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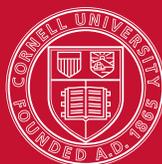


Integrating Self Service Kiosks in a Customer-service System

Cornell Hospitality Report

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by Tsz-Wai Lui, Ph.D., and Gabriele Piccoli, Ph.D.



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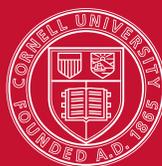
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by Tsz-Wai Lui and Gabriele Piccoli

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EXECUTIVE SUMMARY

Most hospitality companies have been implementing self-service channels with a goal of reducing costs, increasing customer satisfaction and loyalty, and reaching new customer segments. No matter how successful the self-service channel, companies rarely eliminate traditional personal service when they introduce a self-service channel. Instead, companies typically maintain a portfolio of service-delivery channels which allows guests to select the way they interact with the companies. Consequently, managers should consider the interaction among the channels within the portfolio, with particular attention to how they complement each other. Using a research technique called structural equation modeling, the study described here examined the financial and guest-satisfaction results of integrating a self-service kiosk in two brands operated by an international hotel company. Based on data from the company, this study indicates that when certain routine tasks (e.g., checking in and issuing room keys) were handled in kiosks, hotels did see increases in average daily rate. However, when something went wrong with the self-service check-in, the hotels in question saw a reduction in guests' willingness to return. Oddly, the addition of the check-in kiosks did not increase guests' perceptions of service speed at check-in. One possible explanation is that guests used the check-in time to consult with services representatives regarding the destination or other topics, and front-desk associates took the opportunity to make upselling and cross-selling offers.

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The hospitality industry has made considerable strides in using information technology (IT) to improve service efficiency and effectiveness. IT-enabled supplementary services and after-sales service foster differentiation,¹ which helps set a company apart from its competitors.² In addition to the well-known web-based applications, the hospitality industry has innovated in a number of ways to better serve customers; for example, Sheraton Hotels and Resorts and Harrah's Entertainment have introduced Microsoft Surface, a 30-inch, tabletop computer display that guests can use for such services as 360-degree satellite maps and tools to search for local city information, a digital jukebox, and a photo library of Sheraton properties.³ Less radical, but perhaps more common customer service IT applications include mobile-based reservations, kiosk based check-in, and e-folios. These service innovations have been found to improve service and guest satisfaction, and also to create efficiencies for the firm. This configuration of people, technology, and shared information has been termed a customer service system.⁴

¹ O.A. El Sawy and G. Bowles, "Redesigning the Customer Support Process for the Electronic Economy: Insights from Storage Dimensions," *MIS Quarterly*, Vol. 21, No. 4 (1997), pp. 457-483.

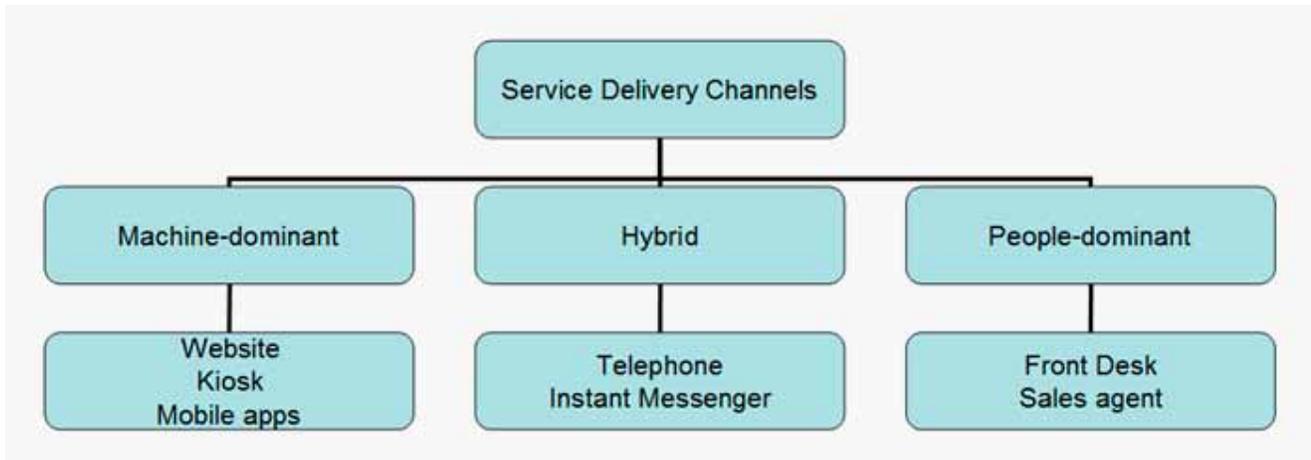
² J. Karimi, T.M. Somers, and Y.P. Gupta, "Impact of Information Technology Management Practices on Customer Service," *Journal of Management Information Systems*, Vol. 17, No. 4 (2001), pp. 125-158.

