Innovativeness of manufacturing SME and the interdependence of types of innovations

Introduction

The successful SMEs development today depends on their capacity to align with technological progress and different types of innovations (organisational, process, product, and marketing). The necessity of SME innovations is determined by the increasing economic globalization. Growing trade liberalisation, market deregulations, accelerating mobility of capital, technological changes, and competition increased the *pressure* on SME to focus on innovation strategies (UN 2009, p. 42).

To sustain the new competition pressure SME have to develop innovation capacities in all areas of their activities (Damanpour 1991, p. 561). The innovations could allow small firms to acquire competitive advantages (Armbruster et al. 2008). Jin et al. (2004, p. 263) demonstrated that *innovative firms outperform non-innovative ones*, while Gunday et al. (2011, p. 672) found that innovative firms have higher sales and exports. According to Acs and Audretsch (1998) the SMEs are a source of innovations based on new technologies, notably on the new IT. Particularly *entrepreneur-driven SMEs* are more willing to innovate as they navigate the frontiers of business activity (UN 2009, pp. 2-3).

Most innovation studies have been devoted to the determinants and barriers of the new products development (De Jong and Vermeulen 2006, pp. 590-591). The innovations encompass, however, new organisations of business processes, restructuring, creation and maintenance of external relations, and other changes, not related directly to the physical goods innovations (Hervas-Oliver et al. 2014, p. 874). Yet other types of innovations (process, organisational, and marketing) remained relatively understudied ((Becheikh et al. 2006, p. 660). Particularly in small firms the process innovation strategies and performance consequences are still *under-researched* (Hall et al. 2009, p. 15).

Some studies demonstrated that product, process, and organisational innovations should not be considered in isolation, but as mutually interdependent forces (Crossan and

Apaydin 2010, p. 1167). Firms are more likely to accomplish non technological innovation when they are engaged with technological ones (Schmidt and Rammer 2007, p. 32). According to Gallego et al. (2012, p. 574) the combination of organizational and technical innovations is crucial for the performance success, particularly for small firms. Reichstein and Salter (2006, p. 676) concluded that theories of innovation need to account for the mutual interaction between the product and process innovations. Other researchers also insisted on a broad concept of innovation, understood beyond its technological dimension (Edquist 2005, p. 201; Damanpour *et al*. 2009, p. 656). The prevailing literature, however, tends to examine individual innovation in isolation and there are no many studies that investigate the interdependence of different types of innovations (Piening and Salge 2014, p. 14).

The goal of this paper is to reveal the innovativeness of the manufacturing SME in Bulgaria in respect to four types of innovations (organisational, process, product, and marketing) and their combined effects on firms' performance. The research is based on data from a survey of 500 manufacturing SME through a standardised questionnaire. The study attempts to answer the following research questions: (1) What is the level of the manufacturing SMEs innovativeness in respect to four types of innovations? (2) What is the interdependence of these types of innovations? (3) What are the direct and indirect influences of these types of innovations on firms' performance?

Methodology

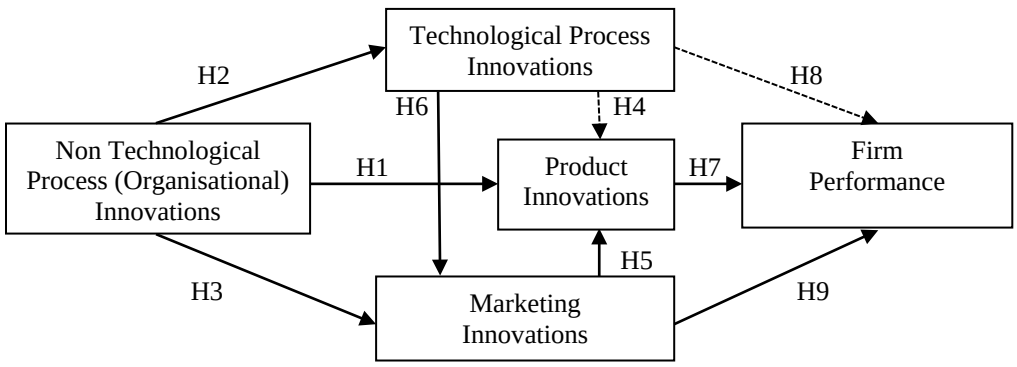
The data are obtained from a larger questionnaire, which was developed to identify the factors for the manufacturing SME performance in Bulgaria. The questions in the survey refer to different innovations such as: product innovations; adoption of advanced technology, e-business, e-integration of processes (as a proxy of technology process innovations); registered trademarks and patents, and developed marketing strategy and surveys (as a proxy to

