

**Essays on Information Technology and Innovation Processes:
Exploring the Effects of IT Investments on R&D Effectiveness and,
Understanding the Drivers of Migration to Services by IT Product
Vendors**

By

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ABSTRACT

This dissertation work comprises of two essays. The first essay explores the impact of information technology on the innovation processes in organizations. In this essay, we examine if and how information technology (IT) impacts the research and development processes in organizations. We argue that information technology could affect firm innovation effectiveness through two mechanisms namely, enhancing efficiency of knowledge integration, and promoting flexibility of knowledge integration. More specifically, we posit that information technology investments could mitigate the negative effects of scaling research and development activities. Using data collected from 145 US firms over a period of 6 years we test our research hypotheses. We find that information technology investments can mitigate the extent of diminishing returns to R&D spending in a way that returns to R&D decline at a lower rate for firms with higher level of IT intensity. However, we do not find any evidence that information technology investments will increase the return to R&D directly.

The second essay focuses on why IT product firms offer services and integrate services with their products. Synthesizing the literatures in market entry, service diversification and organizational decline, we propose that IT product firms offer services to better utilize their knowledge assets, to leverage information asymmetry between them and customers, and to counter performance decline. We hypothesize that firms that have architectural knowledge and those that are in a position to exploit the search costs incurred by customers in sourcing services are likely to earn a higher proportion of their revenues from services. We also hypothesize that the performance of the firm in the recent past will impact the extent to which IT product firms seek revenues from services. We test out hypotheses using data collected from 52 IT firms over a period of 15 years. Our results indicate that IT product firms with more architecture knowledge tend to derive greater proportion of their revenues from services. In addition, we find that the position of the firm in the IT architecture stack influences its service revenues. We find firms selling software products derive a greater proportion of their revenues from services compared to firms that predominantly sell hardware products. However, we do not find evidence that there is a significant difference between firms selling predominantly infrastructure software and firms selling application software

regarding the proportion of revenues they derive from services. We also find that past performance decline, especially a trend of continuous low growth rate has a significant and positive effect on firms' service revenue.