

DO INFORMATION TECHNOLOGY-SAVVY SALESPeOPLE SELL MORE? AN EXPLORATORY STUDY OF THE USE OF INFORMATION TECHNOLOGIES ON SALESPERSON PERFORMANCE

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The purpose of this study is to extend previous sales research by further examining the use of information technology as a new additional determinant of salesperson performance. Particularly, the roles of personal computers, email correspondence, personal digital assistants, Internet advertising and personal web sites are investigated. The empirical results show that not all information technologies are useful but that careful use of technology generally enhances personal selling productivity.

INTRODUCTION

Previous studies have focused on schooling, job-related training programs, professional experiences, other human characteristics, and administrative supports as determinants of salesperson performance (see Churchill, Ford and Walker 1997; Barrick, Steward and Piotrowski 2002; Wilson, Strutton and Farris 2002). The purpose of this study is to further examine the use of information technology as an additional determinant of salesperson performance. Specifically, we investigate the following information technologies recently used among salespeople: personal computers, email correspondence, personal digital assistants, advertising on the Internet and personal web sites or homepages. As new information technologies become available they may be considered along a continuum anchored by assets to performance at one end and potential threats to salespeople's job security at the other (Charness and Levine 2000), and it is important to understand their impact on sales

performance. This exploratory research provides a first step toward such understanding.

The data are from a survey of real estate salespeople in a mid-sized Midwestern city. We selected the real estate industry because its salespeople (also called real estate licensees or real estate practitioners) have to constantly maintain the level of sales qualifications that a given state demands by passing licensing tests and completing continuing education requirements. The real estate industry also has shown a commitment to use of technology with websites such as Realtor.com.

An Empirical Model Examining Sales Performance

The empirical model takes the following form:

Sales performance = f (Experience, Effort, Personal characteristics, Administrative support and Information technologies).

Although the main purpose of this study is to investigate the effect of information technologies, other known determinants should be examined and controlled to precisely reveal the pure effect of

information technologies. Similar factors found in other industries affect real estate salespeople's performance. Studies consistently find that, among others, (1) work experience, (2) number of hours worked per week, (3) being younger, (4) education, (5) gender and (6) the number of personal assistants have positive relationships to sales performance (Sirmans and Swicegood 2000). These six factors are included and controlled in the model to investigate the pure effect of information technologies. Table 1 shows the descriptive statistics of the variables included in the model.

Experience: This determinant was measured by the number of years the salesperson has been actively engaged in the real estate sales business. On average, the salespeople worked 13 years. This is expected to positively affect sales.

Effort: The effort variable was measured by the number of hours per week spent working on sales and related activities. The salespeople worked 41 hours per week on average. Hours worked are expected to positively affect sales.

Personal Characteristics: These variables included age, education and gender. On average, the salespeople were 47 years old and had 15 years of formal education. Over 70 percent of the sample had a bachelor's degree and 35 percent had a graduate degree. Forty percent of the participants were female. Guided by previous studies, age and being a female are expected to negatively affect sales while education, measured by the number of years in formal education, is expected to positively affect sales performance.

Administrative support: This determinant was measured by the number of licensed personal assistants available to aid sales activity. It is common for real estate salespeople to hire their own assistants, who typically are employees of, and are paid by, the salesperson rather than the firm. They usually perform marketing and administrative duties for the salesperson, allowing the salesperson more time for personal selling duties that result in commission generation. Thus, for the special case of real estate sales people, the provision for administrative support

is defined by the employment agreements among brokers, salespeople and assistants, all under the umbrella of the state's licensing laws. On average, the salespeople had access to 0.12 assistants. It is expected that assistants would positively influence sales performance.

Information Technologies: Five representative types of information technologies that salespeople heavily rely on for sales were investigated (Watad and DiSanzo 2000). They are use of personal computers (particularly, notebook or laptop computers) in a yes-no question; use of email, reported as the percentage of written customer correspondence done through email; use of personal digital assistants such as Palm Pilot measured on a five-point scale (0 = never to 4 = always); general use of the Internet, reported as the number of web sites where the listings are advertised (ranging from 0 to 4); and specific use of personal web sites for promoting listings and services in a yes-no question.

Twenty-four percent of the participants used laptop computers; 26 percent, personal digital assistants; and 36 percent had their own web sites. They averaged 14 percent of their written correspondence to customers through email, and they advertised their listings on an average of 1.9 Internet web sites such as Realtor.com.

