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Perceptions of accounting professionals about the influence of information technology in their individual work process

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The continuous flow of technological innovations, combined with the changes that occur in accounting practice is changing the organizational environment and the people involved. Accounting professionals use IT to be able to make reliable and timely information available to managers, supporting the decision making process. This investigation aims to identify the perceptions of accounting professionals from the State of Paraná, Brazil about the use of IT in their individual activities. Data collection was done with an online questionnaire. 362 responses were obtained, validated by Factor Analysis and submitted to reliability testing with Cronbach's Alpha coefficient. The research findings reveal that users indicate higher benefits in Productivity, moderate benefits in Management Control and Customer Satisfaction, and less intense benefits in Innovation. With respect to the participation of accounting professionals in the three levels of decision-making, Cluster Analysis revealed the formation of five respondent groups: Interns, Operational Supervisors, Department Heads, Vice-Directors and General Directors.

Key words: Information technology, accounting, work process, benefits, productivity.

INTRODUCTION

The continuous flow of technological innovations, together with changes in accounting practices induces changes in the organizational environment and in the Behavior of workers, particularly accounting professionals. Fetzner and Freitas (2007) argue that information technology (IT) is one of the determining factors

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of organizational transformation by providing innovative technological solutions since the middle of the twentieth century. According to the authors, IT has brought about technological innovations that enable organizations to reach higher standards of performance and competitiveness, thus its contribution is widely acknowledged.

Davenport (1998) points out that managers must adopt a holistic approach in order to reap the benefits of intensive investments on technology. Such approach has been called information ecology, which emphasizes an encompassing view of the information environment, taking into account the corporate values and beliefs about information (culture); the way people use information and what they do with it (behavior and work process); the pitfalls that may hinder information exchanges (politics); and which information systems are properly implemented (technology).

Thus information ecology is not concentrated on technology, but rather on the way people create, distribute, understand and use information, highlighting the importance of the human factor for the success of IT. For Santana (2004), the human element stands above the technology, taking responsibility for the interaction with all the other components. Hence technology will be neither functional nor useful unless human interaction is fully accomplished. In this view, organizations are composed by a set of activities, not necessarily computer-supported, conducted by people. Accounting (as a business language) and its practitioners play a highly visible role in this context, with significant consequences that transcend the corporate world to reach all society.

Continuous upgrading of technical skills is a major requirement for accounting professionals to perform competently their activities. That enables them to be adequately prepared to supply relevant and timely information as required by managers. Laudon and Laudon (2007) point out that since the 1950s, accounting was one of the first area to use computers in companies. Ever since, the reliance of accountants on IT to perform their activities has been growing, particularly within large corporations. Information is an essential input to corporate managers, thus accounting has a central role as primary supplier of information about business transactions and events. The role of the accountant is highlighted by being among the workers that use IT intensively to perform their tasks (Borinelli, 2006). The relevance of IT impacts on their professional practice is acknowledged by AICPA (2011), which has recently stated that the ability to use IT efficiently and effectively is one of the major competences needed by accounting professionals.

In this context, the understanding of the impacts of IT on organizations and on the professional activities of individual workers, in this case accounting professionals, constitutes a challenging and promising research opportunity. Torkzadeh and Doll (1999) argue that the study of IT impact on organizations is a wide and multifaceted field that provides research opportunities and significant challenges.

Antonelli et al. (2010) used data from international publications to investigate thematic and methodological trends on research about the impacts of IT in organizations across publications from 2005 to 2009. One of the findings is that only two among 38 articles studied IT impacts at the individual level, suggesting a dearth of research of this kind. The results are similar to other studies from the 1990s, such as the one by Torkzadeh and Doll (1999), which reported a number of broad-ranging surveys, but not specifically focused on personal aspects of work.

Individual-level study of IT benefits is particularly relevant because (1) the accounting professional depends strongly on IT to develop its personal and professional competences; (2) the need to focus on the human factor on IT-related studies; and (3) the lack of such studies with a focus on the individual level, and specifically, on accounting professionals. Within the proposed framework, this study is oriented by the following research question: what are the perceptions of accounting professionals about the influence of information technology on their individual work process? Consequently, the objective of the investigation is to identify the perceptions of accounting professionals about the influence of information technology on their individual work process.

The paper is divided into five sections, including this introduction. The following sections present the theoretical empirical foundations and a description of the methodology. The fourth and fifth sections present respectively the results and conclusions.

Benefits of information technology on individual work

Lucht et al. (2007) classify the work of Torkzadeh and Doll (1999), which proposed to measure the impact of IT on individual work, as ground-breaking. Torkzadeh and Doll (1999) propose a framework to measure the impact of IT on individual work on the basis of four constructs: (i) Productivity, (ii) Innovation, (iii) Customer Satisfaction and (iv) Manager Control. The constructs proposed by them are aligned with the organizational objectives that drive companies to invest in technology, per Laudon and Laudon (2007). The Productivity and Manager Control constructs are aligned with: (i) operational excellence, which seeks superior levels of efficiency and performance; the innovation construct is linked to the objective (ii) creation of new products, services and business models; and the Customer Satisfaction construct is related to the objective (iii) closer relationship with customers and suppliers. These connections show that organizational benefits are similar to individual ones, and that individual-level studies may display similarities with organization-level studies.

