, who substituted public transport for some other means of private transport, the use of travel vouchers as currency in informal trade was not uncommon. With ticketing, misuse became more difficult as the credit of the voucher is personalized and cannot be transferred;

2) Difficulties in the misuse of benefits such as school tickets and discounted tickets: the misuse of benefits was previously possible due to the great complexity of controlling the use of these benefits, because the beneficiary was not identified at any moment. With electronic ticketing it is now possible to detect frauds through complaints, abnormal behavior of a particular user or user group (excessive use or exceeding that permitted by law), use of distant lines or even (with recent technology) using someone else's card;

3) Significant reduction of fraud in the use of free users: The advent of electronic forms of use control and identification makes misuse of free users more difficult, because they are intended for certain classes of public officials, inspectors, employees of the transport companies, the elderly and the disabled and cannot be used by a third party. Due to electronic identification it has become possible to identify fraud and misuse by blocking the cards;

4) Reduction in cash values on the buses: with the termination of transport vouchers and school tickets, the appeal for assaults on buses reduced, at least when it comes to the person in charge of collecting vouchers, tickets and cash on the bus. This factor has increased security in vehicles with lower loss with assaults, which although not as significant quantitatively, represents a concern for companies, public authorities and society.

d) F4 Analysis: innovation in services: The ticketing system caused innovations in the processes of the transport companies and Granting Authority, also affecting users as it changed purchasing and payment operations. The use of public transport via new procedures generated more security and efficiency, as well as effectiveness in information management and control. The electronic ticketing system is a typical service innovation made through the adoption of computerized systems and processes which streamlined, qualified and reduced the amount of manual processes in the operations leading to improvements in service quality. Ticketing has increased efficiency and effectiveness of information management making it more available and accurate changing existing services, as well as causing social impact with the end of illegal trade and reducing the appeal for assaults on buses. Additionally, the use of this technology allowed for the growth of credit sale points in retail, although this alternative is still restricted to a few shops. The casual use of cash on the bus was not completely eliminated

because of casual users and the lack of an extensive network to purchase prepaid cards. Given the objectives of this study, the presented data mapped the landscape of information management in public transport ex-ante and ex-post electronic ticketing. In the qualitative part, inter-organizational relationships, legislation and regulation of public transport, characteristics of the ticketing system and information management ex-ante and ex-post were described and analyzed. Regarding this data, the characteristic of the sector regulated by the Granting Authority is analyzed, represented by regulatory agencies or municipal transportation departments, which determine the rules for the development of public transport; joint operations of the transport companies, both for the case of consortia and for ticketing itself; the characteristics of the system that makes it possible to scale and effectively control the operations; the ex-post changes that show improvement in information management. As regards the secondary data, the variations identified allowed us to infer that electronic ticketing has improved the classification of data and information of public transport, because if the quantity of commuters should be falling due to growth of private transport, why has this not happened? The possible answer relates to the fact that the previous manual ways of purchase, sale and use of tickets, which was prone to mistakes, frauds and counterfeit was replaced by an efficient and effective tool in capturing and processing of data, creating information and more understanding (Figure 2). The most recent data on the number of commuters demonstrated the reality of the operation, which provides companies a more appropriate design including problems such as bus routes operating at a loss (costs being higher than revenues) as well as paving the way for management to optimize capacity and capabilities of organizations, equipment and people. A comparison of gains obtained from ticketing and concepts of innovation listed in this study to answer the research question and meet the objectives proposed are presented in the final considerations to complete data analysis.

Discussion and Conclusions

This section was devoted to arguments of researchers on the innovative characteristics of electronic ticketing, considering aspects related to the improvements it provided, which were highlighted due to the transformative capacity, improving information management and supporting a more efficient and effective management in public transport in the cases analyzed for both the transport companies and the Granting Authority. Both were able to see the reality of the operations data ex-ante ticketing due to the high possibility of errors in the processes and inaccuracy of the data, because later there was an increase in the number of free ticket and full-ticket paying commuters, and occasional reductions in categories entitled to benefits. These findings demonstrate efficiency and effectiveness of ticketing in the classification of data and control.

