

Information And Communication Technology Usage Behavior: The Case Of Salespeople In A Canadian Telecommunication Firm

1.0 Introduction

Salespeople in high-technology-based industries, such as the telecommunications industry, are undergoing profound, irreversible changes. They work in organizations characterized by a capacity to succeed amidst market and technological uncertainties and competitive volatility [1]. Democratization of the Internet 20 years ago has changed and shaped the way business is conducted by offering different sales channels. Customers are better informed and more demanding and have timely access to products and services. As streams of ICT continue to glut the market, organizations are acquiring these new technologies in order to collect, manage and distribute data about customers and thus serve them better. The race to streamline organizations is being run flat out, and firms are adopting technology to automate every organizational function. When a sales department adopts many different ICT to enhance its effectiveness and efficiency, the process is often referred to as sales force automation (SFA). SFA tools vary in complexity and the degree to which they need to be integrated into organizational infrastructure. Market trends indicate a move toward more automation from SFA to CRM softwares, then to Internet-based CRM (eCRM), followed by wireless applications (mCRM), sales and marketing automation (SMA), then integrated marketing (IM), enterprise resource planning (ERP) and, lastly, near complete automatization with partner relationship management (PRM) [2]. In such a context, complexity can increase exponentially and consequences for people and organizations become far reaching as automatization progresses.

To understand the impact of automatization on the sales force, this paper takes the salesperson's perspective and examines which ICT are being used in an interrelated manner. We investigate usage patterns in a high-technology-based sales force to determine whether it is oriented mostly toward emerging or mature technologies, or perhaps a mix of both. What technology clusters, i.e. technologies with interrelated usage patterns [3], are encountered in a high-technology firm? Do usage patterns vary across geographical divisions within the same firm? The objective of this paper is to uncover and compare technology clusters between two geographical divisions of a large Canadian telecommunication firm. The first sections review literature on ICT adoption, describe methodology and present the results. The last part consists of discussion and the conclusion.

2.0 Literature review

ICT adoption and diffusion is a two-stage process: first, adoption and implementation by the organization, followed by salesperson adoption and usage of these ICT. However, once ICT are adopted by an organization, it is the salespeople who are the ultimate adopters and users of the new ICT. Depending on their tasks and markets served, salespeople may make extensive use of a small number of ICT (high infusion) or else use a large number of ICT but tap only a few of their functions (low infusion). The actual usage pattern may lie between these two extremes and encompass a mix of mature and emerging ICT. Knowing that licensing rights may vary from US\$10,000 to as much as \$50,000 per seat, often a total expense of several million dollars, while failure rates may be as high as 60 to 80% [4], it seems only natural to explore the problem from the base, i.e. the end-user's perspective. To paint a better portrait of sales force usage of ICT, we used agglomerative hierarchical clustering (AHC) to group ICT with interrelated usage patterns.

3.0 Data collection

An electronic survey was sent to 228 potential sales representative respondents. Data was collected from 193 respondents, 107 from Quebec and 86 from Ontario, for an overall response rate of 85%. Respondents were asked to rate their usage of 32 ICT based on a seven point Likert scale (1 = never, 2 = very seldom, 3 = seldom, 4 = sometimes, 5 = often, 6 = very often and 7 = always). The ICT were selected

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Abstract

The information revolution has opened the floodgate to new innovations. With the advent of information and communication technologies (ICT), organizations are trying to stay afloat in these turbulent times. More than ever, these organizations are facing technological and market uncertainties and competitive volatility. To alleviate these disturbances, new sales channels have opened to meet customer's expectations. The sales function has drastically changed over the past 20 years in order to maintain this market orientation. Salespeople are now equipped with several ICT to accomplish their day-to-day activities. To better understand these changes, we investigate two geographical divisions - one in Quebec, the other in Ontario - of a large Canadian telecommunication firm. Using agglomerative clustering to segment 32 ICT according to usage frequency, we reveal sales force's usage patterns. The resulting technology clusters for each division are then compared to show the different mixes of mature and emerging ICT.