Torkzadeh and Doll (1999) collected data about the

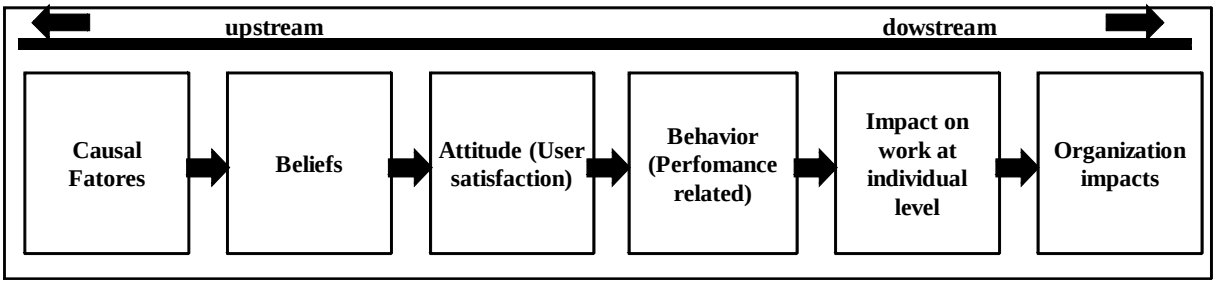

Figure 1. System of value chain. Source: adapted from Torkzadehand Doll (1999).

Table 1. Definition of constructs in the work process framework.

Construct	Definition	Supporting literature
Task Productivity	Degree of improvement in user production by unit of time	Braverman [2], Curley and Pyburn [7], Hirschheim and Farduhar [24], Kraemer and Danziger [30], Liff [32], Sulek and Marucheck [43], Weick [54] and Zuboff [55]
Management Control	Degree to which the application helps to control work process and performance	Braverman [2], Hirschhorn [26], Kraemer and Danziger [30], Shaiken [51] and Zuboff [55]
Task Innovation	Degree to which the application helps users to create and experiment new ideas in their work	Curley and Pyburn [7], Davis [11], Harvey *et al.* [22], Hirschhorn [25], Larson and Fielden [31], Long [33] and Zuboff [55]
Customer Satisfaction	Degree to which the application helps users to create value for internal or external customers of the organization	Curley and Pyburn [7], Filiatrault*et al*. [17], Harvey and Filiatrault [21], Harvey *et al*. [22], Hirschhorn [25, 26], Schlesinger and Haskett [47]

Source: adapted from Torkzadeh and Doll (1999).

perception of IT users to measure its impact on their professional activity. Pereira (2003) argues that such strategy is based on the individual cognitive process that uses a personal framework for understanding the outside world. The cognitive process is based on the behavioral theory of management, represented in the work by Torkzadeh and Doll (1999) as a "system to value chain" to explain the relationship between the use of IT and its impacts (Figure 1). For the authors, IT impact is a central concept that comprises downstream effects and, therefore, to study individually the human element is a direct reflec-tion that the use of technology precedes organizational effects.

The analysis of IT impacts on individual work as an antecedent of organizational impacts was studied by DeLone and McLean (1992). The understanding of those authors, based on research findings, reinforces the relevance and importance of investigating the relationship of IT with the individual level, more specifically in the accounting area.

In order to develop a framework to measure the impacts of IT on individual work, Torkzadeh and Doll (1999) divided the extant literature into two groups: the industrial and the post-industrial model. In the first one, technology was used to produce impacts on productivity and on manager control, replacing human work. In the post-industrial model, the focus was sustained by productivity and managerial control, yet technologies began to be seen as drivers of innovation and customer satisfaction.

The authors produced definitions for the four constructs about the impact on individual work, which describe "how" is the impact of an application on the individual within the organizational context. The application is defined as the use of IT to perform the work. The definitions and supporting literature are described in Table 1.

Torkzadeh and Doll (1999) composed 39 Likert-type questions with a five-point scale to capture individual perceptions related to IT impact in the four proposed

dimensions. For the initial validation of the instrument, they conducted a pilot study for verification of uni-dimensionality, reliability, concision and simplicity of factor structure, using Factor Analysis. As a result, the final version of the questionnaire contained twelve questions to evaluate IT impact on individual work. The authors subsequently applied the final version to a sample of 409 users distributed among 18 organizations of several areas of activity and sectors.

Later, Torkzadeh et al. (2005) conducted a study with the purpose of re-validating the instrument developed by Torkzadeh and Doll (1999). A new validation approach was proposed, using confirmatory techniques and factorial invariance tests. Data were collected from two samples – IT users in the United States and Mexico – with res-pondents from different managerial roles in the hierarchy of the organizations. The study results provided evidences that the four initial constructs measure adequately the impact of IT on individual work. Reliability coefficients were high and the factorial invariance tests showed that, in general, the evaluation model is invariant considering the countries under study and the levels of management.

