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Abstract. Taking “GE” and “SIEMENS” as cases, this paper adopts grounded analysis method, investigates integrated system of value chains and the support capability system during reverse innovation process. Some significant results are found as follows: Firstly, the value chain model of the glocalization is a steady and expanding model while the value chain model of the reverse innovation is a disruptive and reconstructive model, and the two are quite different types. Secondly, in the process of reverse innovation, the value chain integration successively experienced three stages: construction, expansion and climbing. Thirdly, the different support capabilities are required in each value chain integration stages.

Introduction

The concept of Reverse Innovation (RI) was firstly proposed by CEO Jeffery Immelt of GE Healthcare Group (GE) and Professors V. Govindarajan and Trimble, C from Tuck School of Business of Dartmouth University. In 2009, taking the portable imager developed by GE in China as an example, they pointed out that the RI was an innovation that was firstly used by emerging market countries and then reversely exported to the developed countries [1].

In recent years, some MNCs have made a lot of efforts in RI from the perspective of value chain, and a great progress has been achieved longitudinally. However, in the aspect of the horizontal comparison, there is still much space for improvement in RI value chain. Actually, most MNCs can complete a part of integration process of RI value chain and only a few can build a complete RI value chain to realize the high-end climbing in the value chain. Therefore, there is still a large gap between RI value chain and the glocalization value chain in terms of technical level or overall integrity. However, scholars now mainly pay attention to the embedding degree and the position of a country in the global value chain (GVC) [2,3]. There is no research on the integration of value chain in the whole RI process. Obviously, this static research will decrease the explanatory efforts, which leads to the lack of comprehensive theoretical support for the improvement of RI value chain. And it cannot fully reflect the transformation of the value chain from “innovation for developed countries” under glocalization strategy to “innovation for emerging markets” under the RI strategy. Hence, we think that it is imperative to research the dynamic evolution of value chains and the support capability system in reverse innovation process.

Research Design

Research Methods and Case Selection

The research method of grounded theory is of the characteristics of developing the theory and attaching importance to changes and interaction based on the real data and it is well known for its scientific and rigorous analytical procedures [4]. In this paper, the grounded theory is chosen as the main analysis tool. The typicality of case objects is a prerequisite for a successful grounded analysis [5], with the focus on the information richness of cases rather than the sample size [6]. GE
Healthcare Group (hereinafter referred to as “GE”) and Siemens AG (hereinafter referred to as “SIEMENS”) are two cases selected for this study. Both of them are industry leaders in the developed countries with a high localization degree [7] through long-term organization of studies, and they established influential local research & development centers [8] with abundant public information. GE and SIEMENS implemented their own RI strategies in 2008 and 2006 respectively. They actively launched a series of RI activities (as shown in Table 1). So they are relatively typical study cases and it will help to sum up the general rules of reverse innovation by taking them for example.

<table>
<thead>
<tr>
<th>RI Activities</th>
<th>Typical Products and Significance</th>
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<tbody>
<tr>
<td>RI of GE compact ultrasonic equipment</td>
<td>Initial stage: Time: 1999 -2002 Typical product: Compact ultrasonic equipment with price of $30,000-40,000. This product was developed by GE local growth team for China’s market demands under the technical support of GE product R&amp;D center in Israel. Significance: GE gets rid of path dependence of glocalization value chain by building a local growth team with a certain independent right.</td>
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<tr>
<td>RI of SIEMENS practical CT</td>
<td>Initial stage: Time: 1997 -2005 Typical product: economical &amp; practical SOMATOM Spirit. It is an economical and practical CT product developed by Siemens China R&amp;D Team for China’s medical markets and integrated with technologies and parts verified in SOMATOM products. Significance: Based on deep understanding of value demand of emerging markets, SIEMENS uses the applicable techniques and combinations that match the market conditions.</td>
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</table>
documents of case enterprises, public information of case enterprises as well as internal data or information of case enterprises including annual summaries, business memorabilia, internal publications and periodicals that can be searched via search engines. b. Field research. Interviews were performed to top managements of case enterprises. They were asked to provide and verify the relevant information and make comments on the main findings of this paper. The duration of each interview was about 1.5 hours. c. Consultation from industry experts. The experts of the same industry to the case enterprises were consulted and they were asked to verify and make comments on the relevant information.

The survey data was triangulated refer to the qualitative data analysis method proposed by Miles and Huberman [9]. Some data was randomly chosen from the collected data as the pre-test samples, and the encoding results of the three coders were calculated based on the mutual consent and reliability formula [10]. The higher consistency for the classification of the three coders (reliability is greater than 0.8) ensures the reliability and validity of this study.

### Data Analysis

In this paper, the qualitative data analysis was performed (as shown in Table 2) based on the collected data of the two cases. The data was processed using qualitative analysis software ROST CM6.0 (due to the limited space, the processes of open coding and axial coding were omitted here).