³ "Sheraton Hotels and Resorts Transforms the Hotel Lobby Experience with Microsoft Surface," Microsoft PressPass, August 18, 2008. Accessed Nov. 30, 2009 at <http://www.microsoft.com/Presspass/press/2008/aug08/08-13SheratonMSSurfacePR.mspx>.

⁴ J. Sophrer, P.P. Maglio, J. Bailey, and D. Gruhl, "Steps toward a Science of Service Systems," *Computer*, Vol. 40, No. 1 (2007), pp. 71-77.

EXHIBIT 1

Customer service delivery channels, with examples



We believe that the lodging industry's attention to IT-enabled guest service innovation is paying off. According to a 2007 PricewaterhouseCoopers study, customer satisfaction levels in the lodging industry were trending in a positive direction, even with a decrease in the number of employees per available and occupied room.⁵ One of the factors contributing to this result is the use of technology. Customer service systems enable a firm to anticipate customers' needs based on their demographic and purchasing profiles—even when the customers don't expressly voice those needs. IT also provides customers with product information, facilitates transactions and payments, and helps personalize the firm's service offerings and manage customer relationships.⁶ Moreover, lodging firms will make greater use of IT as labor costs continue to rise and as customers become both more discriminating and more accustomed to IT-enabled service.

In this report, we analyze the effect on hotel revenues and customer service perceptions of adding an IT-based

self-service channel at two hotel chains. First, let's examine the framework of a customer service system that includes service channels based both on people and technology.

Customer Service Systems

Your guests experience your service via any of three types of channels: (1) people-dominant service, which involves direct interaction of customers and service agents (with or without technology support); (2) machine-dominant service, in which customers use technology only (with no human intervention); or (3) a hybrid, in which customers and service agents interact through technology.⁷ These channels are illustrated in Exhibit 1, which provides examples of each type of service delivery channel.

Self Service

Many customers are pleased to serve themselves using machine-dominant channels, provided they see an advantage to this self-service channel. Technology-based services offer speed, multilingual operations, and a degree of separation from human emotion that customers may value. At its

⁵ "High Levels of Customer Satisfaction with Lodging," *Hotel Marketing*, August 24, 2007. Viewed November 30, 2009, at www.hotelmarketing.com/index.php/content/article/070824_high_levels_of_customer_satisfaction_with_lodging/.

⁶ T. Lui and G. Piccoli, "Toward a Theory of IT-enabled Customer Service Systems," in *Handbook of Research on Contemporary Theoretical Models in Information Systems*, ed. Y. Dwivedi, B. Lal, M.D. Williams, S. Schneberger, and M. Wade, (Hershey, PA: IGI Global 2009).

⁷ J.G. Rayport and B.J. Jaworski, "Best Face Forward," *Harvard Business Review*, Vol. 82, No. 12 (2004), pp.47-58; and C.M. Froehle and A.V. Roth, "New Measurement Scales for Evaluating Perceptions of the Technology-Mediated Customer Service Experience," *Journal of Operations Management*, Vol. 22, No. 1 (2004), pp. 1-21.

EXHIBIT 2

Smartphone apps offered by Hilton and Hyatt; Domino's Tivo ordering screen



Sources: Hilton Photo, *USA Today*, found at www.usablenet.com/in-the-news/exclusive--hilton-worldwide-to-lure-apple-iphone-users-with-seven-apps/; Hyatt Photo, VAS report, found at vasreport.com/site/microsoft-signs-mobile-ad-deal-with-hyatt/8/.

best, a self-service channel provides customers with a level of autonomy and anonymity that they may appreciate in many situations. The system does not become impatient, for instance, when a customer takes a long time deciding which airplane seat he wants, nor does a computer judge a guest who orders fatty foods.

