ADOPTION AND DIFFUSION OF ICT IN REAL ESTATE INDUSTRY: AN EMPIRICAL STUDY

Real estate refers to activities concerned with the ownership and transfer of physical properties in business and includes in law, land and everything more or less attached with it. While the term “real estate” includes all retail, industrial, corporate, and residential properties, in this paper we limit our study only to residential sector because it is often difficult to assess the impact of information and communication technologies (ICT) on an entire industry. In this research-in-progress, we seek to examine the adoption of ICT in residential real estate sector combining two approaches: rationalistic goal-oriented behavior of individuals; and socio-technical behavior of organizations. In this study, we propose to develop, operationalize, and empirically test a model to explain real estate agents’ usage of ICT in their work.

Introduction

Real estate refers to activities concerned with the ownership and transfer of physical properties in business and includes in law, land and everything more or less attached with it (Friedman, 1993). According to Kummerow & Lun (2005), roles of real estate firms can be divided into the following categories: agency (brokerage); property management; valuation and research; funds management and investment; development, design, construction, and land use planning; and management of corporate and public sector real estate. Brokerage refers to the act of bringing together prospective buyers and sellers for the purpose of sales or leasing of real estate properties. Property management involves marketing, customer relationships, accounting, and maintenance of properties. Valuation and research deal with the assessment of current market values of the properties by using appropriate information from reliable sources. Funds management and investment are usually done through wholesale funds and syndication. The development, design, construction, and land use planning refer to the creation of new real estate assets for transactions. Corporate and public sector real estate management aims at offering the most appropriate real estate products and services to corporate and public sectors. Real estate agents in residential sector are primarily involved in brokerage and since the objective of this study is to examine the institutional adoption of ICT in residential real estate, we now describe in detail the roles of agents in this sector.

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A prospective seller hires a real estate agent with the goal of selling her property either through an assignment of a real estate firm or through her own personal contacts. The seller’s agent, also known as a listing agent, markets the property by advertising it in several places (e.g., the multiple listing service websites, neighborhood etc.) and suggesting renovation of the property if necessary. The listing agent assists in determining the list price for the property based on recent transactions in that neighborhood and starts meeting with potential buyers. The listing agent also helps the seller in negotiating the final selling price and in facilitating transactions. The listing agent generally receives commission as a certain percentage of the sales price from the seller.

Similarly, a prospective buyer also hires a real estate agent either through an assignment of a real estate firm or through her own personal contacts. The buyer’s agent, also known as a buying agent, helps the buyer find suitable properties that meet her needs and makes arrangements for their property inspections. The buying agent assists in negotiating a final price and helps in securing mortgages. The buying agent receives commission as a share from the listing agent. Figure 1 summarizes the tasks of a listing agent and a buying agent. Figure 2 shows the brokerage process which brings together prospective buyers and sells for sales or leasing of real estate properties.

Figure 1: Major Tasks Performed by Listing Agents and Buying Agents

<table>
<thead>
<tr>
<th>Listing agent (Sell side)</th>
<th>Buying agent (Buy side)</th>
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<tbody>
<tr>
<td>✓ Market a property by advertising and suggesting renovation</td>
<td>✓ Help find suitable properties</td>
</tr>
<tr>
<td>✓ Assist in determining list price</td>
<td>✓ Help inspect considered properties and make arrangement for visits</td>
</tr>
<tr>
<td>✓ Screen potential buyers</td>
<td>✓ Assist in deciding on offer prices</td>
</tr>
<tr>
<td>✓ Assist in negotiations and transactions</td>
<td>✓ Help in negotiations and details of transactions</td>
</tr>
<tr>
<td>✓ Receive commission as % of the sales price from the seller</td>
<td>✓ Assist in inspection and securing mortgages</td>
</tr>
<tr>
<td>✓ Receive commission as a share from the listing agent</td>
<td></td>
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Figure 2: Real Estate Brokerage Process

A seller contacts a real estate agent to sell her property. After agreeing with their terms and conditions, the seller and the agent sign a binding contract. The selling agent enters description and photo/video of the property in a shared database such as Multiple Listing Service (MLS). A buying agent searches the database and prepares a list of properties that could be appropriate to the buyer.