Sommaire

La révolution de l'information ouvre les vannes à toute une panoplie d'innovations. Plus que jamais, les organisations axées sur les hautes technologies font face à des incertitudes émanant des technologies et du marché ainsi qu'à une volatilité concurrentielle. Pour diminuer ces perturbations, de nouveaux canaux de vente sont ouverts afin de répondre aux exigences des clients. La force de vente a dû s'adapter durant les vingt dernières années afin de maintenir une orientation marché. Les représentants sont équipés de plusieurs TIC afin de pouvoir accomplir leurs tâches quotidiennes. Afin de mieux comprendre ces changements, nous étudions deux divisions géographiques, l'une au Québec, l'autre en Ontario, dans une grande firme de télécommunication canadienne. Une analyse de regroupement est utilisée pour segmenter les 32 TIC selon la fréquence d'utilisation. Les regroupements sont analysés et comparés afin de révéler les différences entre portraits d'utilisation.

from a list developed by the Centre francophone d'informatisation des organisations (CEFRIO 1999) and from the literature.

4.0 Sample characteristics

Age distribution between the two geographical divisions is markedly different, with 42.1% of salespeople being younger than 40 years old in Quebec and 72.1% in Ontario ($p < 0.000$). Salespeople in Quebec have a higher level of education, with 66.7% having a university degree, as compared with 53.5% in Ontario ($p < 0.000$). The national average for a university degree is 21.6% in Quebec and 24.7% in Ontario based on total population (national figures, 2001). Thus, the education level within the study firm is three times higher than the national average for Quebec and more than twice the average for Ontario. Experience also differs greatly, with an average of 15.5 years in Quebec and 7.8 years in Ontario. The time spent outside the office by salespeople does not dif-

fer significantly between the two divisions ($p = 0.52$). We therefore cannot rely on mobility to interpret the differences in usage patterns across geographical divisions.

5.0 Analytical procedures

For the purpose of this investigation, we used clustering analysis (CA) to group objects, the ICT themselves, as opposed to clustering salespeople as is traditionally done in marketing. To be realistic and since we had no a priori information as to how many clusters represent the best solution, we generated solutions for two, three, four, five and six clusters. To choose the best solution, we stopped clustering when there was a sharp decrease in the agglomeration coefficient. To confirm that we had identified the best solution, we used three methods, two intuitive and one statistical. The inverse scree test, a plot of the agglomeration level versus the number of clusters, showed a sharp nick in the curve at four clusters. The second intuitive method is based on our ability to name the cluster. What is the homogeneous characteristic underlying these technology clusters? Could we explain it? If yes, the solution was retained. If not, we looked at a different solution. The third, statistically-based method, Mojena's Rule, is a one-tailed t-test [5]. According to Mojena's Rule, usage patterns are best explained with a four-cluster solution for Quebec and Ontario, with significance levels $p < 0.05$ and $p < 0.04$, respectively. To compare usage patterns between geographical regions, we needed to know if we had distinct solutions. We therefore used the Rand index (r) to test the stability of the solution [6], where $r > 0.70$ indicates a stable solution and, conversely, $r < 0.70$ indicates an unstable solution. With $r = 0.59$, we have an unstable solution and thus two distinct usage patterns.

6.0 Results

Clusters are presented in Table 1 for Quebec and Table 2 for Ontario. For this preliminary investigation, we classified ICT as mature or emerging, in accordance with a discussion panel composed of other researchers involved in the technology management field. About half of the 32 ICT are qualified as mature: desk computer, printer, scanner, photocopier, fax, word processing, spreadsheet, database, CD-ROM, telephone, cellular phone, voice mail, pager, videoconferencing and file transfer protocol (FTP). The other ICT are classified as emerging and are mostly Internet-based: laptop computer, pocket PC, electronic message minder, computer imaging, presentation software, Internet, intranet, extranet, e-mail, chat, company web site, search engine, e-catalog, e-commerce, discussion forum, visioconferencing and CRM. Since no universally accepted classification was found in the literature, we believe that this classification is appropriate in this exploratory research.

