Considering Stakeholders when Implementing New Technologies

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Abstract:

Integrating the concerns of stakeholders into the decision process can be particularly important when adopting a new technology. Radio Frequency Identification (RFID) offers many potential benefits to the healthcare industry. However, hospital administrators who are examining this technology may not be considering the concerns of some secondary stakeholders (e.g, patients). A consumer survey found that support for two RFID applications in hospitals varied both across respondents and across applications. Privacy attitudes and behaviors were linked with RFID support levels. Increased two-way communications between healthcare management and both primary and secondary stakeholders may help improve the technology adoption decisions.

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A common strategy recommendation for organizations is to identify and consider the interests and concerns of their key stakeholders. Stakeholders can be groups or individuals who can affect or are affected by the achievement of an organization's objectives (e.g., owners, customers, employees, and suppliers). Wheeler and Sillanpaa (1998, p. 201) concluded: *"All the available evidence suggests that companies which are run with a view to the long term interests of their key stakeholders are more likely to prosper than those which take a short term, 'shareholder first' approach."* Integration of stakeholder concerns can, at least indirectly, create a competitive advantage for organizations (Driessen and Hillebrand, 2012). Mitchell, Agle, and Wood (1997) argued that stakeholders have different relationship attributes (e.g., power, legitimacy, and urgency) that influence their importance to the organization. These attributes can create a stakeholder typology. Mapping these perceived attributes may help organizations identify their definitive or core stakeholders (i.e., those who possess all the attributes).

A problem can emerge if managers assume some stakeholders do not have legitimate concerns and do not try to integrate them into the decision process. An illustration comes from Monsanto's development of genetically modified crops and the difficulties the firm faced as they tried to gain societal acceptance of the new technology. The firm focused on those perceived to be their core stakeholders: investors, scientists (both at the firm and in academia), farmer-customers, and government regulators. Hall and Martin (2005) believe Monsanto did not appreciate that *"economic, technical and regulatory pressures are not the only constraints that can hinder the development of a new technology or innovation."* (p. 279). Secondary

stakeholders, including activist groups and the general public, added some societal uncertainty that was not considered. Other research on genetically modified foods suggests that initial acceptance of a new technology does not necessarily imply that key concerns have been addressed. Marris (2001) concluded that: *"deep-felt concerns often persist and accumulate . . . [and] can therefore have important long-term effects on public reactions to technological innovations."* (p. 548) Monsanto's decisions not to involve the public early in the process and not to address the concerns of a small minority contributed to the difficulties the firm had in getting their new technology adopted (Heugens, van den Bosch, and van Riel, 2002; Frewer et al., 2004). A lesson for organizations adopting or promoting new technologies is that they should monitor the concerns of all their stakeholders over an extended period. It is not enough to focus on those perceived to be the core stakeholders or to trust that, after a successful implementation, all important issues have been addressed.

This paper discusses another emerging technology that is being adopted by some organizations who may not be considering the issues and concerns of all stakeholders. The technology is radio frequency identification (RFID) and the organizations are healthcare providers. This technology raises some privacy concerns with some consumers. After a review of a variety of possible applications in many industries, Wu et al. (2012, p. 420) concluded: *"User's concern about privacy is a major impediment to wide-spread use of RFID."* However, only one survey was found that asked consumers about their acceptance of any RFID healthcare applications. Some hospitals may not be considering employee or patient privacy concerns in their evaluations of this technology. The first section of this paper will introduce the technology. Next, published case-study lessons from implementations of RFID in hospitals will be reviewed. Then a survey methodology will be described that asked consumers to react to the use of RFID

for tracking hospital employees and patients and for monitoring medication authenticity. After summarizing the survey results, the paper will conclude with a discussion on how hospitals could benefit by integrating more consumer concerns into their technology adoption plans.