Sales Performance: Sales performance, as the dependent variable, was measured in three forms: annual dollar sales volume, annual number of transactions and annual personal income. Annual sales volume and annual number of transactions were obtained from data compiled by the local Multiple Listing Service (MLS), while annual personal income was self-reported by the salespeople. Thus, personal income was a subjective measure and sales volume and the number of transactions were objective measures. Participants' average personal income was \$65,780 and their average sales volume was \$1,737,000 for 16 transactions.

THE DATA

The data were collected through a survey of the real estate salespeople in a mid-sized city in the Midwest.

Table 1
Descriptive Statistics of the Variables

Variables	Mean	Standard Deviation	Minimum	Maximum
Dependent Variables				
Personal annual income (thousands)	\$65.78	\$57.99	\$10.00	\$450.00
Annual number of transactions	16.05	13.07	1.00	52.00
Annual sales volume (thousands)	\$1,737.73	\$1,582.23	\$56.90	\$7,665.70
Independent Variables				
(1) Experience: Sales experience (years)	13.15	8.21	1.00	28.00
(2) Effort: Working hours per week	41.32	15.05	4.00	70.50
(3) Personal Characteristics: Age (years)	47.13	11.03		
Education(years)	15.15	1.76	22.00	67.00
Female (% of sample)	40	-	11.00	19.00
(4) Administrative Support: Number of licensed personal assistants	0.12	0.35	0.00	2.00
(5) Use of Information Technologies Use of laptop computers (% of sample)	24	-		
Email correspondence (% of total correspondence)	13.69	10.89	0.00	65.00
Use of personal digital assistants	0.26	0.82	0.00	
Number of web advertising sites	1.92	1.06	0.00	4.00
Use of personal web sites (% of sample)	36	-		4.00

n = 125

The survey was mailed to the entire population of the 350 active salespeople in the city. As a token of appreciation and an instrument to increase the response rate, a crisp one-dollar bill was inserted in each survey. Of the respondents, 125 responses containing complete data were used in this study, resulting in a response rate of 35.7 percent. These survey data were later combined with individual salespeople's objective sales data printed in the annual report of the local MLS.

Table 2 exhibits the correlation matrix of the variables. According to the simple correlations, the three variables measuring sales performance are highly correlated; sales experience, age, education and being a female are weakly related to sales performance; working hours and the access to personal assistants are strong determinants of sales; and the use of various information technologies

except emails is positively related to sales. However, such initial observations may not be confirmed as significant in regression analysis, which estimates the partial and pure effect of the variables on sales with all other effects controlled.

RESULTS

The regression results for the empirical model are reported in Table 3. For easy comparisons to previous sales studies, a backward stepwise regression was performed for each of three dependent variables and standardized regression coefficients were produced. The model had a R^2 ranging from 0.46 to 0.57 and an adjusted R^2 from 0.45 to 0.55. F-values indicated the model was significant at a level of lower than $p = 0.01$. No serious multicollinearity was detected as the variance inflation ranged from 1.14 to 1.20 (lower than the threshold of 10) and the condition index

Table 2
Correlation Matrix of the Variables

Variables	1	2	3	4	5	6	7	8	9	10	11	12	13	14
1. Personal annual income (thousands)	1.00													
2. Annual number of transactions	0.76	1.00												
3. Annual sales volume (thousands)	0.79	0.97	1.00											
4. Sales experiences (years)	0.10	0.00	0.01	1.00										
5. Working hours per week	0.48	0.54	0.50	0.04	1.00									
6. Age	-0.14	-0.06	-0.07	0.51	-0.08	1.00								
7. Education	-0.00	-0.03	-0.03	-0.12	0.08	0.03	1.00							
8. Female	0.00	0.13	0.17	-0.07	0.05	0.04	-0.13	1.00						
9. Number of personal assistants	0.55	0.56	0.60	-0.03	0.22	-0.23	-0.05	-0.01	1.00					
10. Use of laptop computers	0.15	0.19	0.15	-0.15	0.20	-0.14	0.18	0.05	0.18	1.00				
11. Email correspondence (%)	-0.03	-0.05	-0.05	-0.21	0.01	-0.25	0.02	-0.02	0.11	0.18	1.00			
12. Use of personal digital assistants	0.17	0.14	0.18	-0.17	0.01	-0.20	-0.00	0.04	0.32	0.15	0.00	1.00		
13. Number of web advertising sites	0.16	0.16	0.18	0.02	0.26	-0.12	-0.00	0.00	0.16	-0.08	0.09	0.01	1.00	
14. Use of personal web sites	0.26	0.24	0.28	0.01	0.19	-0.05	-0.02	0.20	0.19	0.20	0.26	0.07	0.21	1.00

n = 125.

ranged from 7.90 to 8.49 (lower than the threshold of 30; see Hair et al. 1998).

