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Cumulative manufacturing capabilities in Europe: Integrating sustainability into the sand cone model

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ABSTRACT

The purpose of this paper is to investigate the development of manufacturing capabilities in Central and Eastern Europe. In particular, top management's competitive priorities, plants' manufacturing strategies, and plants' manufacturing performances are compared between old and new European Union member states. Internationally collected data are compared using various analyses of covariance. The findings are interpreted against the background of the sand cone model, which is extended by integrating sustainability twice—that is, in its proactive and reactive forms. The results indicate that old and new member states dwell on different steps of cumulative manufacturing capability development. It is hypothesized that this can be attributed to differing labor costs; the requirements imposed by supply chains; and the pressure from stakeholders, such as civil society organizations. Our study responds to various calls to refine the sand cone model through the use of contingency theory by considering the operating conditions of plants in the two country groups as environmental contingency factors.

1. Introduction

When the European Union (EU) experienced its hitherto most important enlargement in 2004, eight former Warsaw Pact states, featuring the heritage of various forms of planned economies, were among the new entrants. Their transition to market economies may be considered largely finalized as a result of their acceptance as new member states (NMS) of the EU. Indeed, important macroeconomic figures—such as gross domestic product (GDP), fiscal stability, and inflation—indicate their continuing convergence (Čihák and Fonteyne, 2009). In addition, statistics show that actual European integration in terms of trade is advancing. Since the fall of the Iron Curtain, export volumes from NMS to old member states (OMS) have been developing much more strongly than the export volumes of other emerging economies to OMS in the same period (Čihák and Fonteyne, 2009).

Likewise, manufacturing practices have been successively aligned, for example, through supply chain relationships, aiming for chain competitiveness and sustainability (Grekova et al., 2016), foreign direct investments (Bijsterbosch and Kolasa, 2010), and knowledge transfers from headquarters to subsidiaries. Regarding the European automotive industry, Jürgens and Krzywdzinski (2009) conclude that the upgrading of manufacturing sites in NMS can be observed, thus preventing the emergence of a division of labor between the OMS featuring high-end production and the Central and Eastern European (CEE) countries featuring low-end production. The authors conclude that the expansion of OMS automotive industries to NMS had an overall favorable effect on growth and employment in OMS. For instance, German car manufacturers—the largest investors in CEE countries—were able to enhance their competitiveness in the market through low-cost component imports from CEE countries. Reiner et al. (2008) observed this positive effect of the internationalization of NMS on parent companies in OMS in other industries as well.

Bijsterbosch and Kolasa (2010) confirm the important role of foreign direct investments for productivity growth in CEE countries, contributing to a productivity convergence in these countries as well. According to Correa et al. (2010), foreign direct investments seem to accelerate technology adoption and, hence, manufacturing performance in CEE countries. Pavlínek (2015) finds that the economic crisis starting in 2008 in fact enhanced the shift from

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traditional core manufacturing areas to less developed countries, such as the Czech Republic and Slovakia.

In contrast, previous research on German automotive Original Equipment Manufacturer (OEM) located in CEE countries shows that even in the same automotive company, the productivity objectives in assembly factories located in CEE countries are much lower compared to OMS (Poiger et al., 2010). This means that even within the same company (with production in OMS and NMS), the country-specific context influences the local strategy, manufacturing competitiveness, manufacturing performance, and required capabilities. Similarly, Pagell et al. (2005) highlight the effect of national culture on operations decision making. More specifically, Yayla-Kullu et al. (2015), for example, confirm the influence of future-oriented cultures on the quality of airline services, and Phan and Matsui (2010) find that the relationship between just-in-time production practices and plant performance is contingent on the national context.

Conversely, Naor et al. (2010) find that organizational culture has more effects on manufacturing performance than national culture. National-level factors, as reflected by the Country Developmental Index (www.worldbank.org), are found to have only a weak influence on manufacturing performance. This finding has important consequences for managers who plan to expand their manufacturing activities across national borders. For them, it is a priority to build a company-internal organizational culture that favors high-performance manufacturing over the country-specific context of operations. This scattered and partly contradictory evidence underlines the necessity of gaining a better understanding of the development of manufacturing capabilities in NMS (in comparison to OMS). Therefore, it is our objective to investigate the extent to which competitive priorities, manufacturing strategies, and manufacturing performance actually differ across the regions of NMS and OMS and how possible differences can be explained.