marketing innovations); access to information, internal R&D, networking with research institutions, and staff training (as a proxy of non-technological process or organisational innovations). Firm performance is reflected by the changes of four indicators – number of staff, sales, profit, and market share.

The sample covered 500 SMEs from 18 manufacturing activities. It included 195 microenterprises, 202 small, and 103 medium size enterprises. The field data were gathered by a professional vendor agency Noema in February and March 2013, and the data were processed on SPSS 20. The answers of 16 questions with a total number of 40 items are taken into account. All of the individual variables are scored on two-point scale (zero - "none", and one - "yes"), except some demographic characteristics of firms and entrepreneurs. For each type of innovations the indexes have been constructed as an average of their constitutive items. The indexes take values from zero to one, which allows for comparing the levels of manufacturing SMEs innovativeness in respect to each type of innovations.

The interdependence of types of innovations and their joint impact on firms' performance has been tested through path model using Amos of the SPSS. The model contains nine hypotheses, which are derived from the literature review, particularly from the sections on the interaction of innovations types and their impact on firm performance (Fig. 1):

Figure 1
Conceptual model of the interdependence of four types of innovations and their effects on firm performance



Results

The main findings reveal a relatively *low level* of innovativeness in respect to organisational, process, and marketing innovations. More than 50 percent of the firms have not done organisational improvements, and in total more than 70 percent have low values on the index of organisational innovations. The figures for technology process and marketing innovations are similar. The level of product innovativeness is a little bit higher, but it is not related strongly with the R&D activities, which suggests that these are mainly small and incremental product innovations. These findings suggest that the manufacturing SMEs belong to the category of "modest innovators", which is similar to the country place in the Innovation Union Scoreboard (EC, 2014).

The acceptable level of the goodness of fit indices of the model allows for analyses of paths structure among different innovations and their effects on performance. All of the hypotheses have been confirmed except for H4 and H8. The organisational type of innovations seems to be most important as it influence directly and positively other types of innovations, and indirectly and positively the firm performance. Both process and marketing innovations play a mediating role between organisational and product ones. Product type of innovations exercises a direct positive impact of firm performance, and it mediates the influence of marketing innovations on performance. The technology process innovations also impact positively both product innovation and performance, but these impacts are not statistically significant. The data show that a small share of performance variance is explained by all types of innovations (only 11 percent). It means that other, more traditional factors, are of greater importance for the manufacturing SMEs performance.

These results are in line with studies, investigating the relationships of different types of innovation and performance, and the interdependence of types of innovations. For instance Gunday et al. (2011, p. 671) found that the innovative performance is directly and positively affected by the organizational, product and marketing innovations. Process innovation

influences innovative performance through product innovation, while organizational and marketing innovations have both direct and indirect (through product innovation) effects on innovative performance.

Conclusion

The findings reveal a relatively *low level* of innovativeness on all these types of innovations. The organisational innovations turned to be the most important as it influence directly and positively other types of innovations, and indirectly and positively the firm performance. The product type of innovation has the strongest direct effect on firm performance compared to the impact of marketing and technology process innovations.

The implications of these results for managers are that before introducing new products, the firms need to take into account the respective changes in process requirements (Pisano, 1997). Other studies have shown that the synchronous co-adoption of organizational and technological innovations is positively related to innovative performance (Hervas-Oliver et al. 2014, p. 877). Piening and Salge (2014, p. 5), however, suggested that firms need to focus on a *limited number* of activities instead of engaging in many activities simultaneously. The challenge for the firms is to find a particular *combination* of innovation activities, which can bring the highest success.