Background

The medical field is striving to control costs while improving patient care. To accomplish this goal, a variety of new technologies are being tested. One technology, Radio Frequency Identification (RFID), has been successfully used for tracking equipment and employees, monitoring and identifying patients, matching patients with the prescribed dosages of medicine, and preventing the use of counterfeit medicines (Ting et al., 2011). An RFID tag can be smaller than a grain of rice. The tag is attached to an antenna. If batteries are included, the "active" tags can broadcast information which can be interpreted by a reader that is more than 100 yards away. An active tag system could help hospital staff find equipment or track employees. If batteries are not included, the "passive" tags can be scanned at a distance of several feet. Passive tags can be added to medicine bottles, blood supplies, name badges, and folders and can be included on patient wrist or ankle bands. A passive tag system could also be used to count surgical sponges, making sure none are left inside patients, and to identify and match dentures to patients (Rogers, Jones, and Olleynikov, 2007; Madrid et al., 2012).

To understand the RFID adoption process used by healthcare organizations, at least three surveys have been published that asked management about factors that might influence their decisions. Lee and Shim (2007) asked about issues including the perceived benefits from RFID, the technical knowledge possessed by the organization, and the financial resources required in different applications. Questions to managers included whether an RFID system would improve

customer service and whether hospital employees and patients were satisfied with the existing patient identification system. Mogre, Gadh, and Chattopadhyay (2009) surveyed 33 California hospitals on their interest in using RFID. Of the eight factors considered as reasons for implementing an RFID service system, better efficiency was rated as most relevant and better patient comfort was rated as least relevant. The perceived impediments listed (e.g., funding, costs, integration difficulty etc.) did not include any items involving stakeholder concerns. Carr et al. (2010) surveyed American hospitals and healthcare organizations on their attitudes about RFID. Their survey included questions about perceived risks and resistance to change but did not directly mention stakeholders or privacy. The design of these studies and the responses the received suggest that employee and consumer concerns about the technology may not be considered priority issues when making RFID deployment decisions.

Lessons from Case Studies

Leonard (2004) discussed five critical success factors for the adoption of new technology in healthcare. The third factor was the amount of buy-in (or contribution) from stakeholder groups. Unfortunately, some hospitals may not be examining all the critical stakeholder concerns. One example is a lack of integration of the issues from nurses. In discussions with nurses around U.S., Fisher and Monahan (2008) found that nurses expressed concern about tracking technologies. Several hospitals have had their RFID implementations blocked by nurses unions. Norten (2012) surveyed nurses on their acceptance of RFID. Intention to use the technology was significantly related to basic attitudes about the technology and to subjective norms (e.g., how others would feel about them using the technology) and was not related to privacy concerns. This illustrates how different stakeholders can have varying concerns about a proposed action.

Descriptions of early adoptions of RFID technology usually emphasized the feasability and benefits generated. Recommended implementation steps seldom included staff or patient communications (e.g., Chen et al., 2005; Wang et al., 2006; Chen et al., 2009; Bendavid, Boeck, and Philippe, 2012). A few case studies highlighted the value of staff training. Kumar, Livermont, and McKewan (2010) recommended involving physicians and nurses in the discussions about savings initiatives but did not mention patients. Other case studies recognized the importance of patients. For example, Ohashi et al. (2010) noted that patient tags would require patient consent and assumed that this would not be difficult to get because the tags would not contain any data. There appeared to be little concern that patients may resist the use of this technology. An Ohio hospital was surprised by the negative response when they required mothers and babies to wear RFID bracelets for identification (Corsi, 2008). Mehrjerdi (2010) believed one-way communication with patients (e.g., free lectures and brochures) should be sufficient to address any patient privacy concerns. The authors of this paper argue that two-way communications may be needed to integrate stakeholder concerns into the adoption process.

Reviews of early RFID adoptions usually discussed issues such as testing for radio wave interference, addressing infrastructure limitations, working with good vendors, and educating staff (e.g., Ting et al., 2011; Mehrjerdi, 2011; Anand and Wamba, 2013). Some mentioned that patient concerns should be addressed. Tzeng, Chen, and Pai (2008) pointed out the importance of involving stakeholders outside the organization's boundaries, Crooker, Baldwin, and Chalasani (2009) considered many RFID applications to be potentially disruptive innovations and highlighted being sensitive to patient privacy concerns, and Yao, Chu, and Lie (2012) listed privacy concerns as a potential adoption barrier. These case study examples and reviews suggest there may be an uneven consideration of issues that patients might raise with RFID technology.