Experience: The number of years of work in sales was not a significant determinant of sales performance.

Effort: Across the dependent variables, the number of hours worked was the second strongest determinant.

Personal Characteristics: Both age and formal education were not significant factors while being a female had a positive effect on sales volume, but not on the number of transactions or personal income. Thus, the three selected variables of personal characteristics seem to have little impact on sales performance.

Administrative support: The number of licensed personal assistants was the strongest determinant of sales performance. Their professional assistance may reduce salespeople's workload by processing routine administrative work and allow salespeople to spend their time on more important tasks related to sales.

Information Technologies: Among the five types of information technologies, use of laptop or notebook computers, use of personal digital assistants and advertising listings on Internet web sites were not significant in predicting sales performance. On the other hand, e-mail correspondence had a negative

effect on sales while the use of personal web sites for promoting listings had a positive effect.

Information Technology Savvyness and Sales Performance

For further insight, cluster analysis was conducted to segment the salespeople based on their use of information technology, and ANOVA was then performed to examine each cluster's sales performance. Segmentation variables for cluster analysis were the five types of information technology. According to hierarchical methods of cluster analysis, a four-cluster solution was optimal for the sample because both the distance and the cubic clustering criterion between the final three clusters suddenly jumped, much more than in any other cluster solution (Milligan and Cooper 1989).

As reported in the top of Table 4, Cluster 1 salespeople (n = 11) were the heaviest users of laptop computers, emails and personal web sites, but they did not own personal digital assistants and did not advertise their listings on the Internet. Members of Cluster 2 (n = 77), the largest group of salespeople (62 percent of the respondents), were the most conservative technology users as shown in the lowest usage level of every technology except for laptop computers. Cluster 3 members (n = 28) were almost identical with those in the second cluster in use of technology except for Internet advertising, in which

Table 3
Regression Results: Effect of Information Technology on Sales Performance

Variables	Annual Sales Income	Annual Number of Transactions	Personal Income
(1) <i>Experience:</i> Sales experience (years)	N/S	N/S	N/S
(2) <i>Effort:</i> Working hours per week	0.32*****	0.38*****	0.35*****
(3) <i>Personal Characteristics:</i> Age (years)	N/S	N/S	N/S
Education (years)	N/S	N/S	N/S
Female (% of sample)	0.11*	N/S	N/S
(4) <i>Administrative Support:</i> Number of licensed personal assistants	0.54*****	0.50*****	0.46*****
(5) <i>Use of Information Technologies</i> Use of laptop computers (% of sample)	N/S	N/S	N/S
Email correspondence (%)	-0.15**	-0.15**	-0.12*
Use of personal digital assistants	N/S	N/S	N/S
Number of web advertising sites	N/S	N/S	N/S
Use of personal web sites (% of sample)	0.15**	0.14**	0.14*
R ²	0.57	0.54	0.46
R ² -adjusted	0.55	0.52	0.45
F-value	31.16	34.55	25.90
Largest variance inflation	1.20	1.14	1.14
Condition index	8.49	7.90	7.90

n = 125.

N/S = Not significant at .10.

*p < 0.10; **p < 0.05; ***p < 0.01; ****p < 0.001; *****p < 0.0001.

Standardized regression coefficients are reported.

Cluster 3 topped every other cluster. Cluster 4 (n = 12) was the second heaviest user group for laptop computers and personal web sites and was by far the heaviest user group of personal digital assistants. These four clusters were significantly different in each of the technology variables with the smallest F-value of 4.82, which indicates the statistical soundness of the segmentation.

