Influence of internal and external relationships of foreign subsidiaries on innovation performance. Evidence from Germany, Czech Republic and Romania*

*Tomasz Gołębiowski, Małgorzata Stefania Lewandowska***

The paper assesses the influence of foreign-owned subsidiaries' (FS) intra- and inter-organizational relationships on product innovation performance. Data drawn from CIS figures for the 2006-2008 cover 1747 FS established in Germany, 385 FS in the Czech Republic, and 276 FS in Romania. Our analysis, employing the structural equation model, reveals a positive influence of FS internal relationships (with both local and foreign partners) and of FS external linkages on product and marketing innovation, the strongest in Germany-based FS. Moreover, a significant positive influence of FS internal relationships on external innovation cooperation is shown. Results suggest a relatively deeper embeddedness of Germany-based FS than of FS located in analysed transition economies.

Der Artikel beurteilt den Einfluss der internen und externen Auslandsniederlassungsbeziehungen auf die Produktinnovationsleistung. Die Daten wurden aus der CIS-Datenbank für die Jahre 2006-2008 gezogen und umfassen 1747 etablierte Auslandsniederlassungen in Deutschland, 385 in Tschechien und 276 in Rumänien. Die Analyse, die auf einem Strukturgleichungsmodell basiert, zeigt einen positiven Einfluss sowohl von internen Auslandsniederlassungsbeziehungen (mit lokalen und ausländischen Partnern) als auch von externen Verbindungen auf Produkt- und Marketinginnovationen. Dieser Einfluss ist in den in Deutschland ansässigen Tochtergesellschaften am stärksten. Außerdem wurde ein signifikant positiver Einfluss von internen Auslandsniederlassungsbeziehungen auf externe Innovationskooperationen gefunden. Die Forschungsergebnisse weisen auf eine verhältnismäßig stärkere interne und externe Einbettung von in Deutschland etablierten Tochtergesellschaften als von Auslandsniederlassungen, die in den untersuchten Transformationswirtschaften ansässig sind, hin.

Key words: foreign subsidiary, internal and external relationships, innovation cooperation, transition economies (JEL: D83; O32)

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1. Introduction

Intense competitive pressure to innovate and a rapid growth in the amount of knowledge available from numerous sources in the globalized economy are among the drivers that are changing firms' business models and their innovation processes. Multinational enterprises (MNE) have unique opportunities to generate, acquire and exchange knowledge both within MNE organizational structure and as result of MNE units' relationships with external partners.

The main objective of this paper is to analyze FS cooperation in product and marketing innovation with internal and external partners and to assess the influence of such cooperation on FS innovation performance. According to the available literature, FS innovation differs depending (i.e.) on the level of overall development and innovativeness of the host country, although little research exists regarding transition economies. Our analysis therefore includes an innovation leader (Germany), a moderate innovator (the Czech Republic), and a low performing innovator (Romania) − as ranked by the Innovation Union Scoreboard in 2008 (which remained unchanged in 2013).

The paper is organized as follows: the theoretical background and outcomes of studies on the influence of FS intra- and inter-organizational relationships on innovation performance is reviewed in section 2; our analytical methodology is described in section 3; and the results of that analysis are presented in section 4 and discussed in section 5.

2. Literature review and hypotheses development

2.1 Selected determinants of MNE/FS innovation

Factors explaining a firm's innovation activity and performance include, i.a., firm size, its absorptive capacity, external knowledge sourcing, product diversification, firm export orientation, and industry innovativeness. These standard variables also explain MNE and FS innovation practices (Damijan et al. 2010). Other factors suggested by the literature include the role of FS in MNEs, characteristics of the host country (such as the level of development, accessibility of valuable knowledge, and intensity of local competition), the heterogeneity of foreign investors (e.g., the type of foreign investor), and the heterogeneity of FS as related to the strategic motives of FDI, FS age, and foreign equity share (e.g. Kokko/Kravtsova 2008; Damijan et al. 2010).