In addition to the benefits that self-service can offer customers, hospitality companies have expanded self-service with the idea of reducing costs, increasing customer satisfaction, and reaching new customer segments.⁸ Self service has gone beyond web sites and lobby kiosks to include smart-phone apps that allow guests to search for hotel information, manage their reservation, and check in or out (see Exhibit 2). Domino's provides an innovative example of using multiple forms of technology. According to public accounts, Domino's offers sixteen different ways for guests to order pizza, including web-based ordering, Tivo, and texting from a mobile phone. Moreover, Domino's allows customers to track their pizza order online (see Exhibit 3). The airline industry long ago installed kiosks for passenger check-ins. With paperless boarding passes, passengers can download their boarding pass in advance to their cell phone, completely eliminating the need for any paper documents other than IDs.

⁸ M.J. Bitner, A.L. Ostrom, and M.L. Meuter, "Implementing Successful Self-Service Technologies," *Academy of Management Executive*, Vol. 16, No. 4 (2002), pp. 96-108.

EXHIBIT 2

Domino's pizza tracker screen



Multiple Channels

Despite the rapid rise of self service, companies generally do not eliminate existing service channels when they automate an operation. Instead the new channel is added to existing service processes, which means that companies find themselves managing a portfolio of service delivery channels. A portfolio approach to customer service enables the firm to match service interactions to channel characteristics for the best possible service delivery. Because people-dominant channels, for instance, are superior in conveying empathy and handling exceptions,⁹ they are best suited in services that require relationship building and unstructured problem solving with individuals who value personal interaction. Recurrent and routine transactions are better suited to the machine-dominant channel, which is usually speedier and more reliable for processing such standard procedures as transactions and payments.

As we suggested above, companies should look for ways to integrate self-service and personal contact.¹⁰ Customers evaluate service quality based both on the outcome of the service and on the quality of the service delivery process—which includes appropriate interaction with technology or employees.¹¹ Guests form different attitudes toward technologies as they apply to various services,¹² and guests generally develop separate, distinct attitudes toward the employees and the technology. On top of that, customers then form an attitude toward the service firm itself.¹³ The key point is that customers typically do not distinguish between service delivered through a self-service channel and service delivery through customer service agents, even though organizations typically think of the two separately. To ensure appropriate service, organizations must treat all channels as part of a

larger customer experience that integrates service delivery channels to provide a higher level of customer service.¹⁴

As we indicated above, one reason to add a self-service channel is to free customer service agents to spend more time performing consultative tasks, interacting with customers to enhance relationships, and generating revenue from upselling and cross-selling. Reducing the space needed for employees also releases precious space for generating revenue. For example, Lodge on the Park, a property in the U.K. owned by Shire Hotels, makes full use of its reception area—which features a Starbucks cafe, pizza restaurant, and bar—by having guests check themselves in at the Starbucks. One particular advantage of adding a self-service channel is that it gives your guests additional choice, and consumers who can make their own choices are more intrinsically motivated than consumers who engage in activities without having a choice.¹⁵ In general, higher intrinsic motivation and higher perceived responsibility toward the process outcome leads to a positive attitude toward the core products and service. This, in turn, leads to a positive evaluation of the service provider, positive word of mouth and loyal behavior,¹⁶ and a willingness to pay a premium.¹⁷

Real Benefits?

The combined effects of different service delivery channels should be considered carefully. There is no guarantee that adding a self-service channel to a people-dominant channel will be profitable—and even if it does become profitable, there may be a considerable time lag before that occurs. As a cautionary tale, for example, a McKinsey & Company publication described a company that introduced a service technology solution that resulted in a \$16 million loss. The loss was attributed to a number of factors, including the rate of customer use, the need for follow-up help, and the absence of cross-selling opportunities.¹⁸ Let's look at the elements of success or failure for a self-service channel.