<table>
<thead>
<tr>
<th>Development stage</th>
<th>Primary category</th>
<th>Sub-category</th>
<th>Initial category</th>
</tr>
</thead>
<tbody>
<tr>
<td>Production stage in emerging markets</td>
<td>Value chain construction</td>
<td>Value chain construction</td>
<td>Build a local technology chain; build a local value chain; get rid of the dependence on path of glocalication value chain path</td>
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<td></td>
<td>Independent parenting linking capability and niche local linking capability</td>
<td>Independent technology link</td>
<td>Technology recombination of subsidiary company; product reconfiguration and process optimization; building low-cost integration capability; adaptation utilization of technology resources of parent company</td>
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<tr>
<td></td>
<td></td>
<td>Independent market link</td>
<td>Repositioning of target markets; building new marketing channels; adaptation utilization of technology resources of parent company</td>
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<td></td>
<td></td>
<td>Niche market link</td>
<td>Market embedding in emerging markets; learning of local policies; organization of boundary reshaping; assessment of local demands</td>
</tr>
<tr>
<td></td>
<td>Niche technology link</td>
<td>Technology embedding in emerging markets; learning from local companies; Product reconfiguration and process optimization; construction of local value chains</td>
<td></td>
</tr>
<tr>
<td>Diffusion stage in emerging markets</td>
<td>Value chain expansion</td>
<td>Value chain expansion</td>
<td>Expansion of local technology chain; penetration of local value chain</td>
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<tr>
<td></td>
<td></td>
<td>Coupling technology link</td>
<td>Dominating of research and development by subsidiary company; building adapting capability of market segments; supplementation utilization of technology resources of parent company</td>
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<tr>
<td></td>
<td></td>
<td>Coupling market link</td>
<td>Penetration into segmented markets; supplementation utilization of market resources of parent company</td>
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<td></td>
<td></td>
<td>Segmented market link</td>
<td>Market embedding in segmented markets; industry-university-research cooperation; business innovation</td>
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<tr>
<td></td>
<td>Segmented technology link</td>
<td>Technology embedding in segmented markets; industry-university-research cooperation; development of series products</td>
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<tr>
<td></td>
<td>Diffusion stage in developed</td>
<td>Value chain climbing</td>
<td>Upgrading of local technology chain; Upgrading of local value chain integration of local technology chain into global technology chain; integration of</td>
</tr>
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</table>
Case Analysis

Local Value Chain Construction and Capability Supporting System

In this stage, MNCs established their local R&D centers in emerging markets. Based on the previous engineering and technical supports for R&D projects of business departments in emerging markets and headquarters, local R&D centers have accumulated a certain amount of product process technology. Then they start to update and upgrade the value-added products targeted at emerging markets and break down the labor division predominated by R&D centers of developed countries. They climb from production link with low level division of labor as well as low profit margins to R&D design and marketing service link with high technology contents and high added value, which improves the status of international division of labor and completes the transition from a supportive role to a protagonist. Conversely, the local R&D centers will gain more competitive advantages and enhance their own value-added capabilities through the climbing of the embedding positions, and meanwhile attract the home country to arrange more and more high value-added links to be locally produced. Based on the support of parent companies resources, these centers will make full use of local technical resources and supporting resources in emerging markets to build a competitive and relatively complete localization value chain which is embedded in the situations of emerging markets so as to increase the added value of emerging markets in RI products and promote the localization of products. For example, compact ultrasonic equipment with selling price of $30,000 - 40,000 launched by GE and SOMATON Spirit launched by SIEMENS are both based on the establishment of local teams, localization of product design, and local procurement of spare parts, which break down the dependence on path of glocalization value chains by building new localized value chains.

The RI in “value chain construction” stage requires the support of the independent parenting link capability and niche local link capability. First of all, the local growth team should promote the knowledge transfer between parent company and subsidiaries through the independent integration mechanism. The local growth teams of GE and SIEMENS independently choose the technologies which match with the parent company in the development of compact ultrasonic equipment with price of $30,000 - 40,000 and SOMATON Spirit. Secondly, heterogeneity exists in infrastructure, culture and consumption between emerging markets and developed countries. MNCs set up a bridge between themselves and local culture by establishing the local growth teams. The local growth teams cooperate with local stakeholders, such as leading users, suppliers and other local firms, to speed up the learning of local market knowledge and technical know-how. For instance, in the development of portable ultrasonic devices and SOMATOM Spirit, both GE and SIEMENS united the people, who understand the demands of emerging markets and are capable of providing the solutions, to establish the local growth teams.
Local Value Chain Expansion and Capability Supporting System

In this stage, by mining the segmented market information, the MNCs attract more local supply chains and other technical service providers into the development process of products to get more product concepts and functional combinations. Setting up complete local industry chain and technology chain acquires more abundant external opportunities, which are located in a central position in the markets, suppliers, R&D alliance and industry-university-research cooperation network. MNCs continue to exploit the market segments to achieve rapid growth of market segments by a series of low-cost, easy-operation, and high-quality products innovation or business model innovation. For example, GE local growth team in China has improved the compact ultrasonic equipment. The price of device has dropped to $15,000, which is less than 15% of the cost of high-end ultrasonic equipment. So, its sales in China entered into Take-off Stage. Subsequently, this product appeared in international markets, which means that GE found application fields in ambulance teams and emergency rooms of developed countries. Similarly, during the development process of SOMATOM Emotion 16# CT, because SIEMENS R&D engineers in China understood the local medical needs and the supporting level of spare parts, 80% of spare parts of the product were purchased in China through the integration with SIEMENS’ technology, which greatly reduces the cost. It has now become a product with the largest sales in all SIEMENS CT products.