The limitations of the study are related to the subjective evaluations of innovations and performance by interviewed managers. The research reflects the results only from one sector – manufacturing, although this sector behave more in line with the theory compared to the service sectors. Additionally, the distinction between hi- and low-tech subsectors is not considered. These limitations might be areas for future research on the topic. There is a need for comparative research, which take into account specific sectors, firm size, and the effects of more environmental factors on the SMEs innovativeness and performance.

Cited literature:

Acs, Z. J., and D. B. Audretsch (1988). "Innovation in large and small firms: An empirical analysis", *American Economic Review* 78(4), 678-690.

Armbruster, H., A. Bikfalvi, S. Kinkel, and G Lay (2008). "Organizational innovation: The challenge of measuring non-technical innovation in large-scale surveys", *Technovation* 28(10), 644–657.

Becheikh, N., R. Landry, and N. Amara (2006). "Lessons from innovation empirical studies in the manufacturing sector: A systematic review of the literature from 1993–2003", *Technovation* 26, 644-664.

Crossan, M. M., and M Apaydin (2010). "A Multi-Dimensional Framework of Organizational Innovation: A Systematic Review of the Literature", *Journal of Management Studies* 47(6), 1154-1191.

Damanpour, F. (1991) "Organizational innovation: a meta-analysis of effects of determinants and moderators", *Academy of Management Journal* 34 (3), 555-590.

Damanpour, F., R. M. Walker, and C. N. Avellaneda (2009). "Combinative effects of innovation types and organizational performance: A longitudinal study of service organizations", *Journal of Management Studies* 46(4), 650-675.

De Jong, J.P.J., and P. A. M. Vermeulen (2006). "Determinants of product innovation in small firms: A comparison across industries", *International Small Business Journal* 24(6), 587-609.

EC (2014). "Innovation Union Scoreboard 2014", (http://ec.europa.eu/enterprise/policies/innovation/policy/innovation-scoreboard/index_en.htm). January, 10, 2015.

Edquist, C. (2005). "Systems of Innovation: Perspectives and Challenges", In *The Oxford Handbook of Innovation*. Eds. J. Fagerberg,, D. C. Mowery, and R. R. Nelson. New York: Oxford University Press Inc., 181-208

Gallego, J., L. Rubalcaba, and C. Hipp (2012). "Organizational innovation in small European firms: A multidimensional approach", *International Small Business Journal* 31(5), 563-579.

Gunday, G., G. Ulusoy, K. Kilic, and L. Alpkan (2011). "Effects of innovation types on firm performance", *International Journal of Production Economics* 133, 662-676.

Hall, B., F. Lotti, and J. Mairesse (2009). "Innovation and productivity in SMEs: Empirical evidence for Italy", *Small Business Economics* 33, 13-33.

Hervas-Oliver, J.L., F. Sempere-Ripoll, and C. Boronat-Moll (2014). "Process innovation strategy in SMEs, organizational innovation and performance: a misleading debate? *Small Business Economics* 43, 873-886.

Piening, E.P., T. O. and Salge (2015). "Understanding the Antecedents, Contingencies, and Performance Implications of Process Innovation: A Dynamic Capabilities Perspective", *Journal of Product Innovation Management* 32(1), 80–97

Pisano, G. P. (1997). *The Development Factory: Unlocking the Potential of Process Innovation*. Boston: Harvard Business School Press.

Schmidt, T., and C. Rammer (2007). "Non-technological and technological innovation: Strange bedfellows? *ZEW Discussion Papers*, 07-052, (http://papers.ssrn.com/sol3/papers.cfm?abstract_id=1010301). December, 15, 2014.

UN, ESCAP (2009). *Globalization of Production and the Competitiveness of Small and Medium-sized Enterprises in Asia and the Pacific: Trends and Prospects. Studies in Trade and Investment*, 65. New York: United Nation.