The authors have indicated that the proposed framework should be confirmed, with replication to test its stability and to develop standards to evaluate specific applications. To that end, there are some studies that replicate Torkzadeh and Doll's (1999) framework, including: (i) the study of Maçada and Borenstein (2000) that measured user satisfaction among users of a Decision Support System and concluded that the four dimensions of the model are sufficient to analyze a public organization prototype, and (ii) Lunardi et al. (2004), that evaluated the Enterprise Resource Planning system in a federal university hospital, employing the user satisfaction metrics.

METHODOLOGY

A survey was undertaken with the application of the instrument developed by Torkzadeh and Doll (1999). According to Babbie (2001), a survey is designed to achieve three main goals: to describe, explain and explore. Hence this study seeks to measure, using an ordinal scale, the degree of intensity of the benefits of TI on professional activities from the perspective of the users themselves. Following the criteria laid out by Hair Jr. et al. (2005), this research is classified as quantitative and descriptive.

Torkzadeh and Doll (1999) point out that, as a result of the collection of several responses from a great variety of applications and organizations, the results may be generalized. For this study, the selected population comprises the accounting professionals of the state of Paraná, Brazil.

The instrument for data collection has twelve questions replicated from the instrument developed by Torkzadeh and Doll (1999). They are Likert-type questions, with five levels that range from “1” (very low) to “5” (very high) to measure the perception of the intensity of TI benefits on the work of the individual. Seven other questions, divided into two groups, were used to characterize the respondent. The first group is related to the IT application, with three assertions that verify: (i) whether the application is in its implementation phase, so that if the answer is positive, the impact is expected to be lower than if it is not in the implementation stage; (ii) whether the application is part of an ERP or not, considering that previous studies indicate that ERP brings significant changes in its environment, such as reported in the study by Newman and Westrup (2005), which concluded that the rise of ERP systems constitutes a fundamental change for accountants; (iii) what is the main function, or functions that are performed by the application that is most used by the professionals. The second group of characterization questions includes four assertions related to the respondent, in order to investigate: (i) age of respondent; (ii) duration of employment in the current organization; (iii) education background; and (iv) what is the intensity of the professional decisions, considering the three levels of decision making: operational, tactical and strategic. Therefore, the survey questionnaire comprises twelve Likert-type questions to measure the benefits of TI on the work of the respondents, and seven questions to characterize their profile, for a total of nineteen questions.

At the time of the survey, there were 20,228 accountants and 10,355 accountant technicians in the state of Paraná, totaling 30,583 licensed active professionals, according to data from the State Accounting Council – *Conselho Regional de Contabilidade do Paraná - CRCPR* (2011). The Council, as well as a company association–*SESCAP-PR (Sindicato das Empresas de Serviços Contábeis e das Empresas de Assessoramento, Perícias, Informações e Pesquisas no Estado do Paraná)* and a women's accounting association – *IPMCONT (Instituto Paranaense da MulherContabilista)* sent e-mail messages to their membership lists introducing the research, asking for their cooperation and including a link to the electronic questionnaire. It should be noted that only accounting professionals with registered e-mail addresses in the above mentioned organizations were invited to take part in the survey.

The electronic questionnaire was made available on the Qualtrics® software platform for web data collection. The e-mail messages to potential respondents were sent by the institutions in the following dates: (i) CRCPR on 7/14 and 7/28/2011; (ii) SESCAP-PR on 8/4/2011 and (iii) IPMCONT on 7/11 and 7/29/2011. The period for data collection ended on 8/17/2011. A total of 362 valid responses were received, excluding questionnaires that were incomplete or that had taken less than five minutes to be completed. Data treatment was initially done with descriptive and univariate statistical techniques, followed by multivariate techniques, including Cronbach's Alpha, Exploratory Factor Analysis and Cluster Analysis.

RESULTS AND DISCUSSION

The study results are described in four parts. The first is about sample characteristics, and the second deals with the validation and analysis of Torkzadeh and Doll's (1999) instrument. The third phase used Cluster Analysis to identify respondent groups in terms of their intensity of decision-making by organizational level. The last part related the survey results with sample characteristics, in addition to a Cross-tabs analysis to locate important characteristics among the sample clusters.

Sample characteristics

The following characteristics were observed after the

Table 2. Comparison of Cronbach's Alpha coefficient among work process studies.