⁹ D.D. Gremler and K.P. Gwinner, "Customer-Employee Rapport in Service Relationship," *Journal of Service Research*, Vol. 3, No. 1 (2000), pp.82-104; and U. Schultze, "Complementing Self-Service Technology with Service Relationships: The Customer Perspective," *E-Service Journal*, Vol. 3, No. 1 (2003), pp. 7-31.

¹⁰ F. Selnes and H. Hansen, "The Potential Hazard of Self-Service in Developing Customer Loyalty," *Journal of Service Research*, Vol. 4, No. 2 (2001), pp. 79-90; and H. Salomann, M. Dous, L. Kolbe, and W. Brenner, "Self-Service Revisited: How to Balance High-Tech and High-Touch in Customer Relationships," *European Management Journal*, Vol. 25, No. 4 (2007), pp. 310-319.

¹¹ J. Han and D. Han, "A Framework for Analyzing Customer Value of Internet Business," *Journal of Information Technology Theory and Application*, Vol. 3, No. 5 (2001), pp. 25-38.

¹² J.M. Curran and M. Meuter, "Self-Service Technology Adoption: Comparing Three Technologies," *Journal of Service Marketing*, Vol. 19, No. 2 M. (2005), pp. 103-113.

¹³ J.M. Curran, M.L. Meuter, and C.F. and Surprenant, "Intentions to Use Self-Service Technologies: A Confluence of Multiple Attitudes," *Journal of Services Research*, Vol. 5, No. 3 (2003), pp. 209-224.

¹⁴ Y.N. Li, K.C. Tan, and M. Xie, "Factor Analysis of Service Quality Dimension Shifts in the Information Age," *Managerial Auditing Journal*, Vol. 18, No. 4 (2003), pp. 197-302.

¹⁵ M. Zuckerman, J. Porac, D. Lathin, and E.L. Deci, "On the Importance of Self-Determination for Intrinsically Motivated Behavior," *Personality and Social Psychology Bulletin*, Vol. 4, No. 3 (1978), pp. 443-446.

¹⁶ M.J. Reinders, P.A. Dabholkar, and R.T. Framback, "Consequences of Forcing Consumers to Use Technology-Based Self-Service," *Journal of Service Research*, Vol. 11, No. 2 (2008), pp. 107-123.

¹⁷ J. Sierra, R.S. Heiser, and S. McQuitty, "Exploring Determinants and Effects of Shared Responsibility in Service Exchanges," *Journal of Marketing Theory and Practice*, Vol. 17, No. 2 (2009), pp. 111-128.

¹⁸ As reported in: M.J. Bitner, A.L. Ostrom, and M.L. Meuter, "Implementing Successful Self-Service Technologies," *Academy of Management Executive*, Vol. 16, No. 4 (2002), pp. 96-108.

Investment Does Not Guarantee Adoption

The impact of information technology stems from the actual rate at which it is used rather than the investment made to implement the technology.¹⁹ Research has uncovered an assimilation gap—the difference between the pattern of cumulative acquisitions and cumulative deployment of an innovation across a population of potential adopters.²⁰ In the case of adding a self-service channel, the assimilation gap can be pronounced because the firm cannot mandate that customers adopt the technology. Customers have to be willing to learn and adopt the technology, especially when multiple service delivery channels offer them the choice of how to interact with the hotel. The cost of self-service technologies is typically high, requiring investments in customer terminals, telecommunications, and hardware and software to process transactions.²¹ For example, each ATM costs a bank an average of \$250 per month.²² Deploying self-service channels that are not adopted and used by a critical mass of the customers, therefore, can result in large losses.

Lagged Benefits

Managers need to realize that they may not see immediate benefits from a new technology. A lag in benefits may arise from any step in the installation and adoption process. First, a company must incorporate the new channel into the existing operational or managerial work system in a way that brings value to the company.²³ The blending of channels increases as users gain experience with the technology-enabled options. In the context of self-service, customers engage in a six-step adoption process: (1) awareness, (2) investigation, (3) evaluation, (4) trial, (5) repeated use, and (6) commitment.²⁴ First, customers must be aware that the self-service channel exists. They are then likely to collect additional information about the technology that may become

¹⁹ S. Devaraj and R. Kohli, "Performance Impacts of Information Technology: Is Actual Usage the Missing Link?" *Management Science*, Vol. 49, No. 3 (2003), pp. 273-289.