The RI in “value chain expansion” stage requires the support of the coupling parenting link capability and permeable local link capability. First of all, when the supply of local knowledge is not sufficient to make up for the shortage of innovation demand, the local growth teams should be able to rapidly couple with the global R&D platforms in time so as to promote the development process of RI products. For example, Both the compact ultrasonic equipment with price of $15,000 and SOMATOM eMotion 16# CT were developed by the growth local team through the complementary utilization of the parent company's technical resources system. Secondly, the local growth teams carried out the local permeability learning by way of R&D alliances and industry-university-research cooperation, to match the existing technologies with the needs of different users in more segmented markets. For example, GE compact ultrasonic equipment with price of $15,000 and SOMATOM eMotion 16# CT are all the product series of the basic medical markets developed by the local growth teams based on the new product platforms.

Local Value Chain Climbing and Capability Supporting System

In this stage, with the enhancement of its own value-added capabilities and accumulation of mastered technical advantages, local R&D centers begin to take the lead in R&D work and they are proactively embedded in high value-added links to enhance their profitability in the value chain division of labor so that the leading role can be stabilized. The global products that are geared into the international standards are developed and backtracked to developed countries by the local growth teams relying on the technical resources and market service resource of parent companies. The value chain established in emerging markets is then integrated into the global value chain system so as to better develop the innovative products and technologies to the whole worlds. For example, GE improved the imaging quality of its hand-held small-size ultrasonic unit Vscan and SIEMENS improved the quality of its eMotion CT SOMATOM Perspective respectively, which cater the mainstream market demands of the United States and other developed countries whose social targets are to control the cost of healthcare. The local value chains of both GE and SIEMENS are also integrated into the global technology chain and value chain system.

The RI in “value chain climbing” stage requires the support of joint parenting linking capability and backtracking local linking capability. First of all, the joint parenting linking capability is mainly characterized by the integration of technical resources within international scope for market demand of developed countries. For example, Vscan was developed through the efforts of the local growth team and the parent company by relying on the breakthrough beamforming technology developed by GE for high-end ultrasonic equipment. Secondly, As RI enter the diffusion stage in developed countries, there are low generality between emerging markets and the mainstream markets of
developed countries. The object of enterprise localization learning is changed to markets of developed countries from the emerging markets. For example, After the prototypes products of Vscan and SOMATOM Perspective were completed, the related staff of the healthcare system head office went to many countries to investigate whether the product design was in line with the market demand.

Main Research Conclusions

In this paper, we put forward the following research propositions:

Proposition 1: There are two models of value chain for MNCs to enter emerging markets: glocalization value chain model and RI value chain model, and they are two very different models. The glocalization value chain is in fact a kind of steady and expanding value chain model, which focuses on the value-added capability of existing value chains. MNCs use the corporate resources mainly in the strategic aspects of value chain in developed countries, on the basis of which, the existing value chains are finitely extended geographically in emerging markets through production outsourcing or transfer, but its aim is still to control the risks and reduce the costs of the existing value chains; The RI value chain is a kind of disruptive and reconstructive value chain model, which emphasizes the value-added capability of the new value link. MNCs tend to tilt the corporate resources to the local value chain of emerging markets. On this basis, they will gradually get rid of the dependence on the path of glocalization value chains, to build a new value chain integrated into the emerging market situations, and incorporate it into the GVC.

Proposition 2: In the evolution process of RI, attention should be paid to two aspects: firstly, it is required to not only emphasize the construction and upgrading of new local value chain, but also pay attention to the improvement of parenting linking capability and local linking capability from independence feature to joint feature, and from niche feature to backtracking feature. Secondly, in the RI process, an enterprise should take the initiative to create synergic opportunities and space from two levels of parent company and subsidiaries, and it should attach importance to the autonomy and creativity of the subsidiaries and emphasize the synergy between the subsidiaries and local contexts while the parent-subsidiary synergy is performed.

This study reveals the disruptive and reconstructive characteristics of the RI value chain. Therefore, the RI is not only a new challenge for MNCs but also a new catch-up opportunity for latecomer enterprises. The future research can explore the specific factors affecting the integration of value chains in the RI process to guide the enterprises to better practice RI value chains.

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Reference


