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RESEARCH PAPER EVALUATION

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# "Assimilating Information Technology Innovations: Strategies and Moderating Influences"

By Agarwal, Tanniru, and Wilemon

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## Introduction and Summary

Agarwal et al. explored the process of assimilating information technologies in organizations. They started with a conceptual four-mode framework for innovation assimilation based on individual and organizational perspectives. They listed adoption and diffusion as two major activities in assimilation of innovations. Innovation adoption and diffusion are two concepts which have been studied frequently [2,4,5,6,11]. Figure 1 summarizes these two activities.

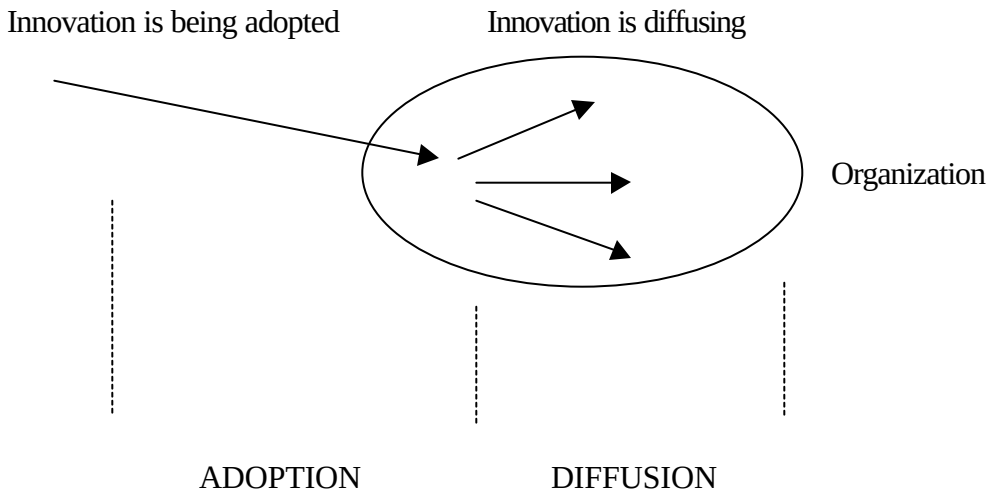


Figure 1. Adoption versus Diffusion

Figure 1 describes how the authors defined "assimilation". According to the authors, adoption and diffusion are two different activities which are interrelated. Adoption covers how innovations are acquired, and diffusion covers how innovations are accepted within the organization.

Then analyzing this through individual and organizational perspectives, the authors defined their framework for the assimilation of a new information technology (IT). They stated that adoption could be either individual or organizational, as well as the diffusion. They provided examples to the four scenarios. Table 1 provides more examples summarizing the framework that the authors developed.

| | | **Diffusion** | |
|---|---|---|---|
| **Adoption** | | ***Individual*** | ***Organizational*** |
| ***Individual*** | | *1*<br>*Individual adopts a new innovation to meet a local need, and further diffusion is initiated by the individual to the interested parties.*<br>*E.g. Flat screen monitors, natural keyboards, Microsoft Plus Themes, A Graphic SW to draw banners for an upcoming event.* | *2*<br>*Individual adopts a new innovation which exhibits organization wide relevance. Then diffusion is supported by the firm..*<br>*E.g. An interface code to automate the creation of a monthly report which was done manually before.* |
| ***Organizational*** | | *3*<br>*Organization adopts a new innovation, and leaves it to the individual interest of the users for further diffusion.*<br>*E.g. Early adoption of upgraded versions of existing e-mail or web browser SW for test purposes* | *4*<br>*Organization adopts and supports the diffusion of a new innovation.*<br>*E.g. Starting to use e-mail for all communications* |

Table 1. Modes of Technology Assimilation

Later the authors presented strategies for technology assimilation, moderating influences and the relationships. Figure 2 summarizes the concepts discussed in that section of the paper. The assimilation strategies define how companies will move from cell 1 to cell 4 in Table 1. It could be via cell 2 (advocacy), or via cell 3 (support) or directly (total commitment). According to the authors, the choice is impacted by the adopter characteristics, implementation characteristics, and the nature of innovation. To test this statement, the authors picked eight companies to analyze the influences described in Figure 2 further.