Another aspect that should be mentioned is the end of illegal trading, which was used for a long time to market counterfeit tickets and encourage the sale of travel vouchers by employees. This was generating misuse of a benefit guaranteed by law encumbering employers with expenses that could have been avoided. Such situation may also encourage a discussion about moral and ethical aspects of labor relationships; however this research did not focus on this discussion leaving it to other fields of social sciences. Eliminating the sale of tickets by means of transport vouchers had a positive impact on society because there was a network of vendors who survived or supplemented income with the profits from this trade and had to change activities after ticketing was implemented. Increased security or at least the sense of security is subject to better analysis due to the decrease in the appeal for assaults caused by the reduction of cash values (money and tickets) on the bus. Although there is no precise data on the latter subject, it seems logical that may be occurring and becoming an extraordinary benefit of ticketing. Upon exposure to these benefits, there is still comparison to some aspects of the innovation standard to which ticketing fits (Table 9).

Citations	Argumentation
<p>Innovation itself does not exist as it foresees development and implementation of something (TETHER, 2005; JONG e VERMEULEN, 2003)</p>	<p>Innovation is the effect caused by the introduction of any new method, procedure, idea, approach, different implementation of anything that causes beneficial changes to organizations or society and has measurable economic or social results. Based on the foregoing, where innovation is reflected in the analyzed set of benefits that are evident in this research on the effects of the introduction of electronic ticketing.</p>
<p>Innovation is an activity or action that creates value in products, services and processes (SMITH, 2008)</p> <p>Innovation is caused by the change in the way a product or service is conducted with the introduction of new methods or procedures within the organization (TARAFDAR e GORDON, 2007; DAVENPORT, 1992).</p> <p>Innovation occurs by adopting computerized technical systems directly associated with process innovation. (GALLOUJ e SANSON, 2007; TETHER, 2005; SUNDBO e GALLOUJ, 1998).</p> <p>Innovation creates new services or changes existing services. (BARRAS, 1986).</p> <p>Innovation may be the establishment of a new organization in any industry (SCHUMPETER, 1982; 1942).</p>	<p>Benefits provided by ticketing may be considered innovative as it has the ability to add value to services enabling transport companies to offer a range of new services (ticket payment via cellular phone, control of the use of transport vouchers, recovery of virtual credit if card is lost or stolen) and organize business processes so that they become more rational, efficient and effective. In addition, changes in the procedures in the organizations were of great value and brought new methods and procedures, such as the work of the collectors, now with fewer steps and less complexity, allowing for work of an inspectional nature, as it is no longer necessary to check tickets received or even transport a large amount of cash to the company, which required recounting and presentation of data.</p>
<p>Innovation of medium intensity corresponds to being new in the country or region (OSLO MANUAL, 2004).</p>	<p>The ticketing system is not new in the world, for it has been used in other countries since the 1990s. However, it consisted of a new benefit in the cases studied, which ranks it as an intermediate level innovation for causing changes in the country and region.</p>

Table 9: Concepts of innovation versus electronic ticketing/ Source: research

Innovative features of ticketing are reflected by the improvements provided for transport companies, Granting Authority, users and companies in general (the term "companies in general" refers to any organization, which grants travel vouchers to their employees), this set of improvements was described in Figure 3 relating ticketing benefits and its benefitted public. The characteristic effects of an innovation are in line with the results of ticketing in the cases analyzed making this system a way to achieve innovation. Following the precepts chosen for this study,

it is relevant to stress that the effects caused by ticketing are innovative and not the system itself.

This means that the same system with the same functionality may not be groundbreaking in another context where different companies perform or different locations are surveyed. This reinforces the proposal of the considerations of this study, which is not intended to be general, but focused on a particular context at a given moment that may maintain the established characteristics or change given the complexity of the macro environment.

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