Both regions have a very large cluster, the second one, and three smaller ones with markedly different cluster composition. In Quebec, Webcrawler contains 16 technologies (50%) and 12 of these are emerging ICT, while Messenger consists solely of mature ICT. In Ontario, Integrator is composed solely of emerging ICT, and the rest of the emerging ICT are more evenly distributed throughout the other three clusters. Interestingly, CRM is found in a small compact, spherical cluster containing only emerging ICT in Ontario. In Quebec, on the other hand, it is found in Webcrawler, the largest and one of the most eclectic cluster. Telephone and cellular phone, the two ICT that allow direct voice communication with customers, are found in the same cluster (Informer) in Ontario, and in two distinct clusters in Quebec (Processor and Demonstrator), respectively. Another interesting feature of these usage patterns is the cluster embedment. Integrator (search engine, CRM, extranet and Web site) in Ontario is embedded within Webcrawler in Quebec. Conversely, Processor (printer, e-mail, telephone, laptop, word processing and voice mail) in Quebec is embedded within Informer in Ontario. This embedment reveals that the Ontario division of the firm may be more progressive in its use of CRM. We believe that use of a small number of ICT may indicate in-depth usage of the functionalities (high infusion), as opposed to superficial usage of many ICT. Furthermore, the fact that CRM clustered exclusively with a few emerging ICT, while being clustered with mature ICT in Quebec, indicates that it may be used in a more integrated manner in Ontario. Since SFA and CRM tools are usually customized, it is not surprising to find markedly different usage patterns within the same firm for the two geographical divisions. Figure 1 presents usage patterns for both regions on the same graph.

7.0 Discussion

Our findings indicate that Ontario has a younger, well educated sales force and that Quebec's salespeople are more educated and more experienced. Younger, more educated salespeople will be the first to utilize SFA systems and make full use of their capabilities [7]. Clusters found in Ontario clearly show more progressive usage of ICT since one cluster consists solely of emerging ICT. In Ontario, emerging ICT are also more evenly distributed across the patterns than in Quebec, where 70% of them are found in a single, very large cluster. Being older, the sales force in Quebec may have already settled into work routines. This is reflected by Processor, the only cluster composed solely of mature ICT. Sales experience is another variable that may help explain cluster composition. Salespeople in Quebec average 15.5 years of experience, those in Ontario 7.8 years. Salespeople with less than five years of sales experience have a more positive attitude toward ICT and thus will use technology more fully [8]. This is further reflected in the more even distribution of emerging ICT across the clusters in Ontario, particularly by

Table 1: Clusters for Quebec

DEMONSTRATOR	WEBCRAWLER	PROCESSOR	MESSENGER
<i>Presentation software</i>	<i>E-catalog</i>	Printer	Fax machine
<i>Pocket PC</i>	CD-ROM	<i>E-mail</i>	Photocopier
Cellular phone	Database	Telephone	Videoconference
Pager	<i>Intranet</i>	<i>Laptop computer</i>	Desk computer
<i>PDA</i>	FTP	Word-processing	
Spreadsheets	<i>Internet</i>	Voice mail	
	CRM		
	<i>Own company Web site</i>		
	<i>Computer imaging</i>		
	<i>Search engine</i>		
	<i>Forum of discussion</i>		
	<i>Chatroom</i>		
	<i>Extranet</i>		
	<i>Scanner</i>		
	<i>E-commerce</i>		
	<i>Visioconferencing</i>		

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EMERGING: Italics
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Table 2: Clusters for Ontario

IMAGER	INFORMER	INTEGRATOR	NETWORKER
<i>Computer imaging</i>	Fax machine	<i>Search engine</i>	<i>E-commerce</i>
<i>PDA</i>	Spreadsheet	CRM	<i>Discussion forum</i>
Scanner	Voice mail	<i>Extranet</i>	Desk computer
<i>Pocket PC</i>	Printer	<i>Own company Web site</i>	
<i>Chatroom</i>	<i>Presentation software</i>		
<i>Visioconferencing</i>	Photocopier		
<i>E-catalog</i>	<i>Intranet</i>		
Videoconferencing	Telephone		
Pager	<i>Internet</i>		
Database	Word processing		
FTP	CD-ROM		
	<i>E-mail</i>		
	<i>Laptop computer</i>		
	Cellular phone		

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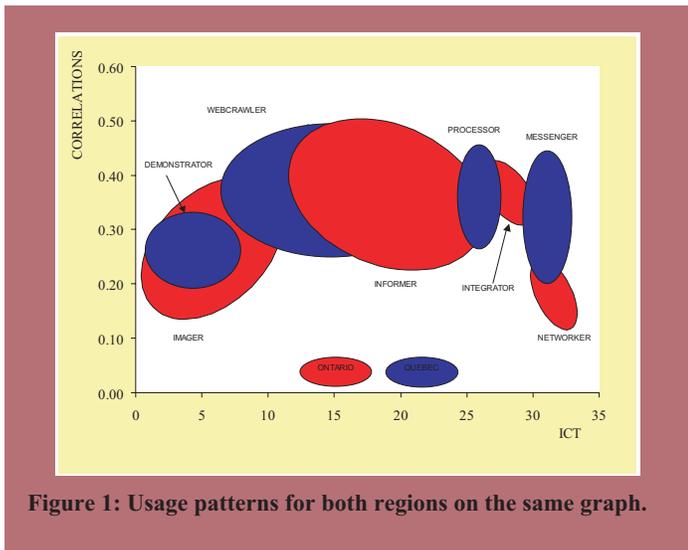


Figure 1: Usage patterns for both regions on the same graph.