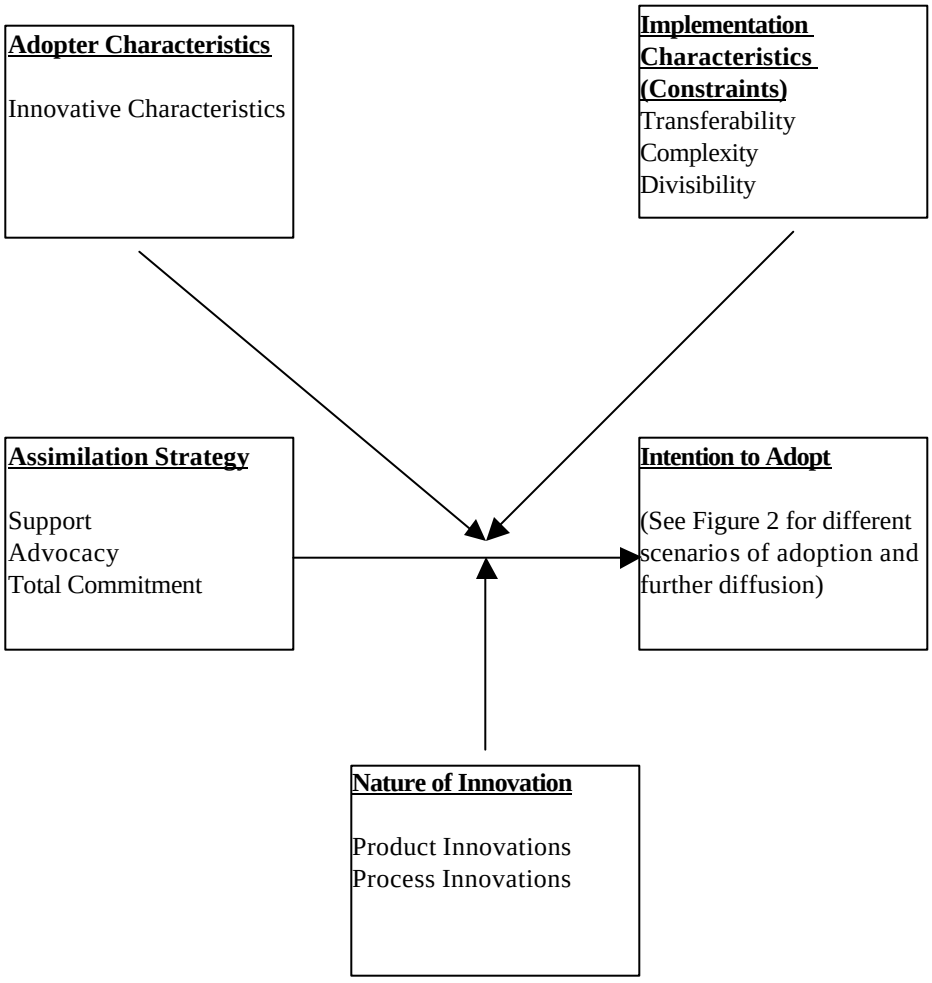


Figure 2. Moderating Influences on Assimilation Strategy

The companies analyzed ranged from credit unions to manufacturing companies, from regional to multinational companies, and innovations types ranged from expert system implementation to use of PCs. The authors analyzed these companies by identifying the nature of innovation, target adopters, implementation characteristics, and the assimilation strategy. Their conclusions are presented in Table 2.

