

論文 / 著書情報
Article / Book Information

題目(和文)	電気自動車における技術進化と技術の学習：技術能力チェーンの管理を通して加速されたキャッチアップの事例
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種別(和文)	論文要旨
Type(English)	Summary

論文要旨

THESIS SUMMARY

専攻： Department of	イノベーション	専攻	申請学位（専攻分野）： Academic Degree Requested	博士 Doctor of	（ 技術経営 ）
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要旨（英文 800 語程度）
Thesis Summary（approx.800 English Words）

This thesis entitles “*Technological Evolution and Learning in Electric Vehicles: The Case of Accelerated Catching up through Managing the Technological Capability Chain*” (電気自動車における技術進化と技術の学習：技術能力チェーンの管理を通して加速されたキャッチアップの事例 in Japanese), consisting of seven chapters.

Chapter 1 Introduction

This chapter sets the ground for the rest of the chapters by pointing out the need for research focusing on the understanding of the dynamics of technological change and its relevance of learning. It also enumerates the research questions, context, and expected contribution of this study. The research objective is to bring forth a picture of co-evolutionary process between dynamic technological change and its relevant technological learning for catching up and innovation in emerging industry.

Chapter 2 Grounding in the Literature and Building the Conceptual Framework

This chapter begins with a description of theoretical streams underpinning this research, namely technological change, technological catch up, phenomena of complexity, and technological capabilities. Focusing on the interrelationships among the different research streams and innovation, the last part of this chapter provides a brief description of the conceptual and analytical framework for this research.

Chapter 3 Research Methods and Data Sources

This chapter enumerates the main research methods and data sources used in this study. Here, quantitative and qualitative approaches such as bibliometric methods of patent, case study are reviewed in detail. In particular, for EV technological evolution, a dynamic method of trajectory identification based on patent citation network is proposed to discern the evolutionary nature of technological change with enhanced accuracy. For the case of Chinese leading EV maker—BYD, together with the co-categories network and cluster analysis method for visualizing its dynamic patenting activity, the appreciative theorizing case study is used to support the proposed Technological Capability Chain model for accelerated catching up in emerging Chinese EV industry.

Chapter 4 A Technical Narrative of EV Fundamentals

This chapter introduces technologies in the field of EV. By relying on the technical narrative of development of EV, this chapter enumerates the nascence and historical development of the EVs,

the technological considerations of EV, and the key technologies of EV. It then describes the general background of the emerging Chinese case in a creative economy, and technological development of EV in China.

Chapter 5 Discerning Evolutionary Nature of Technological change

Together with a network-based bibliometric method and an empirical investigation of the technology evolution of EV, this chapter proposes a dynamic method to ascertain and calibrate technological trajectories, and describes the dynamic nature of technology changes in detail. The long-term historical technological development of EV is presented with the identification of the evolution of specific technological directions, technical bottlenecks, and problem-solving heuristics. Two waves of EVs technology development and the dynamic evolutionary trajectories in second wave are discerned and brought forth through the grace of the proposed dynamic methods with the extent of cumulativeness and persistence at knowledge level.

Chapter 6 Designing a Catching up Model for Indigenous Innovation in Creative Economy

This chapter proposes a new conceptual model, named Technological Capabilities Chain (TCC), to embed endogenous capability into STI system invoked by the technological changes. The acceleration of catching up is contributed by constructing the holistic TCC and four types of innovation prototypes are revealed in such expediting model. An in-depth case study of Chinese leading EVs manufacturer—BYD company is conducted to examine the model. BYD was an IT firm with its technology strength in recharging battery. This case elaborates how BYD built on their competences to be an EV production forerunner. The significant role of the endogenously independent technological capability and its networking effect is argued, by distinguishing from the previously most studied impact of the technology transfer, for technological learning of latecomers

Chapter 7 Conclusions – Summary, Contribution, Limitation, and Outlook

This chapter concludes and puts forward implications for technological innovation management. On the right hand, the problem-solving heuristics are procedures and inter-concatenations to search information on technological direction, technical bottlenecks and solutions. They hence are indicative of evolutionary trajectories for learning. On the left hand, the acceleration of constructing TCC is contributed to the technological learning generate and adapt the dynamic technical changes to the emerging markets. It also creatively embeds the findings into the literature by discussing the findings with earlier research results. Grounding in that, it provides an overview of the theoretical contributions and a research outlook. This research filled in the gap of latecomers' technological learning in an emerging industry during the fluid phase in which dominant design has not emerged. Moreover, a holistic TCC construction method with heuristic strategy contributed to the learning for accelerated catching up and innovation.

備考：論文要旨は、和文 2000 字と英文 300 語を 1 部ずつ提出するか、もしくは英文 800 語を 1 部提出してください。

Note：Thesis Summary should be submitted in either a copy of 2000 Japanese Characters and 300 Words (English) or 1 copy of 800 Words (English).

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