At the interface between economic geography and production management, there is only rather limited empirical research on the competitive priorities, manufacturing strategies, and manufacturing performance of plants located in OMS and CEE NMS. Based on a sample of 234 firms, this paper intends to address these research gaps by providing multiple analyses of covariance that investigate the lines along which manufacturing plants in these two regions actually differ and how these differences can be interpreted. In particular, the following research questions are addressed:

(1) Several years after the EU entry of NMS, which differences still exist between OMS and NMS in Central and Eastern Europe in terms of manufacturing capabilities (operationalized by competitive priorities, manufacturing strategies, and manufacturing performance)?
(2) How can these differences be explained?
(3) What implications do these discrepancies in manufacturing capabilities have for the competitiveness and sustainability of manufacturing plants in NMS and OMS?

In line with these three research questions, this paper reports findings from a three-stage research process, as depicted in Fig. 1. Stage I identifies differences in manufacturing capabilities between the two country groups by following a deductive hypothesis-testing approach. In stage II, the results of the empirical analysis are interpreted through the concept of the sand cone model, taking into account country group-specific environmental contingency factors. This rather exploratory step leads to theory refinement in the sense that sustainability is integrated into the sand cone model as an additional important manufacturing capability. Stage III draws conclusions for business practice, helping managers to decide which set of manufacturing capabilities a manufacturing plant should develop as a priority in light of limited resources and various stakeholder pressures. In particular, the research supports managers in two ways. First, it helps them to understand their plants' specific situations regarding cumulative manufacturing capability development in order to identify the right focus when developing manufacturing capabilities in the short term. Second, it allows managers to anticipate the future requirements of operating environments for the effective long-term development of manufacturing capabilities that are likely to lead to operational performance, competitive advantage, and corporate sustainability.

The remainder of the paper is structured as follows. After the theoretical background, the empirical research methods applied in this study are described. Then, the results of the statistical analysis are presented, followed by their interpretation through the lens of a

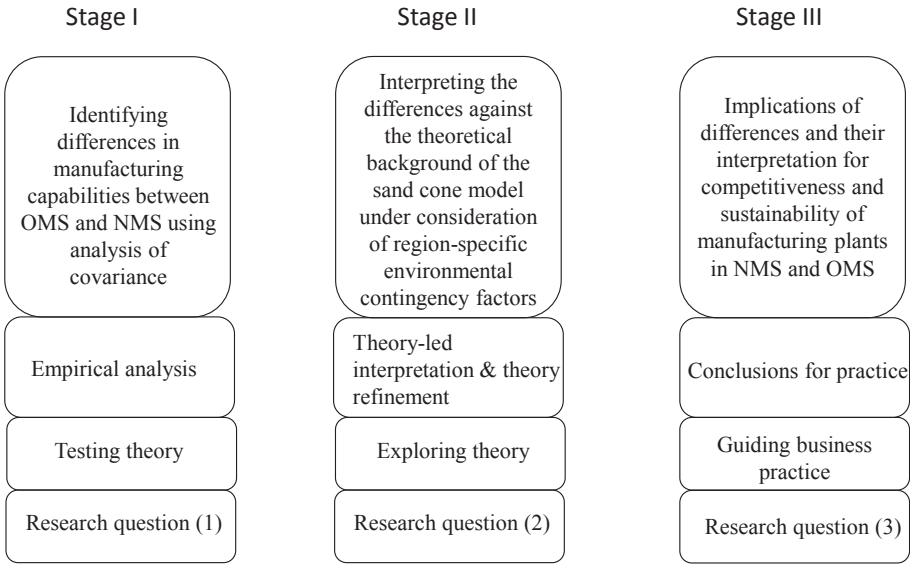

Fig. 1. Research procedure.