Literature underlines the significance on innovation performance of a firm's internal innovation effort (e.g. its own R&D) and external sources of innovative solutions (Veugelers 1997; Frenz/Ietto-Gilles 2009). The importance of cooperation in innovation activities, and its positive impact on innovation performance have been analyzed (e.g. Biemans 1991; Love/Roper 2004; Bell 2005; Prahalad/

Krishnan 2008), and innovation networking has also found support in the concept of open innovation (Chesbrough 2003; Lichtenthaler 2011).

The competencies, diversity, and geographic dispersion of MNEs offer unique opportunities for both internal creation and external sourcing of knowledge leading to innovative solutions. The growing role of FS in that process, resulting from internal collaborative relationships within MNE networks and from MNE/ FS external collaborative linkages, has been highlighted in the literature. (Birkinshaw/Hood 1998; Ambos et al. 2006; Phene/Almeida 2008)

Internal (intra-organizational) relationships − FS linkages with the parent company (HQ) and sister subsidiaries within the same MNE enable the actors to access knowledge that fosters organizational learning and the transfer of innovations developed in the MNE network (Kogut/Zander 1992; Buckley/Carter 1999; Kumar/Ganesh 2009). Recently, most studies on FS linkages have focused on their *external (inter-organizational) relationships* (Yamin/Andersson 2011), i.e. linkages with independent business partners: suppliers, customers, competitors, independent R&D units, universities, governmental and local agencies, etc. The benefits of these relationships flow, i.e. from increased flexibility due to FS proximity to local partners and easier access to their technological and market knowledge that enhance FS innovation capabilities (Dunning/Lundan 2008).

In this study, FS size (reflecting scale and scope of a firm's activities and own innovative potential) is used to assess its direct influence on product and marketing innovation, as well as on internal and external collaborative relationships. It is assumed that larger firms (or FS) with greater heterogeneous resources and competencies have a higher absorptive capacity, i.e. the ability to recognize the value of, assimilate, and apply external knowledge commercially (Cohen/ Levinthal 1990), which positively affects innovation. Many studies have also underlined the fact, that large firms (or FS) having higher level of external knowledge absorption can achieve greater benefits from cooperation. Research shows a positive relationship between firm size and the propensity to cooperate (Tether 2002; Czarnitzki et al. 2007). In the above context we posit the following hypotheses:

> *FS size positively influences: product innovation performance (H1a); FS absorptive capacity (H1b); FS internal innovation cooperation (H1c); FS external innovation cooperation (H1d); and FS marketing innovation (H1e).*

A firm's absorptive capacity, usually measured in terms of R&D expenditures and capacities, is widely recognized as a determinant of innovation performance. This is consistent with Zahra and George's (2002:185) observation that absorptive capacity is ''a dynamic capability pertaining to knowledge creation and utilization that enhances a firm's ability to gain and sustain a competitive advantage.''Apart from valuing and assimilating external knowledge, greater R&D

capacity allows a firm to recognize new opportunities in the market (Cohen/ Levinthal 1994) and to better evaluate opportunities for collaborative R&D projects. The more the firm (FS) invests in R&D the better it is prepared to absorb external knowledge, including knowledge resulting from cooperation. This leads to the following hypotheses:

> *FS absorptive capacity posively influences: FS product innovation performance (H2a); FS internal innovation cooperation (H2b); and FS external innovation cooperation (H2c).*