²⁰ R.G. Fichman and C.F. Kemerer, "The Illusory Diffusion of Innovation: An Examination of Assimilation Gaps," *Information System Research*, Vol. 10, No. 3 (1999), pp. 255-275.

²¹ R.J. Kauffman and L. Lally, "A Value Platform Analysis Perspective on Customer Access Information Technology," *Decision Science*, Vol. 25, No. 5/6 (1994), pp. 767-794.

²² E. Florian, D. Burke, and J. Mero, "The Money Machines," *Fortune*, Vol. 150 (2004), p. 2; and H. Salomann, M. Dous, L. Kolbe, and W. Brenner, "Self-Service Revisited: How to Balance High-Tech and High-Touch in Customer Relationships," *European Management Journal*, Vol. 25, No. 4 (2007), pp. 310-319.

²³ R.W. Zmud and L.E. Apple, "Measuring Technology Incorporation and Infusion," *Journal of Product Innovation Management*, Vol. 9, No. 2 (1992), pp. 148-155.

²⁴ P. Attewell, "Technology Diffusion and Organizational Learning: The Case of Business Computing," *Organization Science*, Vol. 3, No. 1 (1992), pp. 1-19; and Bitner *et al.*, *op. cit.*

the basis for an evaluation judgment. If the technology is judged as appealing, customers are more likely to try it, and if the trial is successful, the customer can repeatedly use and become committed to the process. The benefits of the self-service systems (chiefly, enhancing customer service) will only be realized when the organization's customers adopt the technology. They not only must become comfortable using the self-service channel, but they must prefer this method over traditional ones.²⁵ They must see that the more skilled they become with their self-service role, the more they will benefit.²⁶ Whether a hotel will realize the benefits of the additional self-service channel depends on how often the customers interact with the technology, and particularly how often customers repeat their use of the new channel. We raise this point because the benefits of self-service technology are structurally lagged for some organizations and cannot be accelerated. This is an important point in the assessment of the technology's value, because this lag is the reason that the company may not realize an immediate benefit.

Process Improvement Does Not Lead to Overall Financial Gain

While technology initiatives may improve service processes, managers will generally not be able to discern an improvement in overall revenues. Added revenues through a self-service channel may mean reduced revenues in more conventional processes, or in divisions and departments that the initiative does not affect. Managers must keep in mind the net effects of all business processes, in addition to those enabled by the new technology.²⁷ Consequently, the place to measure the effect of the technology is at the process level. Overall financial performance may not truly reflect the benefits of the technology.

The Study

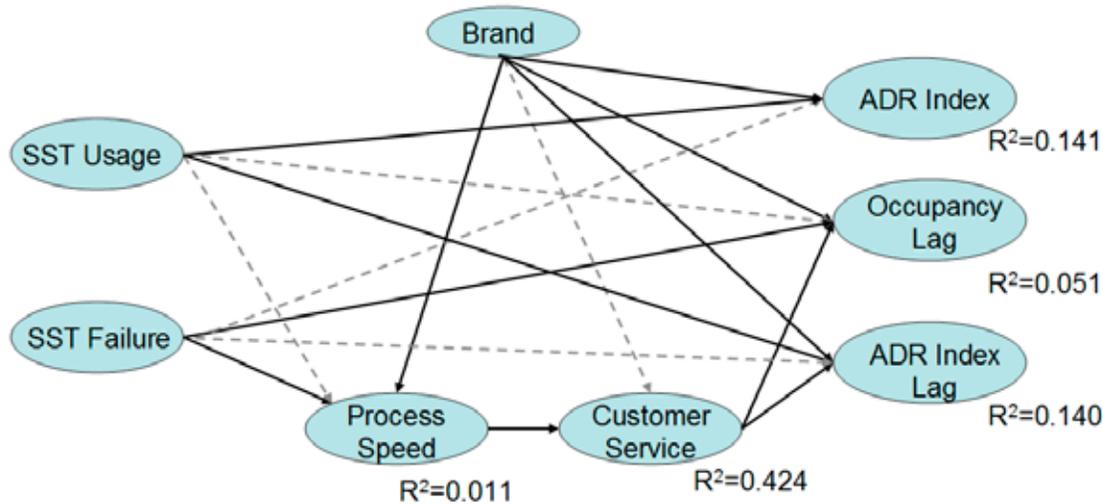
To test the above reasoning, we analyzed the specific process and financial effect of adding a self-service channel as it functions in hotel customer service system. In this case, the self-service process is part of an integrated service-delivery channel portfolio that combines personal service with a machine-dominant self-service channel. We obtained data from two hotel brands of a major hotel chain in the United