It is evident from the above discussion that the role of real estate agents is that of information intermediary. The widespread adoption and diffusion of ICT could, therefore, have disintermediation effects and may threaten agents’ jobs in real estate industry. Crowston & Wigand (1999) notice that real estate agents are generally early adopters of ICT such as
databases, emails, webs, and cellular phones to remain competitive in their field. Furthermore, realtors believe that property related data is proprietary information which should be accessible to only the firm and its subsidiaries (Baen & Guttery, 1997).

Researchers contend that real estate industry is information-intensive and therefore, it is critical to understand the adoption and diffusion of ICT in this industry (Tucillo, 1997). Because it is not easy to assess the impact of ICT on an entire industry (Dess & Beard, 1984), we examine only residential sector in this research. Studies pertaining to the adoption and diffusion of ICT are important because they help us understand how technologies, individuals’ work, and organizational structures interact with each other and consequently change business processes and underlying value chains (Crowston, 2000; Orlikowski & Robey, 1991). While several studies in the past have examined the adoption and diffusion of ICT in various industries (e.g., (Walsham, 1993; DeSanctis & Poole, 1994), comparatively fewer empirical studies have been done in real estate sector. In this research-in-progress, we seek to examine the institutional adoption of ICT in the residential real estate sector combining two approaches: rationalistic goal-oriented behavior of individual real estate agents; and socio-technical behavior of real estate firms. In this study, we propose to develop, operationalize, and empirically test a model to explain real estate agents’ usage of ICT in their work. We now briefly discuss adoption and diffusion of technologies in organizations.

Adoption and Diffusion of Technology in Organizations

The rationalistic, goal-oriented view of human behavior assumes that individuals underscore the importance of technological design, functionalities, and capacities as determinants of IT adoption, and ignore the impact of such organizational factors as functional coordination, social connectivity, strategic collaborations, and integrations. Sociological perspectives on technology, on the other hand, avoid purely technical interpretation and emphasize the role of power dynamics, corporate strategies, social environments and practices on an organization’s IT adoption (Fountain, 2001). For example, the theory of structuration (Giddens, 1986) views structures as rules and resources ascribed as properties of social and organizational systems. It recognizes that actors possess reflexive and situated knowledge, the recurrent use of which leads to their institutionalization. DeSanctis & Poole (1994) proposed the adaptive structuration theory to describe the appropriation\(^2\) of social structures into concrete situations and to explain how technology is used with respect to its “spirit”. In her critique on the duality of technology, Orlikowski (1992) underscored the role of power, meaning, norms, and interpretive flexibility\(^3\) within the structuration process. In her later study, Orlikowski extended the structuration theory by proposing the practice lens perspective which stresses that technologies do not have structures within themselves and that structures emerge only from the repeated and situated action of players (Orlikowski, 2000).

Individual adoption of IT, which has been a focus of many studies in the past, has such theoretical underpinnings as theory of reasoned action (Fishbein & Ajzen, 1975), technology acceptance mode (Davis, 1989), motivational model (Davis, Bagozzi, & Warshaw, 1992), theory

\(^2\) Refers to the assimilation of concepts and technologies into a governing framework.

\(^3\) A notion that technological artifacts are culturally constructed and interpreted.
of planned behavior (Ajzen, 1991), innovation diffusion theory (Rogers, 1995), social cognitive theory (Bandura, 1986), and more recently, the unified theory of acceptance and use of technology (Venkatesh, Morris, Davis, & Davis, 2003). Individual acceptance of IT tends to be rationalistic, goal-oriented, and is primarily concerned with objective attributes such as perceived usefulness and perceived ease of use of information systems.