2.2 FS collaborative relationships and their impact on innovation performance

Within MNE network the parent company − through incentives, coordination, and resource allocation decisions − is able to influence FS innovation activities while maintaining its role as provider and integrator of innovative solutions (Gupta/Govindarajan 2000; Buckley/Hashai 2009; Chiabuschi et al. 2012). However, FS are also increasingly involved with innovation processes, as much of the technological and market knowledge is affordable at the FS level (Rugman/Verbeke 2001; Gnyawali et al. 2009). FS contribution to an MNE's innovation processes builds up with the development of FS specialized capacities that are acknowledged by parent company as being superior in MNE, which are then leveraged across the MNE (Birkinshaw et al. 1998). FS capabilities and initiative in knowledge development are reflected in FS roles/mandates in innovation processes ranging from innovation adopter, local implementer/innovator up to a centre of excellence, and strategic leader with a world mandate (e.g. Gupta/Govindarajan 1991; Frost et al. 2002). Research suggests that FS contributions to innovation are primarily explained by its strategic role, and that competence-creating FS demonstrate higher levels of innovation performance (Giroud et al. 2012). The leading roles of FSs in innovation, in turn, result in the growing intensity of their internal cooperative relationships. It is generally assumed that intra-corporate innovation transfers positively affect the business activities of its recipients (e.g. Teece et al. 1997). Intra-organizational networks positively influence FS performance and are particularly important for underperforming FS (Gnyawali et al. 2009). Knowledge exchange between a parent company and FS positively impacts product innovation performance (Monteiro et al. 2008). Damijan et al. (2010) in their study on FS based in selected EU new member states revealed that FS with higher R&D expenditures and more transfers from MNE headquarters do more product innovations. Srholec (2009) in a study on innovation cooperation based on firm-data of from 12 EU member states (the 3rd wave of CIS) has revealed that FS show a higher propensity to cooperate with non-affiliated partners abroad than in their host countries, and prefer foreign collaboration partners located in less developed EU member states.

All this leads to the next hypothesis:

FS internal innovation cooperation with MNE units based in the host country (H3a), and with foreign actors (H3b) is positively related with FS product innovation performance.

The concept of firm embeddedness has been employed to emphasize the critical role of FS relationships with external (independent) actors as a driver of FS success and position in the MNE (Birkinshaw et al. 2005; Cantwell/Mudambi 2005). Embedded relationships are characterized by a larger number of functional areas of the firm that are involved with business partners, more adaptations made between the partners, a higher dependence on business partners, and the long-term importance of linkages, mutual commitment, and trust (Andersson et al. 2001; Forsgren et al. 2005). Many studies focus on the influence of FS external embeddedness on the development of FS capabilities and knowledge transfer needed for product and process innovations (Andersson et al. 2001; Boehe 2007; Schmid/Hartmann 2011). The literature suggests that an understanding of their host country's environment, coupled with the scope and features of local (external) embeddedness, result in enhanced FS competence development, innovation, and market performance (e.g. Mu et al. 2007; Schmid/Hartmann 2011). In this context we posit the next hypothesis:

H4. External innovation cooperation with suppliers, clients, competitors, consultants, universities and R&D institutes is positively related with FS product innovation performance.

Numerous studies indicate the complementarity between internal R&D and external technology sourcing (e.g. Belderbos et al. 2004; Caloghirou et al. 2004; Cassiman/Veugelers 2006; Schmiedeberg 2008). Studies on MNE networks reveal interdependencies between internal and external knowledge development, and interactions between FS internal and external collaborative relationships that lead to innovative solutions. Gammelgaard et al. (2012) in their study of FS based in developed economies revealed that increased external linkages increase internal collaborative relationships. They argue that external embeddedness is crucial in FS evolution, but establishing of internal embeddedness is also required, if FS intends utilize its resource-dependency power to improve its position in MNE. Moreover, increased absorptive capacity is necessary to assimilate and further diffuse externally gained knowledge.

Transition economies offer, in general, access to knowledge which is perceived as less valuable than knowledge accessible in developed economies. This reduces opportunities to enhance FS R&D mandates in CEE countries (Narula/Guimon 2010). As a result, CEE-based FS have to rely more on transfers of innovative product and process solutions from their parent firm than on innovation gained from external relationships in the host country. FS with stronger competencies in product and process innovation are, however, more independent in this

regard (Kokko/Kravtsova 2008), as they are better prepared to assimilate external knowledge. Taking this into account, we predict the following:

H5. FS internal innovation cooperation positively influences external innovation cooperation.