Construct	Cronbach's Alpha test coefficients		
	Current Research	Pereira (2003)	Torkzadehand Doll (1999)
Productivity	0.88	0.74	0.93
Managerial Control	0.89	0.82	0.93
Innovation	0.88	0.80	0.95
Customer Satisfaction	0.89	0.81	0.96
Total	**0.94**	**0.82**	**0.92**

Source: calculated from survey data.

verification of the 362 valid questionnaires:

The functions of the IT applications used by respondents in the sample are essentially linked to their professional formation. The Accounting function has the largest share with 86 percent, followed by Fiscal and Payroll, with 70 percent and 56 percent respectively;
2. The software programs used by the majority of accounting professionals are fully implemented (74 percent of the cases), so it is possible to assume that those applications are fully functional;
3. With respect to ERP systems, 43 percent of the respondents informed that the software program is integrated with ERP, 30 percent do not use it and 27 percent were not able to answer the question;
4. The age of the respondents was also analyzed, indicating that 66 percent are in the 19 to 35 age group, indicating a predominantly young sample;
5. Among the respondents, 19 percent (70 people) have been “up to one year” in the organization, so those may not be fully adapted to the managerial practices, processes and technologies that are used. Within the interval of two to four years, there are 37 percent (135) of the respondents; 21 percent are in the organization for “more than ten years”; 14 percent (51) between five and seven years, and 8 percent (30) between eight and ten years. The data show a small percentage of workers in the five to ten-year employment period;
6. The education background of the respondents comprises in the majority (i) accounting technicians and (ii) accountants, but it also includes other backgrounds.

Validation and analysis of the work process instrument

For validation of the instrument, the reliability scale using Cronbach's Alpha was applied, with subsequent validation using confirmatory factor analysis (CFA) to confirm the theoretical sustainability of the replicated survey. The following parameters were used for the operationalization of factor analysis.

Method of factor extraction

The principal components model was used with the goal of determining only the linear components within the data and how the variables may contribute to each component (Field, 2009);

Criteria for the extraction of the number of factors

The *a priori* criterion was used, which according to Hair et al. (2005), is applied when the researchers knows the number of factors before performing factor analysis;

Rotation of factors

The option was for Equamax orthogonal rotation, with the objective of minimizing the number of factors needed to explain each variable, and allows to maximize variable explanation within a single factor, while also ensuring that factors remain non-related (Hair et al., 2005; Field, 2009).

The Cronbach's Alpha test was done initially for each assertion and subsequently for each construct. The analysis took into account the assumptions of each coefficient, so that there was no correlation with negative values. Table 2 details the coefficients for Cronbach's Alpha test and compares them with previous studies. The total coefficient for this survey (0.94) is greater than the previous ones, showing that the results are acceptable and the model reliability is verified. The results for the individual constructs are also satisfactory, and confirmatory factor analysis could then be performed.

The results of the confirmatory factor analysis for the work process survey were consistent and precluded new analyses, that is: (i) the communality table did not display any indicator with low explanatory power; (ii) the correlation matrix did not indicate any high correlations among the indicators; (iii) the KMO test, which indicates data adequacy from the factors derived from CFA was

Table 3. CFA of work process survey.

Rotated Component Matrix[a]		Component			
Theoretical Construct	**Question**	**Factor 1**	**Factor 2**	**Factor 3**	**Factor 4**
Productivity (Factor 3)	Q01			0.724	
	Q02			0.731	
	Q03			0.830	
Managerial Control (Factor 2)	Q04		0.733		
	Q05		0.791		
	Q06		0.755		
Innovation (Factor 1)	Q07	0.839			
	Q08	0.790			
	Q09	0.770			
Customer Satisfaction (Factor 4)	Q10				0.706
	Q11				0.751
	Q12				0.763

[a]Extraction Method: Principal Component Analysis. Rotation Method: Equamax with Kaiser Normalization. Rotation converged in 9 iterations. Source: calculated from survey data.

0.94, a highly adequate value to perform CFA; (iv) Bartlett's test of sphericity, which indicates the existence of adequate relations among the indicators for application of CFA, was satisfactory, and (v) the anti-image matrix, which indicates the explanatory power of the factors in each of the variables under analysis, returned values above 0.91 in its lower diagonal area, which denotes a high explanatory power for all variables.

The four factors that were obtained from the instrument advanced by Torkzadeh and Doll (1999) exhibit a 81.86 percent explanatory power, distributed among the four generated factors, which, after Equamax rotation, explain respectively 21.01, 20.6, 20.54 and 19.7 percent respectively. Table 3 shows the load distribution of the variables among the four factors. These results are similar to previous studies (Torkzadeh and Doll, 1999; Pereira, 2003), which supports the applicability of this instrument for measuring IT impacts in the context of accounting professionals in Brazil.

Table 4 shows the means of answer frequencies by question and factor. All questions received the same minimum and maximum values (1 and 5) and the means were between 3 and 4 in the response scale. Some values for the means are near 3, indicating an IT impact of “neither low nor high”; others are near 4, suggesting a greater intensity (“high”). The ones with higher evaluations (near value 4 in the scale) are for the Productivity factor, followed by Management Control. The construct that is nearest to 3 in the scale is Customer Satisfaction, and Innovation displays the lowest evaluation. This order remains the same when the analysis is done by factor, indicating the absence of disparity among assertions in each factor.