²⁵ Kauffman and Lally, *op. cit.*

²⁶ A. Beatson, N. Lee, and L.V. Coote, "Self-Service Technology and the Service Encounter," *Service Industries Journal*, Vol. 27, No. 1 (2007), pp. 75-89; and M.L. Meuter, A.L. Ostrom, M.J. Bitner, and R. Roundtree, "The Influence of Technology Anxiety on Consumer Use and Experiences with Self-Service Technologies," *Journal of Business Research*, Vol. 56, No. 11 (2003), pp. 899-906.

²⁷ G. Ray, J.B. Barney, and W.A. Muhanna, "Capabilities, Business Processes, and Competitive Advantage: Choosing the Dependent Variable in Empirical Tests of the Resource-based View," *Strategic Management Journal*, Vol. 25, No. 1 (2004), pp. 23-37.

PLS result, including ADR and occupancy indices in the model (solid lines represent the significant paths)



States that used self-service kiosks allowing guests to check in and check out on their own, and also to print boarding passes. The data set included detailed guest information at the individual level; guest survey data obtained after their stay at the two brands' properties during 2006 and 2007; detailed information about each property; and the performance of the self-service kiosks.

Measures

We measured the overall use of the kiosk by computing the ratio of check-in through the self-service kiosk to the total number of arrivals during a given month. Then, to measure the failure rate of the self-service channel, we calculated the ratio of completed check-ins through the self-service kiosk to the total number of attempted kiosk check-ins during a given month. We measured customers' perceptions of the speed of the customer service process using guests' responses to one question on the lodging chain's standard post-stay survey. Customer service level was obtained using a 5-item scale derived from the same post-stay survey. The scale included the following items: (1) overall experience, (2) overall service, (3) overall value, (4) overall accommodation, and (5) overall arrival experience. Finally, we used the ADR (average daily rate) index and occupancy index compiled by Smith Travel Research as the measures for financial performance. An ADR index of 100 indicates that the hotel has the

same ADR compared to its competitors. An ADR index that is more than 100 points indicates that the hotel has a higher ADR than its competitors and vice versa. In this study, we lagged these financial measures (both ADR index and occupancy index) according to the guest return cycle computed from the guest behavior data. Given that the average return cycle was 79.64 days (81.21 days for Brand A and 78.74 days for Brand B), we lagged the ADR index and occupancy index by three months, because we expect the financial effect of self-service channel performance will occur when customers return to the hotel on their next visit.

Analysis and Results

We used structural equation modeling (SEM) techniques to analyze the research model shown in Exhibit 4 for both brands (130 hotels in Brand A and 33 hotels in Brand B). In this model, we posited that the use and failure of the incremental self-service channel will affect the financial performance of the hotel both directly and indirectly through the speed of the service process and customer service level. Brand was included in the model as a control variable. In this model, we used the actual use and failure of the self-service channel, rather than the purchase of the technology; we incorporated a process level measure (check-in process speed); and we examined the delayed benefit realization. We made these adjustments to account for the reasons for not

EXHIBIT 5**Path coefficient, t-statistics, and standard errors of path**

	Path	t-statistics	S.E.
Usage - Speed	-0.0280	1.2106	0.0231
Failure - Speed	-0.0490	2.0963	0.0234
Brand - Speed	-0.0860	3.7023	0.0232
Speed - CS	0.6530	31.5909	0.0207
Brand - CS	0.0210	1.2820	0.0164
CS – ADR Index Lag	0.0610	2.7213	0.0224
Usage – ADR Index Lag	0.1200	5.3328	0.0225
Failure - ADR Index Lag	0.0160	0.7985	0.0200
B- ADR Index Lag	-0.3360	18.2460	0.0184
CS – Occupancy Index Lag	0.0970	4.0982	0.0237
Usage –Occupancy Index Lag	0.0270	1.2731	0.0212
Failure - Occupancy Index Lag	-0.0830	3.3890	0.0245
B- Occupancy Index Lag	-0.1640	6.6768	0.0238
Usage -ADR Index	0.1130	5.4117	0.0209
Failure - ADR Index	0.0100	0.4609	0.0217
B- ADR Index	-0.3460	19.9438	0.0173

Note: Significant relationships shown in red type.

realizing the benefits of incorporating a self-service channel that we discussed above. Exhibit 5 summarizes the results of the data analysis.