Only one survey was found that looked at the public's attitudes toward RFID technology adoption by hospitals. Katz and Rice (2009) focused on mobile healthcare devices and found fairly high levels of support with some differences across applications. Unfortunately, this survey did not use Likert or semantic differential scales to assess respondent attitudes. Instead, the authors used a nonsymmetric, 5-point scale with "4" indicating "No interest" and "5" labeled as "It's a bad idea." In surveys, it is often recommended that higher numbers should be associated with more positive responses (Rammstedt and Krebs, 2007). In spite of these methodological problem, the authors found a small minority who were negatively disposed to RFID-based mobile medical devices. Between 5 and 10 percent respondents thought the various applications were "bad ideas." The authors interpreted their findings to indicate that their does not seem to be high levels of public concern about RFID applications. However, if those responding "bad idea" have particularly strong feelings about the technology, ignoring their concerns could cause problems for healthcare organizations who try to implement the technology.

Survey Methodology

To better understand the public's attributes toward RFID applications in hospitals, a survey was mailed to about 4900 adults aged 25 to 60 in four Midwestern states. There were 268 usable responses (i.e., respondent answered all the questions used in the model). The relatively low response rate was expected because the mailing list was generated at random, the survey dealt with a "futuristic," somewhat unfamiliar technology, and there was little incentive for survey completion. The respondent profile was similar to the target population. After describing RFID, two questions dealt with the use of RFID in hospitals and suggested some benefits to the consumer. The first question: Hospitals are exploring the use of RFID tags in medical wrist

bands and employee badges in order to identify where any patient, doctor, or nurse is located whenever that information is needed. The other question: Prescription drug manufacturers are considering adding RFID tags to their medication containers to help identify counterfeit drugs and to reduce the likelihood that patients receive the wrong drug. Respondents were asked to rate their support for both options using a 7-point Likert scale.

The survey included sex, age, marital status, adults in household, children in household, education, home ownership, ethnicity, and income questions. Besides demographics, respondents were asked how frequently they attended organized religious services during the last year (attending at least once per month was considered religious). Self-reported attendance to religious services is probably the most common measure of religiosity (Hall, Meador, and Koenig, 2008). Religiousness may be linked with RFID support because it is associated with stronger ethical norms and judgements (Vitell, 2009). Attitudes and behaviors toward privacy were measured with a set of questions. Table 1 shows 13 statements dealing attitudes toward privacy that were developed by Smith, Milberg, and Burke (1996) and Parasuraman and Igbaria (1990). Respondents showed their agreement with each statement using a 7-point Likert scale. The survey also included 10 dichotomous questions about the behaviors related to privacy (Table 2).

Survey Results

For the question on wristbands and badges, 42.5 percent of the respondents were very supportive, giving the RFID application a "7" and 20.5 percent were supportive (a "6"). About 10.82 percent gave this application a "2" or "1," representing little or no support. For the question on medicine containers, 49.3 percent gave the application a "7," 16.8 percent gave it a "6," and 8.21 percent gave it a "2" or "1."

Table 1. Attitude Statements related to Privacy

1. When companies ask me for personal information, I sometimes think twice before providing it.
2. Computer databases that contain personal information should be protected from unauthorized access – no matter how much it costs.
3. I am anxious and concerned about the pace of automation in the world.
4. Sometimes I am afraid the data processing department will lose my data.
5. Companies should never sell the personal information in their computer databases to other companies.
6. Computers are a real threat to privacy in this country.
7. Companies should have better procedures to correct errors in personal information.
8. It bothers me to give personal information to so many companies.
9. Companies should take more steps to make sure that the personal information in their files is accurate.
10. Companies should never share personal information with other companies unless it has been authorized by the individuals who provided the information.
11. I am easily frustrated by computerized bills.
12. I am sometimes frustrated by increasing automation in my home.
13. People should refuse to give information to a business if they think it is too personal.

Table 2. Behavioral Practices Questions Related to Privacy

1. Do you regularly use a cellular telephone?
2. Do you regularly shop and buy items on the internet?
3. Do you regularly shop and buy items by phone?
4. Do you regularly use on-line banking services?
5. Do you regularly enter promotional sweepstakes sponsored by companies?
6. Do you regularly use a credit or debit card for making purchases?
7. Have you asked a firm to remove you from their mailing list in the last year?
8. Have you joined a "Do Not Call" phone list to reduce unwanted calls?
9. Have you decided to not purchase an item from a firm or not use their services because of their privacy policy (i.e., the way they use personal information)?
10. Do you regularly destroy personal documents using a paper shredder?