The results of the study by Torkzadeh and Doll (1999) with IT users in the United States were compared to the findings of this survey. It should be noted that other previous studies (Pereira, 2003; Ferreira and Ferreira, 2008) also confirmed Productivity with the highest impact on Work Process and Innovation with the lowest value. The results show that Productivity presents a significant benefit in most environments and professions, including accounting professionals. On the other hand, Task Innovation remains as a benefit that is more “restricted” to IT professionals. This comparison also suggests that the benefits that are perceived by accounting professionals are not unlike users in general, considering that the study by Torkzadeh and Doll (1999) used a broad and diversified sample.

In order to verify whether the differences among the factor means in Table 3 are statistically significant, firstly data normality was analyzed with the Kolmogorov-Smirnov test. At a 5 percent significance level for all factors, the null hypothesis (H0) was accepted, reporting non-normality of the data with the following results: for Factor 1, $D(362) = 0.186$, $p < 0.05$; Factor 2, $D(362) = 0.176$, $p < 0.05$; Factor 3, $D(362) = 0.116$, $p < 0.05$; and for Factor 4, $D(362) = 0.167$, $p < 0.05$. Hence it was necessary to use a non-parametric technique to evaluate the differences between factor means.

The application of the non-parametric test Kruskal-

Table 4. Descriptive analysis of Work Process survey instrument and comparison with previous study.

	Factor	Analysis by question			Analysis by factor		Results by assertion from Torkzadeh and Doll (1999)	
		Question	$\bar{X}_s$*	S**	$\bar{X}_p$***	S**	$\bar{X}_s$*	S**
Work Process (WP)	Factor 3 (Productivity)	Q01	3.90	0.95	2.98	0.66	3.70	1.20
		Q02	3.88	0.97			3.50	1.30
		Q03	3.95	0.99			3.50	1.30
	Factor 2 (Management Control)	Q04	3.55	1.00	2.72	0.66	3.20	1.40
		Q05	3.56	0.94			2.90	1.40
		Q06	3.62	0.96			3.10	1.40
	Factor 1 (Innovation)	Q07	3.12	0.99	2.47	0.72	2.30	1.30
		Q08	3.02	1.02			2.20	1.30
		Q09	3.11	1.00			2.40	1.20
	Factor 4 (Customer Satisfaction)	Q10	3.72	0.93	2.67	0.62	3.20	1.40
		Q11	3.51	0.96			3.10	1.30
		Q12	3.60	0.86			3.20	1.40

*$\bar{X}_s$: simple means; ** S: standard deviation; ***$\bar{X}_p$: weighted average calculated by weighing each assertion with its factor load. Source: calculated from survey data.

Wallis, with Monte Carlo extraction since it was a large sample (Field, 2009), enabled the comparison of two or more sample groups of unpaired data, in this case the four factors. A significance level of 5 percent was used with the null hypothesis of non-existing statistically significant differences between the sample means, which was rejected, proving statistically the existence of difference between means [H(3) = 130,00, $p < 0.05$].

The following phase was the application of *post hoc* hypothesis testing to verify which of the means were statistically different. The Mann-Whitney hypothesis test was chosen, with application of Bonferroni correction in all effects, with a significance level of 0.0083 (0.05/6). The null hypothesis of equality of means was accepted for just one effect, from Factor 2 with Factor 4, which represent the Managerial Control and Customer Satisfaction respectively. Therefore, it is possible to affirm that the benefits of IT on the individual work of accounting professionals are greater in the aspect of Productivity (Factor 1), moderate in Managerial Control (Factor 2) and Customer Satisfaction (Factor 4), and lower in Innovation (Factor 3).

Cluster analysis

In order to provide a taxonomic description of the data for exploratory purposes, one assertion of the characterization questions sought to clarify the level of intensity of decision-making in the professional activity of the respondents within three levels: operational, tactical and strategic (Moritz and Pereira, 2006). The cluster analysis was used to classify the sample according to their organizational hierarchy level, measured by an adapted Likert scale with six points [(0) no decision making; (1) very few; (2) few; (3) neither few nor many; (4) many and (5) very many]. This type of exploration was undertaken in the study by Torkzadeh et al. (2005), in which the sample was divided into two groups, “top management” and “lower management”.

The frequency analysis began with eight clusters, which were gradually reduced (Figure 2). In the process, it was observed that one of the groups with 44 respondents would not group with others, and its grouping occurred only in the analysis involving four clusters, with another cluster with 67 respondents. This result led to a descriptive analysis of cluster to verify whether the means of decision-making within the group with 67 respondents were similar to the ones in the group of 44, so that they could be joined. In those two groups, similar means were observed at the operational and strategic levels, but they were quite different in the tactical level (3.39 and 0.23). That result led to the option of choosing five clusters to represent the study sample.