As expected, self-service technology failure has a direct negative effect on financial performance (as measured by the occupancy index) and an indirect effect on both the ADR and occupancy indices. This result is consistent with previous studies of self-service systems. Clearly, it's essential that the self-service system be reliable because a high incidence of technological breakdown and difficulties in service remedies create a negative impression, particularly when service personnel are not present to assist. Contrary to what we expected, we saw no increase in customers' assessments of process speed based on the use of the self-service kiosks. Perhaps this finding stems from a shift in employees' functions during check-in. We suggested that guest services associates who are freed from the routine check-in function may spend more time performing consultative tasks, such as providing guests with local tourist information, regardless of how guests choose to check-in (assisted or self-service). We speculate that hotel guests may not perceive a faster check-in process because the focus of the check-in shifts

from a routine task (merely getting a room) to a consultative task (advice regarding the destination or other discussions, including upselling and cross-selling).

The results also showed the effect of different dimensions of the performance of the incremental self-service channel. While the use of the self-service channel affected only the ADR index (with or without lag), the failure of the self-service channel mainly affected the occupancy index. That is, using the additional self-service channel affected customers' willingness to pay a premium for the core product (higher average daily rate against its competitors), while the failure of the channel related to customers' willingness to return (higher occupancy percentage against its competitors).

Conclusions and Managerial Implications

Our results showed that when firms implement a new IT-enabled service delivery channel, there is a positive, lagged impact on financial performance. Hoteliers should not expect immediate adoption or favorable returns when they install self-service kiosks. Investments on additional self-service channels that initially appear to fail may in fact be judged a success once customers learn and adopt the

technology. Second, the amount of money invested in a technology is not related to the return that can be gained. More critical is the adoption of a self-service technology. Companies only enjoy the fruits of investing in an additional self-service channel when customers actually use it. Customers first need to see the usefulness of a technology before they are willing to use it. Beyond that, customers' familiarity with technology in general and their willingness to use it are key drivers of self-service channel adoption. Since a hotel has a mix of customers, one key value of a multiple channel service delivery system is that it allows customers to select the channel they prefer. Each channel accommodates different customer needs. Above all, it is critical to avoid rolling out a self-service technology without ensuring that it will function properly. We saw that technology failure diminished both process speed and customers' willingness to return. We suggest that during initial operation of a self-service channel, a hotel should have customer service associates standing by to address questions and any problems, whether due to customers' operator failure or due to issues with the kiosks.

In sum, this study offers managers three suggestions:

- Allow enough time for the benefit of the technological investment realized;
- Provide learning opportunities and encouragement for customers to use the self-service channel;

- Generate awareness of the self-service channel so that customers can select the channel they prefer; and
- Allocate resources depending on strategic goals to increase customers' willingness to pay a premium for services or their willingness to return to the property.

In this study, we only examined two channels—a traditional personal service channel and a self-service kiosk channel, but we did not address the optimal mix of the channels. One study of such a mix showed that while having no options diminished customer satisfaction, offering too many choices did not guarantee a positive return.²⁸ That finding points up the danger that we mentioned above, that adding more service-delivery channels may only incur costs without providing significant benefits. Given the cost of adding each new channel, one has to ask whether Domino's, for instance, really gains significantly by offering the sixteen channels to order pizza, instead of, say, eight channels. The company certainly gains a benefit by setting itself apart from other pizza purveyors regardless of whether customers use all those channels. Firms need to pay special attention to investments made in adding any new service-delivery channel to the delivery channel portfolio. Ultimately, firms should strive for maximum customer service and financial improvement. ■

²⁸ Reinders *et al.*, *op. cit.*

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