Instead of including the 13 questions about privacy attitudes in the model, principle component analysis (using a Varimax rotation) was used to reduce the 13 variables to three factors. The first factor was primarily made up from questions 12, 11, 3, 4, and 6 from Table 1. This factor was similar to the computer anxiety scale developed by Parasuraman and Igbaria (1990). The second factor, nicknamed company policies, was primarily made up from questions 9, 7, 2, 5, and 10. The third factor, nicknamed individual control, was primarily made up from questions 1, 8, and 13.

A similar process was used to reduce the 10 questions about privacy behaviors to three factors. The first factor, nicknamed financial/communication, was primarily made up from questions 2, 4, 6, and 1. The second factor, nicknamed risk reducing, was primarily made up from questions 7, 8, 9, and 10. The third factor, nicknamed volunteer data, was primarily made up from questions 5 and 3.

Ordinal probit analysis was used to profile the respondents based on their support for the two RFID applications. This approach is similar to the methodology used by Larson and Rana (2011) in their study on meat and produce traceability. The model's dependent variable is the level of support for each of the applications. The independent variables are the fifteen variables covering respondent demographics, the religiosity question, the three factors on privacy attributes, and the three factors on privacy behaviors.

Table 3 shows the results for including RFID tags in medical wrist bands and hospital employee badges. Sex, age, marital status, household size, home ownership, ethnicity, and income were not significant. The only significant demographic variable was education (shown in bold, 90 percent confidence level). Having advanced college education beyond a bachelors degree was associated with less support for this application. Three of the six privacy factors were

Table 3. Parameter Estimates for Medical Wrist Band and Employee Badge Tagging

Parameter	DF	Estimate	Standard Error	t Value	Approx Pr > | t |
Intercept	1	2.166342	0.437734	4.95	<.0001
Female	1	-0.079867	0.146933	-0.54	0.5867
Age3544	1	-0.120743	0.200542	-0.60	0.5471
Age45+	1	-0.283550	0.198098	-1.43	0.1523
SingleSepDiv	1	-0.151842	0.196915	-0.77	0.4406
Adult2+	1	0.087633	0.212125	0.41	0.6795
NoKids	1	-0.061476	0.156949	-0.39	0.6953
ThreeKids+	1	-0.218916	0.223442	-0.98	0.3272
Religious	1	-0.216355	0.143730	-1.51	0.1323
SomColDeg	1	-0.270744	0.223345	-1.21	0.2254
PostColl	**1**	**-0.485070**	**0.264492**	**-1.83**	**0.0667**
Renter	1	0.279103	0.198067	1.41	0.1588
Nonwhite	1	-0.076959	0.220608	-0.35	0.7272
Incom30-59K	1	-0.175805	0.235133	-0.75	0.4547
Incom60-89K	1	-0.036539	0.262307	-0.14	0.8892
Incom90K+	1	-0.126372	0.267730	-0.47	0.6369
Computer Anxiety	**1**	**-0.254946**	**0.077225**	**-3.30**	**0.0010**
Company Policies	**1**	**0.125694**	**0.068930**	**1.82**	**0.0682**
Individual Control	1	-0.078745	0.075291	-1.05	0.2956
Financial/commun.	**1**	**-0.201365**	**0.079691**	**-2.53**	**0.0115**
Risk reducing	1	-0.060901	0.077211	-0.79	0.4303
Volunteer data	1	-0.085522	0.073570	-1.16	0.2450
Limit2	1	0.143648	0.057331	2.51	0.0122
Limit3	1	0.287424	0.076420	3.76	0.0002
Limit4	1	0.871924	0.108506	8.04	<.0001
Limit5	1	1.134809	0.115448	9.83	<.0001
Limit6	1	1.711415	0.126669	13.51	<.0001