The variance analysis ANOVA was used for cluster interpretation. According to Field (2009), this hypothesis test is used to analyze situations in which there are several independent variables. For the ANOVA application, the Tukey post-hoc hypothesis test was used for multiple comparisons, indicated when sample sizes are the same, in addition to its control over Type I errors. The analysis of the results of the Turkey test enabled to

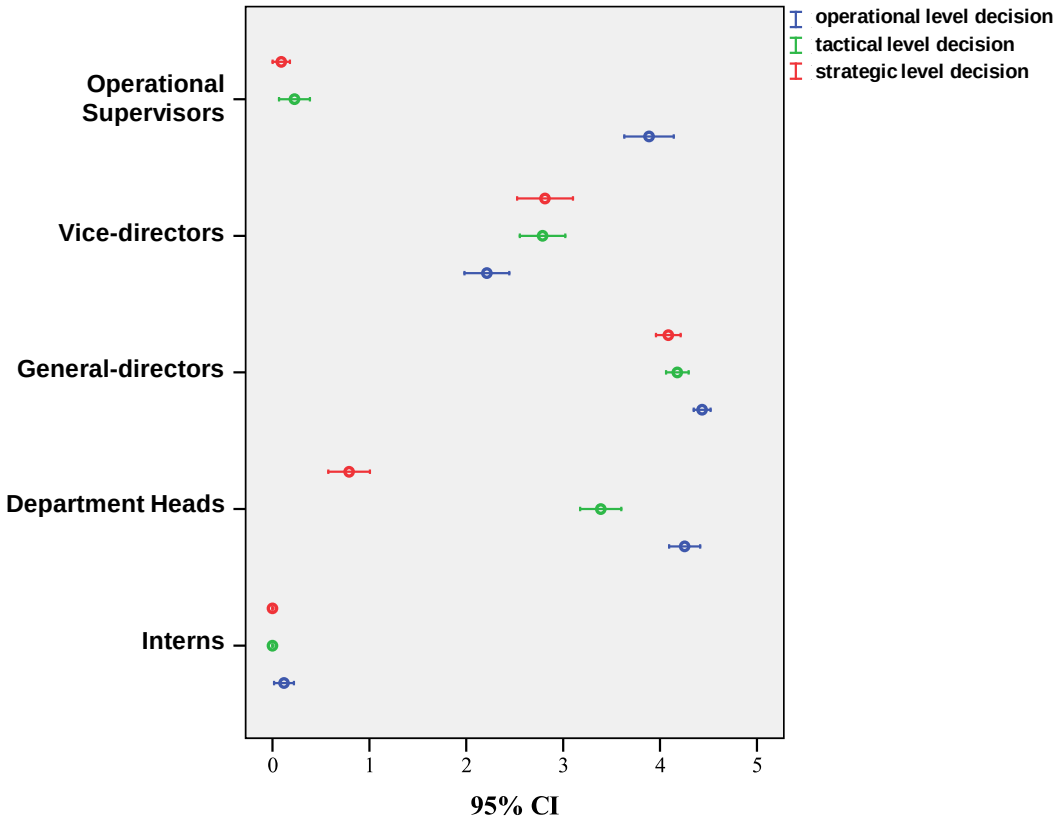

Figure 2. Clusters and their decision-making levels. Source: developed from survey data.

nominate the five clusters (Figure 2). The first group are the so-called “Interns”, referring to users that rarely make decisions in the operational, tactical or strategic levels. The “Department Heads” are those who commonly make operational decisions, sometimes tactical and rarely strategic. Those who are intensely involved in decisions in the three levels are denominated “General Directors.” Those that make mid-level decisions in the three levels are called “Vice-Directors.” The last group is characterized by making only operational decisions, the “Operation Supervisors.”

Relations of the instrument with sample characteristics

At this stage, the resulting factors from the replicated instrument (Torkzadeh and Doll, 1999) were cross-tabulated with sample characteristics. After sample stratification, the means for each one were calculated and analyzed as to whether the differences among them were statistically significant. For that, in the comparison between up to two groups, the Mann-Whitney test was used; for more than two, the non-parametric Kruskal-Wallis test was applied; when a statistically significant difference was found, the Mann-Whitney test was applied to verify in which group was the difference found in the previous test. A 5 percent significance level was used in all tests, and the Bonferroni correction was used when the sub-sample was deemed large (Field, 2009).

Table 5 compares the factor means with sample characteristics. The first relationship refers to benefits of IT applications that are fully implemented or not. It should be noted that in all factors the test shows the existence of statistically significant differences. Therefore, it can be affirmed that fully implemented applications are more helpful for accounting professionals in the aspects of Productivity, Manager Control, Innovation and Customer Satisfaction. This supports the findings of the study by Ferreira et al. (2002): in the process of implementing a technology, there is an operational lag caused by low utilization of software resources, implying lower benefits to users.

Another analysis focused on whether IT applications are part of ERP systems. The importance of this assertion is related to many studies that report benefits from this type of technology, such as the one by Newman and Westrup (2005), which suggests that the use of ERP

Table 5. Relationship of factors in the instrument with characterization questions.

