

# A Multi-Case Study and Framework for the Adoption of Wireless Sensor Networks

Anurag D  
Management Information Systems,  
Indian Institute of Management Calcutta, INDIA  
[anurag@email.iimcal.ac.in](mailto:anurag@email.iimcal.ac.in)

Somprakash Bandyopadhyay  
Management Information Systems,  
Indian Institute of Management Calcutta, INDIA  
[somprakash@iimcal.ac.in](mailto:somprakash@iimcal.ac.in)

Abstract submission for *Presentation Only*

A Wireless Sensor Network (WSN) is a new and upcoming technology that has grabbed the attention of the technical community over the last decade. It opens the possibility of numerous applications ranging from industrial to consumer use. Such is the expected impact of this technology, a recent EU report predicted a mass cultural change along the lines of the Internet. The wide interest from the technical community is largely due to the immense number of application areas enabled by this technology and the unique technical constraints that give scope for innovation (and publications). The technology has matured to a fair extent where sophisticated hardware is commercially available from leading chip manufacturers at low prices and communication protocols (software) have been ratified to allow inter operability among chip vendors. Recently, start-up companies have offered the WSN product on a commercial basis. However, the actual deployments in a business organization, worldwide, have been abysmally low and there has been no publicized deployment of a WSN in India.

*We seek to investigate the reasons for the lack of adoption of the Wireless Sensor Network particularly in the Indian context.*

A wireless sensor network can be thought of as a new technical product (a black box). It has attributes and functionalities which appeal to a consumer. Technical researchers and product developers work to make these attributes better and conform to requirements of certain applications. These attributes of a WSN are accepted universally and large volumes of technical research are associated with them.

However, there has been no study on the implications of the technology or what are the factors that facilitate or inhibit the adoption of a WSN in a business organization. WSNs being new technology, there have been no commercial deployments in business organizations in India. Therefore, our research methodology is based on qualitative causal studies using multiple case studies as research instruments. We first make an in-depth study of related literature that guides the adoption of technology and choose the *fit-viability* model as an initial framework that would determine the potential value of a WSN and thus its applicability. Fit measures the extent to which the capabilities of a WSN meet the requirements of the organization. Viability measures the economic costs/ benefits, the organization's readiness and the infrastructure to accept the technology. We then carefully select 4 organisations where in each case the fit of the technology is good and we investigate the viability. The organizations are a manufacturing plant, a hospital and health care service, an infrastructure development firm and a chemical refining company. In each organization we interview a management executive and a shop floor worker where the technology would make an impact. The responses are made accurate through triangulation and through available external data. Through the case studies, we adapt the fit-viability model and link the fundamental

technical attributes of the technology with the factors that drive its adoption. Our study would be unique in two respects:

- a) This is the first study on the value and adoption factors of a Wireless Sensor Network.
- b) We seek to establish a link between the factors that drive adoption and the fundamental technical attributes of a WSN.

Through this research, we have achieved a framework that would guide the estimation of value and thus the attractiveness of a WSN in a business context. This framework links the fundamental technical attributes of the product with the factors that drive its adoption and thus guides future technical research. Our future research is to make a pilot implementation of the technology in the firms where the viability is shown to be good and test our framework.