| | | **Adopter Characteristics** | |
|---|---|---|---|
| **Nature of Innovation** | **Implementation Characteristics** | ***Inherently Innovative*** | ***Not Inherently Innovative*** |
| ***Product Innovations*** | ***Complex*** | Advocacy/Support | Support/Advocacy |
| | ***Not Complex*** | Support | Advocacy |
| ***Process Innovations*** | ***Complex*** | Advocacy/Support | Total Commitment |
| | ***Not Complex*** | Support/Advocacy | Total Commitment |

Table 2. Choices for Assimilation Strategies

## Concepts Studied in the Paper

The authors studied three major concepts in this paper:

1. Innovation Adoption
2. Innovation Diffusion
3. Information Technology (IT) implementation Strategies

The authors started by exploring innovation adoption and diffusion and calling the sequence of these two activities as assimilation. Then by looking at individual and organizational modes of adoption and diffusion, they developed a framework for innovation assimilation. By reviewing IT implementations in different organizations, the authors developed a model for selecting assimilation strategies based on organizational characteristics. Overall the major concept is how innovations are adopted and then diffused within an organization. The authors picked IT as an application area for their conceptual framework of innovation assimilation.

## Methodology

The overall methodologies used in this paper are literature search, and conceptual model development followed by case study analyses.

The authors build on the IT implementation, and innovation adoption and diffusion literature, and explore innovation adoption and diffusion concepts in actual IT implementation projects.

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## Contributions

There are two major contributions of this paper. The first one is the development of the conceptual model which describes the modes and later the choices for innovation assimilation. The second contribution of this paper is the analysis of the case studies. The presentation summary of the case study analysis on a single table in text provides a good guideline for decision makers in this field.

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## Comparison with the Literature

To compare with other literature, two major areas were researched:

1. Innovation Adoption/Diffusion
2. IT Implementation Strategies.

Studies in the innovation adoption area seem to cover different industries. However issues seem to be very relevant from one industry to another. Noori [13, pp 71-97], explored technology adoption in the manufacturing environment. He analyzed the adoption process in two phases: acquisition and implementation. And he studied organizational characteristics and market forces that impact the adoption process. Like the authors (Agarwal et. al.), Noori

identified that organizational characteristics impact the adoption process. In addition he highlighted market as another major impact area.

Greis [4] also focused on technology adoption. The industry he focused on was the machine tool industry. He emphasized the relationship between product and process technologies and stated that any adoption of technology should be analyzed across these two areas: product and process. The authors Agarwal et al. also differentiated product and process innovations. Harvey et al. [6] explored the relationship between productivity and technology adoption in small manufacturing firms.

Studies looking at innovation diffusion also seem to cover different industries as well as different countries. Mansfield [11] studied the diffusion of flexible manufacturing systems in Europe, Japan and USA. He identified different trends in different countries. The authors Agarwal et.al. have not considered any cultural or national impacts. Abrahamson [1], and Abrahamson et al. [2] explored the impact fads and bandwagons on the innovation diffusion. They identified that existence bandwagons may impact the diffusion of technologies, which the authors Agarwal et.al. have not considered. Grubler [5] focused on patterns of innovation diffusion. He identified S curves as best fits describing the patterns. However he also identified that seasonal and social changes may affect the diffuison of innovations, which the authors Agarwal et.al. have not considered.

Martinsons et al. [12], also focused on technology assimilation like the authors Agarwal et.al. They studied how knowledge based systems are assimilated into organizations. They classified assimilation strategies as “the low road” (user-driven), “the high road” (technostructure-driven), and “the road network” (team based). These strategies are classified according to the driving force, where as the authors Agarwal et.al. classified them based on the degree of the management support.

There are other studies that focused on IT implementation. Lewis et al [10], studied implementation of Computer-Aided Design and Drafting (CADD). Their major finding was that involving people increases the success chances. Lai et al. [8] looked at IT adoption, and identified three effect types impacting decision to adopt: contextual, structural, and strategy. The authors Agarwal et.al. have not considered some of these effects. Other studies by Kolbasuk-McGee [7], Nolan et al. [13], Sviokla [16], and Stoddard et al. [15] focused on strategic issues in IT implementation. They provided examples, and plans for successful implementation. Laudon et al. [9, pp 508-533], also reviewed IT implementation and specifically focused on success and failure examples. Like the authors they also emphasized the managerial and organizational characteristics as impacting the success or failure of the IT implementation projects.