The consequential ANOVA tests on sales performance showed that Cluster 4 was the top performer in each of the three sales criteria as reported in the bottom of Table 4. Realtors in Cluster 4 sold \$4.5 million in property over 36 transactions and earned \$96,000 as personal income. Further post-hoc analysis of multiple comparisons of the clusters showed the first three clusters were not significantly

different from each other in sales performance but they were significantly different from Cluster 4. Thus, members of Cluster 4 were the best performers by far. Their outstanding sales performance was related to their information technology savviness through the heavy use of laptop computers, personal web sites and, more importantly, personal digital assistants.

Types of Information Technologies

To look into factorial groupings of the five information technologies, factor analysis with an orthogonal (here, VARIMAX) rotation technique was conducted. Three distinct factors were found and they explained cumulatively 72.4 percent of the total variance of the technology variables. Factor analysis with an oblique rotation technique produced similar

Table 4
Information Technology Savvyness and Sales Performance

Profiles of Four Clusters of Salespeople Regarding Use of Information Technology					
Information Technology Variables	CL1 (n=11)	CL2 (n=77)	CL3 (n=28)	CL4 (n=12)	ANOVA F-value
Use of laptop computers (ratio)	0.64	0.23	0.11	0.42	4.82***
Email correspondence (%)	46.4*	10.2%	11.4%	15.0%	123.22*****
Use of personal digital assistants	0.00	0.00	0.04	2.50	704.08*****
Number of web advertising sites	1.91	1.14	3.32	2.08	46.36*****
Use of personal web sites (ratio)	0.82	0.29	0.39	0.67	5.84****
Sales Performance by Clusters of Salespeople					
Sales Performance Variables	CL1 (n=11)	CL2 (n=77)	CL3 (n=28)	CL4 (n=12)	ANOVA F-value
Personal annual income (thousand)	\$1,531.31	\$2,163.89	\$2,423.01	\$4,490.88	3.40**
Annual number of transactions	14.18	19.72	21.64	36.25	2.69**
Annual sales volume (thousand)	\$60.22	\$65.66	\$70.42	\$96.27	3.67**

n=125.

*p<0.10; **p<0.05; ***p<0.01; ****p<0.001; *****p<0.0001.

CL=Cluster of Salespeople

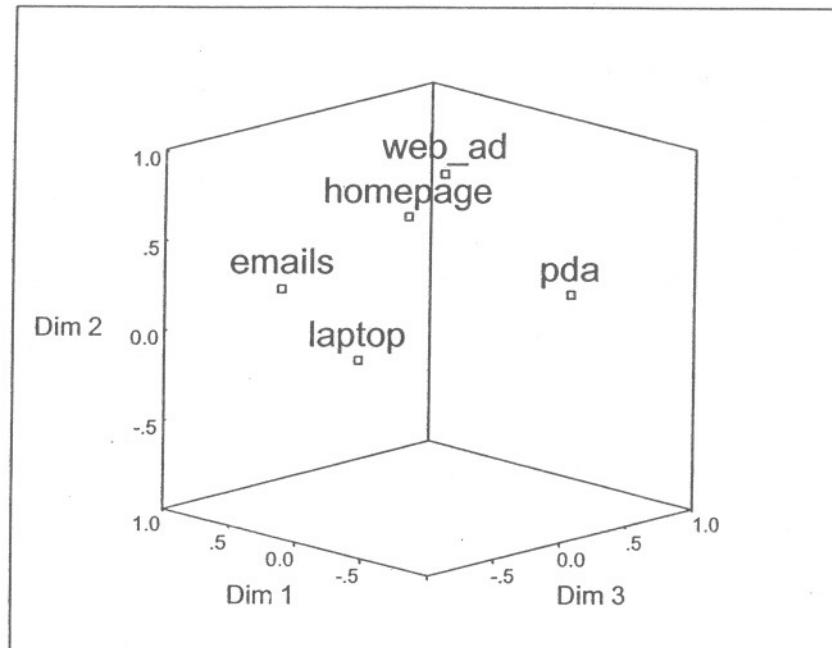
factor patterns, confirming stability of the factor structure. Figure 1 graphically exhibits the relative positions of the information technologies in a three-dimensional space. Specifically, web advertising and personal web sites such as homepages make one group and email and laptop computers make another group while personal digital assistants stand independently of the two other groups.