Integrator the small cluster that includes CRM.

The discussion would be incomplete without mentioning the effects of culture when comparing mainly French-speaking Quebec and English-speaking Ontario. There are significant cultural differences at the societal level between Quebec and Ontario. Subcultural differences in Canada are important owing to multiculturalism and language. It is well established in marketing given the influence of the European founding cultures, the two linguistic subgroups differ significantly in their perceptions, attitudes and buying behavior [9]. Since salespeople can be viewed as individual consumers [7], we believe that these subnational differences in marketing between French speaking and English-speaking consumers are applicable to salespeople and are reflected in the different usage patterns between geographical divisions. Conversely, since both divisions offer the same products and services to customers in their respective regions, we think that these usage pattern differences may also be explained by the characteristics of the market served. As stated earlier, these differences in markets are in turn explained by cultural differences between English and French-speaking customers [9].

8.0 Conclusion and Managerial Implications

Our results suggest that the demographics of salespeople and national culture may explain the different usage patterns across two geographical divisions of the same firm. Clustering techniques are useful for uncovering ICT usage patterns among salespeople. Since these techniques provide a picture of which ICT are used in interrelated fashion, managers may find them highly valuable for purposes of implementation, training and recruitment. Clusters are useful for gaining a deeper understanding of the behavior of salespeople, a strategic human resource that can be described as the bread and butter of telecommunication firms facing strong competition. Clusters may be used as “diagnostic tools” to further improve the tasks (selling/non selling) technology fit, improve the alignment between salespeople ICT usage patterns and organizational goals and culture, and improve alignment between the ICT usage patterns of salespeople and customers. Using clustering as a strategic tool, managers will be better equipped to optimize ICT usage among mature and emerging technologies as well. We believe that this ICT fine-tuning between sales force and sales managers is one means of reducing implementation failure rates.

9.0 Acknowledgment

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10.0 Acronyms

AHC	-	Agglomerative hierarchical clustering
CA	-	Clustering analysis
CRM	-	Customer relationship management
eCRM	-	Internet-based customer relationship management
ERP	-	Enterprise resource planning

ICT	-	Information and communication technology
IM	-	Integrated marketing
mCRM	-	Mobile customer relationship management
PRM	-	Partner relationship management
SFA	-	Sales force automation
SMA	-	Sales and marketing automation

11.0 References

- [1]. Mohr, Jakki. J. (2001), “Marketing of High-Technology Products and Innovations,” New Jersey: Prentice Hall, pp. Chap. 1, p. 7.
- [2]. Gitomer, Jay (2001), “Sales Automation Market Trends,” Faulkner Information Services, September.
- [3]. Rogers, Everett. M. (1995), “Diffusion of innovations,” The Free Press, New York, p. 15.
- [4]. Gitomer, Jay (2002), “Implementing a Customer Relationship Management System,” Faulkner Information Services.
- [5]. Mojena, Richard (1977), “Hierarchical Grouping Methods and Stopping Rules: An Evaluation,” *Computer Journal*, 20, (4) 359-363.
- [6]. Rand, William M. (1971), “Objective Criteria for The Evaluation of Clustering Methods,” *Journal of the American Statistical Association*, 66, (336) 846-850.
- [7]. Parthasarathy, Madhavan. and Ravipreet. S. Sohi (1997), “Salesforce Automation and the Adoption of Technological Innovations by Salespeople: Theory And Implication,” *Journal of Business & Industrial Marketing*, 12, 196-208.
- [8]. Keillor, Bruce D., R. Edward Bashaw and Charles. E. Pettijohn (1997), “Salesforce Automation Issues Prior To Implementation: The Relationship Between Attitudes Toward Technology, Experience And Productivity,” *Journal of Business & Industrial Marketing*, 12, 209-219.
- [9]. Heslop, Louise A., Nicolas Papadopoulos and Margie Bourk (1998), “An Interregional and Intercultural Perspective on Subcultural Differences in Product Evaluations,” *Canadian Journal of Administrative Sciences*, 15 (2), 113-127.

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