

## 論文の内容の要旨

論文題目      Information Technology, Organization, and the Japanese Economy

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Information technology (IT) pervasively affects modern society, from daily communication to business models and politics. The impact of the development of IT is also prominent on business organizations. The impact is not only about the internal structure of departments and divisions, but also about the relation between countries, regions, and entities in the market. For instance, offshore outsourcing of information services such as software development and call-center operations exemplify a new form of international production sharing. Another impact of information technology is cloud computing, which shows that it is possible to outsource computing capabilities, instead of outsourcing a whole business unit. The latest development of mass collaboration suggests that a significant part of production can be carried out by the collaboration of individuals rather than formal business entities. These organizational changes show the emergence of new relations between countries, organizations, and individuals, each of which needs to adjust their role in the market by adapting to the new environments and opportunities. In other words, information technology affects how people cooperate to produce value. Because changes in productive organizations include their impact on international trade and domestic industrial structures, these organizational changes could significantly impact national economy such as output, employment, and productivity.

The aim of this thesis is to assess the impact of information technology on the

economy, through structural changes in productive organizations. In particular, this thesis answers questions about how the development of IT affects organizational structure for production, and how these structural changes affect the Japanese economy, in terms of employment, productivity, and output. In this analysis, most discussions are based on a Japanese context and data from Japan, but the implications can sometimes be applied universally through comparison with prior studies.

This thesis provides an integrated view to understand the impact of changing organizational structures. For this purpose, analyses are conducted on stages based on a timeline from past to present. Additionally, future organizational forms are also explored to draw implication from such analyses. The analyses are reinforced by microeconomic analysis on organizational structures based on transaction cost economics, which provides the foundation on the firms' decision on organizational structure.

In the “past” stage in the integrated approach, the impact of offshore outsourcing of information services is analyzed. The analysis empirically assesses the impact of offshore outsourcing on Japanese employment from 2002 to 2006, specifying the partner countries to which information services are outsourced. Additionally, partner countries are related to certain business processes which are outsourced from Japan. The results on the impact on employment show that information services outsourcing affects employment in the manufacturing sector in Japan, but the impact is different depending on trading partners.

On the other hand, the effect of offshore outsourcing on productivity is also assessed following the same framework as the analysis on employment. The results show that the manufacturing sector gains positive effects from outsourcing to a wider range of countries than the service sector. In sum, the general impact of offshore outsourcing is the rise of productivity and the reduction of employment although the impact varies across

trading partners. In the “present” stage, cloud computing is analyzed based on DSGE (Dynamic Stochastic General Equilibrium) analysis. This analysis identifies multiple paths through which cloud computing affects the economy, and integrates the impact through these paths. The results suggest that cloud computing can raise output and employment if productivity growth is sufficient. However, one of the reasons for the positive relation between productivity and employment in DSGE analysis may be unconstrained demand.

The major part of the analyses in this thesis is on the “past” and the “present” stages which analyze offshore outsourcing and cloud computing. However, since the late 2000s, collaboration between individuals has attracted increasing attention. In order to draw comprehensive implications from the results of the analyses, future development of organizational structure is also discussed. In particular, the latest development of mass collaboration is discussed related to the open data movement and the shift to an information-centric economy. This discussion illustrates how the development of IT enabled not only the collaboration between organizations, but also between individuals, and mass collaboration and outsourcing partly share common grounds in terms of the development of IT and transaction costs.

The overall findings and implications in this thesis are summarized as follows. First, the analyses on organizational structure suggest that business organizations are changing from a hierarchically to vertically disintegrated structure through the development of IT, through the standardization of services and the development of communication networks. In addition, the shift to horizontal accumulation is also observed as a result of businesses pursuing an economy of scale. Secondly, analyses on offshore outsourcing and cloud computing suggest that overcoming the downward pressure on employment is the key to benefitting from IT. Analyses showed that the impact of offshore outsourcing is the rise of productivity and the reduction of employment. On the other hand,

DSGE analysis on cloud computing suggests that it is also possible to raise output and employment if the productivity growth is sufficient. However, one of the reasons for the positive relation between productivity and employment in DSGE analysis may be unconstrained demand. In this sense, to realize the benefit of IT on the economy, it is important to ensure IT contributes to the development of new products or services which create new demand.

Thirdly, there are significant differences among Asian countries as trading partners in terms of the effect of offshore outsourcing on economy. For example, outsourcing to China has a positive effect both on employment and productivity. On the other hand, outsourcing to India and ASEAN6 countries has a negative effect on manufacturing employment. These analyses on offshore outsourcing showed that there is significant diversity on the effects of the international trade of information services on the national economy depending on trading partners, even when limited to Asian countries. In this sense, considering how to realize mutually beneficial relationships with each country, instead of generalizing Asia as a trading partner is important.