Factor (construct)	(a) Implementation			(b) ERP system			(c) Age group (years)			(d) Duration of employment (years)		
	Yes	No	MW*	Yes	No	MW*	Up to 30	More than 30	MW*	Up to 1	More than 2	MW*
F3 (Productivity)	3.09	2.66	≠	3.02	2.90	=	2.93	3.03	=	2.91	3.00	=
F2 (Manager Control)	2.82	2.43	≠	2.82	2.58	≠	2.65	2.78	=	2.64	2.74	=
F1 (Innovation)	2.57	2.18	≠	2.55	2.34	≠	2.38	2.55	=	2.25	2.52	≠
F4 (Customer Satisfaction)	2.80	2.31	≠	2.71	2.65	=	2.61	2.73	=	2.54	2.70	≠

*MW = Results of Mann-Whitney tests. Source: calculated from survey data.

Table 6. Relationship among instrument factors and clusters.

View	Factor (construct)	Means from cluster answers					Result of Kruskal-Wallis test
		Intern	Department Head	General Director	Vice-director	Operation Supervisor	
WP	Factor 3 (Productivity)	2.92	2.95	3.21	2.63	3.05	≠
	Factor 2 (Manager Control)	2.53	2.77	2.92	2.47	2.66	≠
	Factor 1 (Innovation)	2.32	2.39	2.75	2.22	2.36	≠
	Factor 4 (Customer Satisfaction)	2.61	2.63	2.89	2.40	2.63	≠

Source: calculated from survey data.

systems produce fundamental changes for accountants. Along the same lines, Turban et al. (2004) mention that ERP systems provide solutions that improve efficiency, quality and productivity, thus enhancing business performance and customer satisfaction. The results of Mann-Whitney hypothesis tests (Table 5) indicate that the benefits of ERP systems are notable only in Manager Control and Innovation, while for Productivity and Customer Satisfaction there are no significant differences in comparison with applications that are not connected with ERP technology.

As far as age group is concerned, statistically significant differences were not found in any factor. On the other hand, for the duration of employment in the current organization there were significant differences (Table 5). It becomes evident that the perceived benefits in the Innovation and Customer Satisfaction constructs are higher for workers with a longer employment period (more than two years) and lower for those who have been in the company for a shorter period (up to one year).

The final relationship under analysis relates the five clusters with the factors from Torkzadeh and Doll's (1999) instrument. Statistically significant differences were found with the application of the non-parametric Kruskal-Wallis test (Table 6).

Due to the existence of statistically significant differences in Table 6, it was necessary to apply the Mann-Whitney hypothesis test to verify the differences. It should be noted that a significance level of 0.005 (0.05/10) was used for the Mann-Whitney test due to the Bonferroni correction. Table 7 shows the results.

The highest contrasts among IT benefits are related to *cluster comparisons*: (i) General Director with Vice-director (3 – 4) display different IT benefits in all factors, and the General Director cluster shows greater benefits in all of them; (ii) Department Head with General Director (2 – 3) show differences, except in Productivity and Manager Control, which are similar; (iii) lastly, there is a difference only in the Productivity factor when comparing the Department Head with the Vice-director cluster (2 – 4) and the Vice-director with the Operation Supervisor (4 – 5), so that Vice-directors supposedly occupy tactical-level positions and enjoy lower benefits in their productivity compared to the others.

A number of cross-tabulations were also undertaken. Firstly, the number of employees was analyzed together with clusters. It was found that Interns, Vice-directors

and Directors predominate in smaller firms (up to 19 employees). In the larger organizations (more than 50 people), the most common groups are the Operations Supervisors and Department Heads, and this probably relates to the fact that such companies usually are structured with more departments and supervisors of production units on the factory floor.

The second cross-tabulation investigates the relation between clusters and age of respondents. The age group from 26 to 30 years corresponds to Vice-directors, and from 31 to 40 years, to Department Heads. The General Directors, and again the Vice-directors, are concentrated in the 41 to 45 age group; lastly, the Interns, above 46 years. With the exception of the respondents above 46 years, the results denote the importance of professional experience (represented by age group in this analysis) for tactical and strategic jobs.

The last cross-tabulation relates the clusters with the professional experience of the respondents. It was found that people who make few tactical and strategic decisions have little professional experience, such as the interns and the Operation Supervisors, while more experienced people hold decision-making positions, such as the Director and Vice-Director, as it would be expected.

CONCLUSION

The main focus of this investigation was the perception of accounting professionals in Paraná regarding the use of IT in their individual professional activity. For such, the instrument that measures the relation of IT in the Work Process was replicated (Torkzadeh& Doll, 1999). In the validation of the instrument, its twelve assertions were associated to the factors as proposed by the theory, which confirms the model's robustness. It was confirmed that the benefits of IT are stronger in the Productivity construct (2.98); moderate and equal to each other (statistically) in Managerial Control (2.72) and Customer Satisfaction (2.67); and in last place, in Innovation (2.47).

The fact that the Productivity variable occupies the first place demonstrates the automation of several tasks that were done manually some time ago, such as the keying-in of fiscal and accounting records that today are generally done online. This reality is verified in accounting offices where workers attend to an ever-growing number of customers, as a direct consequence of automation. On the other hand, intense use of IT creates a technological dependence, in such a way that a system malfunction can cause a sudden drop in productivity levels. That said, it is valid to point out the importance of the productivity/IT paradox as a topic for future research, since Productivity is the foremost factor in the work process.