Overall comparing with the literature demonstrates that the authors Agarwal et.al. focused on a certain dimension of the whole assimilation process. There seems to be other factors that impact choices and success chances.

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## Strengths and Weaknesses

As reported in the "Comparison with the Literature" section there are many other factors playing a role in selecting assimilation strategies and impacting success chances. However the authors were able to focus on a few issues by isolating them from the bigger picture. This helps the reader to understand the issues considered without getting confused. Simplicity seems to be one of the strengths of this paper. The paper does not seem to have major weaknesses. It does not cover all related issues, however the authors do a good job of analyzing and presenting the issues they cover. As the authors also state in their conclusions, the paper could have been strengthened by a quantitative analysis with a larger sample of companies.

## Conclusions of the Paper

The authors made appropriate conclusions by identifying the implications from research and practice perspectives. Based on their analyses, the authors present a framework for a the choice of assimilation strategy. Table 3 summarizes the authors' conclusions in terms of choices for assimilation strategies.

| | | Adopter Characteristics | |
|---|---|---|---|
| Nature of Innovation | Implementation Characteristics | *Inherently Innovative* | *Not Inherently Innovative* |
| *Product Innovations* | *Complex* | Advocacy/Support<br>*Individual adopts a new innovation which exhibits organization wide relevance. Then diffusion is supported by the firm. Organization adopts this innovation, and leaves it to the individual interest of the users for further diffusion.* | Support/Advocacy<br>*Organization adopts a new innovation, and leaves it to the individual interest of the users for further diffusion. Individuals adopt this new innovation which exhibits organization wide relevance. Then diffusion is supported by the firm.* |
| | *Not Complex* | Support<br>*Organization adopts a new innovation, and leaves it to the individual interest of the users for further diffusion.* | Advocacy<br>*Individual adopts a new innovation which exhibits organization wide relevance. Then diffusion is supported by the firm..* |
| *Process Innovations* | *Complex* | Advocacy/Support<br>*(see above)* | Total Commitment<br>*Organization adopts and supports the diffusion of a new innovation.* |
| | *Not Complex* | Support/Advocacy<br>*(see above)* | Total Commitment<br>*(see above)* |

Table 3. Choices for Assimilation Strategies

Looking at table 3 closer reveals some additional conclusions such as:

- Inherently innovative adopters will choose support as primary or secondary strategy for any type of innovation or implementation. If the implementation is complex, advocacy will be the primary strategy followed by support independent of the nature of the innovation.
- Not inherently innovative adopters will choose total commitment in the case of process innovations independent of the implementation characteristics.

The authors could have presented their findings in a table such as Table 3. It may have helped the readers to capture the findings easier.

Overall the authors are doing a fine job of presenting their conclusions. They do not make strong prescriptive statements. They prefer to indicate that their findings can help managers. They also provide future research areas such as using quantitative analyses with a larger sample.

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## Adequacy of References

The authors refer to sources in the areas of technology and innovation diffusion, innovation adoption, and IT implementation, which represent the major concepts covered in this paper. They provide references from books, proceedings and journals such as Management Science, IEEE Transactions on Engineering Management, and MIS Quarterly. Majority of the references seem to be from Management Science. Papers cited in this evaluation report [4,5,8,12] are all published after the authors have submitted their paper. There seems to be an increase in the number of recent papers in this area.

## Future Research Ideas

This study can be expanded by any of the following ideas:

1. Developing a survey, and collecting data from a larger sample followed by a statistical analyses
2. Repeating what the authors did for IT, for other type of technologies, such as manufacturing, design, and other administrative technologies
3. Incorporating other factors such as Market, Social, and Political Issues.

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