A literature review on the usage of ICT in real estate industry indicated the validity of both individual and organizational perspectives for understanding the adoption and diffusion of technology in this industry. For example, according to the National Association of Realtors’ second technology survey of associations conducted in March 2008, real estate companies as organizations are spending more money on information and communications technologies and are providing more online services to their customers than ever before due to several environmental pressures (RATS, 2008). The survey also found that real estate agents consider the use of technology to communicate effectively and to access listings data securely as their most important technology tasks. The biggest technology challenges in 2007 were listed as the following: getting members up to speed with technology and how to make it work for them; affordability; controlling where listings are displayed; communication; debugging online payment glitches etc. Most popular real estate software were found to be Rapattoni for multiple listing services and hosting services, NRDS, Lamps, MS Access, Maryland Management and BravePoint with majority of them offering technology services such as email, website hosting, online education, electronic voting, scheduling service, online video etc. In the following section, we discuss our proposed research model and hypotheses of this study.

**Research Model and Hypotheses**

As stated earlier, in this study we seek to examine the adoption of ICT in residential real estate sector combining two approaches: rationalistic goal-oriented behavior of individual agents; and socio-technical behavior of real estate firms, which are not necessarily mutually exclusive (Khalifa & Davison, 2006). We will use the Technology Acceptance Model (TAM) to examine individual adoption of ICT. In order to study the institutional aspect of ICT adoption in residential real estate sector, we will examine various environmental pressures (DiMaggio & Powell, 1983), and perceived desirability and perceived feasibility of the systems (Shapero & Sokol, 1982). Figure 3 shows our proposed research model which we now discuss in detail.
Technical support, which is defined as “knowledge people assisting the users of computer hardware and software products” (Ralph, 1991) is one of the critical factors in the adoption of information technology (Sumner & Hostetler, 1999). Hence, we posit the following:

H1: Technical support has a positive effect on the perceived usefulness of real estate ICT.
H2: Technical support has a positive effect on the perceived ease of use of real estate ICT.
H3: Technical support has a positive effect on attitudes towards using real estate ICT.

Hypotheses H4-H12 follow from the TAM which posits that perceived ease of use and perceived usefulness of technology have positive impact on attitudes toward using the technology and that attitudes influence actual usage of the technology (Davis, 1989).

H4: Perceived ease of use has a positive effect on attitudes toward the use of real estate ICT.
H5: Perceived ease of use has a positive effect on the perceived usefulness of real estate ICT.
H6: Perceived ease of use has a positive effect on the use of real estate ICT.
H7: Perceived usefulness has a positive effect on attitudes towards the use of real estate ICT.
H8: Perceived usefulness has a positive effect on the intention to use real estate ICT.
H9: Perceived usefulness has a positive effect on the use of real estate ICT.
H10: Attitudes towards using real estate ICT have a positive effect on the intention to use those systems.
H11: Attitudes towards using real estate ICT have a positive effect on the use of real estate ICT.
H12: Intention to use real estate ICT has a positive effect on the use of real estate ICT.

According to Shapero & Sokol (1982), institutional adoption of technology is influenced by its perceived desirability and perceived feasibility. While perceived desirability can refer to several notions such as perceived benefits, compatibility, complexity, observability, and trialability (Rogers, 1995), we will consider only the first aspect, which is perceived benefits, in this study. The notion of perceived desirability of real estate ICT in this study will be assessed in terms of their cost, security, transaction speed, order management, transaction volume, and transaction accuracy. Perceived feasibility refers to an organization’s ability to successfully implement and adopt technology and is measured through its absorptive capacity (Lenox & King, 2004) and organizational readiness (Iacovou, Benbasat, & Dexter, 1995). In this study, we will consider resources, support, and control as measures of perceived feasibility. Hence, the following:

H13: Higher perceived desirability will lead to greater intent to use real estate ICT.
H14: Higher perceived feasibility will lead to greater intent to use real estate ICT.
H15: Higher perceived desirability will lead to greater usage of real estate ICT.
H16: Higher perceived feasibility will lead to greater usage of real estate ICT.