In second and third place, the benefits in Management Control and Customer Satisfaction are noticeable. In the Management Control variable, the benefits are clearly visible in the substitution of digital storage media for paper, or the improvement in data processing capabilities, creating internal control mechanisms that can influence the behavior of workers, thus increasing the likelihood of reaching corporate objectives. This can be seen in the current accounting environment, where great amounts of information are stored in computational systems that control the performed tasks, such as work-time control, cost spreadsheets emitted on a per-client basis, document control, financial control, among others. Post-industrial concerns can be verified in the Customer Satisfaction variable, a consequence of the rise in competition and increasing customer demands. This has forced companies and professionals to see their customers in a different way, adapting themselves to suit their needs and offering better service as well as competitive prices. The accounting context is no exception; using IT, professionals in the field can obtain information and submit reports quickly, which allows them to ensure greater customer satisfaction. It should be pointed out that, in Managerial Accounting, the tools that are used to generate useful information for the company use IT massively, such as, for instance: simulations, Economic Value Added (EVA®), Economic Management, etc., highlighting once more the importance of IT in this construct. On the other hand, it appears that Brazilian tax bureaucracy impacts Customer Satisfaction negatively, in such a way that the accounting professional is often seen merely as a performer of tax-related activities (Merlo and Pertuzatti, 2005).

On a lower level, the support of IT for the creation and experimentation of new ideas, represented by Innovation, indicates the need for accounting professionals to practice problem-solving skills more intensely, as well as their ability to learn and innovate. The possible causes of Innovation's position seem to result, firstly, from the accumulation of the accounting professional's responsibilities in "reports" for the government and Brazilian regulations, which "freeze" procedures, reducing the likelihood that professionals will experiment with new ideas; secondly, the "turnkey" information systems used in accounting are rigid and not amenable to user adaptations and modifications, in contrast with the post-industrial model.

The characterization questions made it possible to sketch out a profile of the sample, which essentially comprised accountants whose professional practice is closely related to their technical background. They are responsible for diverse tasks within their department and have a close relation with their technical formation, and because of it they use ERP technology to a great extent. The intensity of their three levels of decision-making (operational, tactical and strategic) was the subject of

analysis. Because of the disparity among the answers, Cluster Analysis was employed to classify the respondents in five profiles according to the intensity of their decision-making on the three levels.

Some analyses were carried out to generate speculations about the sample. It was verified, effectively, that users with partially implemented solutions reported fewer benefits of IT usage on all four research constructs. This information is fundamental to guide future research, so that researchers should consider this variable in their work. In contrast with previous studies (Shang and Seddon, 2002; Newman and Westrup, 2005), for the theoretical constructs Productivity and Customer Satisfaction, it was found that ERP systems did not bring more benefits than other kinds of systems, that is, the technology in itself does not imply benefits in work process efficiency or the approach to the customer.

The benefits of IT within the five clusters were evaluated. Considering the hierarchical positions defined by the decision-making level of the respondents, it was observed that jobs that are apart from each other, such as Intern and Vice-director or Intern and Department Head, exhibit statistically similar benefits. On the other hand, hierarchically close jobs such as Director and Vice-Director were the opposite, with totally divergent benefits. These findings reveal that the benefits of IT do not follow hierarchical lines, so that a corporate position does not necessarily derive similar benefits to another position with similar characteristics.

Cluster analysis also revealed that the respondents who make the most corporate decisions were between 41 and 45 years old. The adage that older professionals are more experienced and thus make more decisions was not totally confirmed by this study, since the professionals who least make decisions are the oldest, that is, Interns are more common in the over-46 age group. However, in the analysis of professional experience period, it was found that, in general, the more experienced individuals are, the more decisions they make. These findings reveal the need for future research to characterize respondents not only by age but also by professional experience.

The limitations of these study include: (i) the use of a non-probabilistic sample, which precludes precision estimates and generalization of results; (ii) the findings are specific for accounting professionals; (iii) the study focuses on the perceived relation of IT with the work of accountants from the viewpoint of the individual professional, so the organizational perspective falls out of the scope of this study; (iv) as a geographic delimittation, the research population comprises professionals with registered e-mail addresses in CRCPR, SESCAP-PR and IPMCONT; and (iv) lastly, as a temporal delimitation, the study was restricted to a predetermined time frame during 2011.

Nevertheless, taking into account the research findings as well as its limitations, it may be suggested for future studies: (i) as it was limited by a non-probabilistic method, a replication of the instrument is suggested with a probabilistic sample; (ii) replication of this study with a larger sample, and/or with accounting professionals in other regions and countries, so that a comparison and verification of differences and similarities is possible; (iii) application of instrument with other types of professionals (such as managers, engineers, economists and others) with the purpose of comparing the impacts of IT among them.

Conflict of Interests

The author(s) have not declared any conflict of interests.

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