Web advertising and homepages may be characterized as passive and open technologies in that, although salespeople may wait for customers' initiatives, any customer can approach these publicly available media. On the other hand, email and laptop computers are interactive and closed, since, while salespeople and customers can contact each other simultaneously by these tools, they must first have access to one another's email addresses. Personal digital assistants share similar aspects with email and laptop computers but go beyond them. They are faster, as salespeople can respond to incoming messages upon arrival; they are more intimate and interactive, as salespeople can talk with customers in addition to transmitting written and graphic messages; and they are more convenient, as they are as light and portable as a cellular phone.

The above cluster analysis provides some evidence for the significant impact of information technology on sales performance. The clusters can be viewed as two groups: those with outstanding performance (members of Cluster 4) and those without (members of the other three clusters), who are significantly different from Cluster 4 but not significantly different from one another.

Comparison of these two groups indicates that personal digital assistants are the most effective technology for sales performance, as shown among the members of Cluster 4. On the other hand, these high performers use email and laptop computers less than the members of the other groups. These findings imply that information technologies that enhance sales performance should be open to the customers, faster, intimate and convenient to carry. Technologies that do not satisfy those conditions hurt sales performance. Email belongs to such a category. Online chatting with customers through a web video camera may be considered as a new substitute technology that overcomes the limitations and problems of dry and slow email.

Figure 1
Salespeople's Information Technologies



laptop = Use of laptop computers.
 email = Email correspondence.
 pda = Use of personal digital assistants.
 web_ad = Number of web advertising sites.
 homepage = Use of personal web sites.

MANAGERIAL IMPLICATIONS

This study reconfirms sales literature by finding that salespeople's own efforts combined with appropriate administrative support are important to sales performance (MacKenzie, Podsakoff and Rich 2001; Atuahene-Gima and Li 2002). Both parties, salespeople and the firm, have their own responsibilities to advance sales productivity. Even in this information technology era, salespeople should keep working hard and support must be available to them. In this study, administrative support was measured as the number of licensed office assistants used by the salespeople. In other general sales industries, administrative support may include human aids such as qualified and supportive secretaries, supervisors and co-workers and other supportive mechanisms such as efficient and rational administration and decision-making, corporate culture and compensation methods.

This study also clearly shows that not all types of information technology are equally useful in enhancing sales productivity. In particular, heavily relying on email correspondence to communicate with customers has a negative impact on sales. Possible explanations for this may include loss of human intimacy and lack of quick feedback in comparison to voice or face-to-face contacts. On the other hand, promoting sales items on salespeople's web sites is very efficient in increasing sales performance. Such sales web sites may be an effective tool to fully and accurately explain details of products, to respond to customers who show interest or ask questions and to directly make a transaction with customers when the customers are prepared to do so. Personal web sites can be readily extended to shopping sites. Good quality shopping sites will have a great potential to gradually replace conventional sales methods such as physical stores, mail- or phone-order stores, catalogs and eventually some of the sales force (Yoo and Donthu 2001). However, salespeople will still take

important roles behind and beyond the Internet shopping sites by defining, identifying, contacting and persuading customers, aiding them to make purchase decisions and providing post-sale services. All these activities require salespeople's efforts and administrative support, which will thus remain as two very important factors on sales performance.

The cluster analysis results based on the use of information technologies suggest that the best salespeople are information technology-savvy adopters who avoid heavy use of email in contacting and responding to customers. They are good users of laptop computers and personal web sites and advertisers of their listings on Internet web sites. In addition, they are heavy users of personal digital assistants, which are the best technology to use probably because they promote the relationship with customers the most effectively (Keilor, Parker and Pettijohn 2000; Weitz, Castleberry and Tanner 2001). These findings strongly imply that salespeople need to be equipped with information technology and keep up with the ever-changing technologies to enhance their performance. Practically, personal digital assistants seem to be the most promising technology among the technologies surveyed in this study as they noticeably distinguish the best performers from the rest.

In conclusion, this study has investigated some selected traditional determinants of good sales performance as well as information technologies that influence sales performance. Among the traditional determinants, the number of hours worked and the number of personal assistants were significant. Unlike some other studies, sales experiences, age, formal schooling and being a female did not relate significantly to performance. This does not necessarily mean these factors are not important. More studies are required to investigate their impact on sales, particularly in the context of use of information technology.

Information technology tools did not have a uniform impact on performance. Corresponding to customers through email negatively affected sales while promoting listings on personal web sites positively affected sales. Further analysis revealed the importance of personal digital assistants to the best

sales performers. In summary, the study confirmed that information technology-savvy salespeople perform better.

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