According to DiMaggio & Powell (1983), organizations experience three types of pressures from the environment: coercive, normative, and mimetic. Coercive pressures are exerted by customers as the firms depend on them for their survival. Normative pressures are based on prevalent standards and business environment, and are generally exerted by employees. Mimetic pressures are forces which compel firms to mimic their competitors. Based on these arguments, we posit the following:

H17: Greater coercive pressures from customers will lead to greater intent to use real estate ICT.
H18: Greater pressure to imitate competitors will lead to greater intent to use real estate ICT.
H19: Greater employee pressure will lead to greater intent to use real estate ICT.
H20: Greater employee pressure will lead to greater usage of real estate ICT.
H21: Greater coercive pressures from customers will lead to greater usage of real estate ICT.
H22: Greater pressure to imitate competitors will lead to greater usage of real estate ICT.
Research Methodology

A comprehensive survey questionnaire adapted from Khalifa & Davison (2006) and Ngai, Poon, & Chan (2007) has been developed (See Appendix) and will be soon mailed to real estate agents from Ontario for their participation in the survey. A sample size of about 50/60 responses will be used to test the proposed research model. PLS-based structural equation modeling tool such as SmartPLS\(^4\) will be used for data analysis. Moderating effects of variables such as number of employees of the company, number of years in the real estate business, and average number of transactions per year will also be examined during data analysis.

Conclusions

We would like to conclude this paper by outlining potential contributions of this proposed study. While studies involving the adoption and diffusion of IT in organizations are not uncommon, not many studies have been done in residential real estate sector. By combining two adoption perspectives (rationalistic goal-oriented behavior of individuals, and socio-technical behavior of organizations), we expect to build a better model of ICT adoption in real estate industry. Findings from this study are expected to be of interests to real estate companies and agents, and to scholars studying technology adoption issues.

References


\(^4\) http://www.smartpls.de


APPENDIX
Following is a list of survey questions for the survey participants who will be asked to rate them in 7-point Likert scale.

Technical support
A help desk is available when there is technical problem.
A hotline is available when there is technical problem.
Fax enquiries can be made when there is technical problem.
Web-based enquiries can be made when there is technical problem.
E-mail enquiries can be made when there is technical problem.
The training on the operation of the real estate ICT is sufficient.

Perceived usefulness
Having real estate ICT enable me to work more efficiently.
Real estate ICT improve my job performance.
Real estate ICT enhance the effectiveness of my work.
Real estate ICT give me greater control over my work.
Overall, I find real estate ICT to be advantageous to my work.

Perceived ease of use
Learning to operate real estate ICT is easy for me.
I believe that it is easy to get the real estate ICT to do what I want it to do.
The process of using real estate ICT system is clear and understandable.
It is easy for me to become skilful in using the real estate ICT.
Overall, I believe that the real estate ICT are easy to use.

Attitude
Real estate ICT are fun.
Using real estate ICT is a good idea.
Real estate ICT provide an attractive environment for work. Overall, I like using real estate ICT.

*Intention to use*
To the extent possible, I would use real estate ICT to do my job related tasks. I intend to increase my use of the real estate ICT in the future.

*System usage*
On average, how frequently do you use real estate ICT? On average, how many hours per week do you spend using the real estate ICT?

*Internal and normative pressure - employees*
Our employees believe that we should use ICT in our real estate industry. Our employees believe that ICT are the norm in our industry. Our employees believe that using ICT is beneficial to them.

*Coercive pressure – customers*
Customers that matter to us believe that we should use ICT. We may not build our customer base without ICT. Customers that are crucial to us encourage us to use ICT.

*Mimetic pressure – competitors*
Competitors that have adopted ICT benefitted greatly. Competitors that have adopted ICT are perceived favorably by customers. Competitors that have adopted ICT are more competitive.

*Feasibility*
We have the resources required for using ICT successfully. The effective usage of ICT is well within our control. We have all the support we need for using ICT.

*Desirability (Rate the desirability of ICT in terms of the following attributes)*
Cost
Security
Transaction speed
Order management
Transaction volume
Transaction accuracy