Table 4. Parameter Estimates for Medication Tagging

Parameter	DF	Estimate	Standard Error	t Value	Approx Pr > | t |
Intercept	1	1.552826	0.439857	3.53	0.0004
Female	1	0.164879	0.151017	1.09	0.2749
Age3544	1	-0.302056	0.204779	-1.48	0.1402
Age45+	1	-0.075327	0.204712	-0.37	0.7129
SingleSepDiv	1	-0.002259	0.203806	-0.01	0.9912
Adult2+	1	-0.041964	0.218391	-0.19	0.8476
NoKids	1	0.210406	0.161229	1.31	0.1919
ThreeKids+	1	0.161334	0.228782	0.71	0.4807
Religious	**1**	**-0.310788**	**0.146922**	**-2.12**	**0.0344**
SomColDeg	1	-0.247199	0.223247	-1 .11	0.2682
PostColl	1	0.023247	0.267468	0.09	0.9307
Renter	1	0.162413	0.203140	0.80	0.4240
Nonwhite	1	0.149612	0.228625	0.65	0.5129
Incom30-59K	1	0.236118	0.236439	1.00	0.3180
Incom60-89K	1	0.300078	0.268571	1.12	0.2639
Incom90k+	1	0.408448	0.272007	1.50	0.1332
Computer Anxiety	**1**	**-0.162183**	**0.078139**	**-2.08**	**0.0379**
Company Policies	**1**	**0.117297**	**0.070212**	**1.67**	**0.0948**
Individual Control	1	-0.015209	0.076644	-0.20	0.8427
Financial/commun.	**1**	**-0.165729**	**0.082168**	**-2.02**	**0.0437**
Risk reducing	1	0.060297	0.078195	0.77	0.4406
Volunteer data	1	-0.072138	0.075179	-0.96	0.3373
Limit2	1	0.086511	0.049265	1.76	0.0791
Limit3	1	0.276562	0.080393	3.44	0.0006
Limit4	1	0.699886	0.108392	6.46	<.0001
Limit5	1	1.147690	0.121690	9.43	<.0001
Limit6	1	1.625408	0.130355	12.47	<.0001

significantly related to support for patient and employee tracking. Those who were more anxious about computers and technology were less supportive, those who were concerned about company policies involving information were more supportive, and those who used newer technology for financial transactions or communications were less supportive. The findings that people who were more concerned about how companies handled their information also were more supportive of this application and that users of related technologies were less supportive shows the complexity of the privacy attitudes.

Table 4 shows the results for including RFID tags on medications. None of the demographic variables were significant. Those people self-classified as being religious (based on one dichotomous question) were significantly less supportive. Although the estimates were not statistically significant, the differences in attitudes between the two applications can also be noted by examining the coefficients on the income variables. The same three privacy factors were significantly related to support for this application. Those who were more anxious about computers and technology were less supportive, those who were concerned about company policies involving information were more supportive, and those who used newer technology for financial transactions or communications were less supportive.

Conclusions and Implications

Perhaps 10 percent of consumers have strong concerns about the use of some type of RFID technology in hospitals. In the survey, many respondents did not provide strong support for specific RFID applications. This research found that support levels for these technologies were linked with the consumer privacy attitudes and behaviors. Support varied by RFID application and the variables associated with greater concerns also differed by application.

Because of these differences, generalizations about what general concerns people about RFID applications in hospitals are difficult to make. Other research suggested that core stakeholders (e.g., nurses) appeared to have concerns about RFID that were not considered when some technologies were implemented. Secondary stakeholders (e.g., patients and consumers) also have concerns are unlikely to be addressed with one-way communications after technology adoption. The linkages between support and computer anxiety and between support and religiosity suggest these attitudes and values involved are deep-felt and quite stable. Longer-term, more intensive educational efforts may be needed to address the issues involved.

Hospital administrators may need to make greater efforts to integrate the concerns of primary and secondary stakeholders into their adoption decision processes. If hospitals discovered the large minority of patients who opposed a technology such as RFID, adopting it could create some public relations challenges for the hospitals. The public response could even reach the level similar to what Monsanto experienced as it tried to introduce a technology without addressing the concerns of the secondary stakeholders. More in-depth, two-way communications may be needed to understand and possible resolve the issues involved with RFID.

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