Compared to the extended research undertaken on R&D-related internal and external relationships, studies on marketing innovation cooperation in MNEs are virtually nonexistent. We argue that in MNEs that emphasize a global integration approach to marketing strategy, new marketing solutions are developed either at the headquarters level or result from internal cooperative linkages. By contrast, in MNE emphasizing local responsiveness, a FS's own initiative and extended external relationships (especially with host country partners) allow for the adaptation of FS marketing strategy to the host market environment. Various studies evidence the positive impact of marketing competencies and marketing innovation on firm performance (e.g. Day 1994; Singh 2004). Lokshin et al. (2008) have found a synergistic effect on product innovation of combined technological, marketing and organizational competencies. These findings support the literature indicating that by exploiting synergies between marketing and technological capabilities, firms gain a competitive advantage (Song et al. 2005; Tidd/Bessant 2009). We therefore hypothesize that:

Internal relationships with MNE units based in host country (H6a), and with foreign actors including MNE headquarters (H6b) positively influence FS marketing innovation.

H7. External relationships positively influence subsidiary's marketing innovation.

H8. FS marketing innovation positively influences product innovation performance.

3. Sample, methods and variables' operationalization

3.1. Sample characteristics

The analysis is based on firm level data from the Community Innovation Survey (CIS) for 2006-2008 from German (N=6027), Czech (N=6805) and Romanian (N=9632) small, medium and large firms from NACE 5-71.

A chi-squared analysis with column proportions (Bonferroni method) was applied to verify statistically significant differences between three subsamples (N=1747 FS in Germany, N=385 FS in the Czech Rep. and N=276 FS in Romania) of FS operating in the manufacturing sector. Within the refined samples 86 percent of FS located in Germany, 100 percent of FS in the Czech Republic, and 100 percent of FS in Romania introduced product innovation. Regarding process innovation, these numbers are 75, 82, and 89 percent, respectively. A high frac-

tion of FS introduced organisational innovation (45, 77, and 70 percent, respectively) or marketing innovation (50, 54, and 72 percent, respectively). The sample from which these results were obtained consists of 52, 5, and 22 percent (respectively) of small FS, 38, 28, and 45 percent (respectively) of medium-size FS, and 10, 6, and 33 percent (respectively) of large FS. See Table 1 for further details.

3.2. Methods applied

The structural equations modelling (SEM), examining the structure and strength of linear relationships between at least one independent variable and one or more dependent variables was used to assess the causal relationships between the variables.

The purpose of structural modelling is to best map reality. The SEM method is more accurate in the specification of hypotheses and operationalization of constructs. It also takes into account the reliability of hypotheses test measures in ways beyond the averaging of multiple measures of constructs, and guides exploratory and confirmatory research in a manner combining self-insight and modelling skills with theory. This approach often suggests novel hypotheses that were not considered. Additionally, SEM in contrast to other methods, estimates different hypotheses simultaneously (Henseler 2011).

Table 1: Foreign subsidiaries' characteristics in country cross-section

Foreign subsidiaries' characteristics		FS in Germany N=1747		FS in Czech Rep. N=385		FS in Romania N=276	
		N	%	N	%	N	%
Product innovation		1506	86.2b	385	100.0 a	276	100.0 a
Process innovation		1307	74.8b	317	82.3a	246	89.1c
Marketing innovation		881	50.4a	206	53.5a	199	72.1b
Organizational innovation		795	45.5b	296	76.9a	192	69.6a
FS size	Small	912	52.2b	19	4.9a	61	22.1c
	Medium	658	37.7b	108	28.1a	123	44.6b
	Large	177	10.1b	258	67.0a	92	33.3c
Technology level	Low technology	650	37.2b	70	18.2a	129	46.7c
	Medium/low technology	540	30.9a	132	34.3a	80	29.0a
	Medium/High tech.	557	31.9b	183	47.5a	67	24.3c

Target markets	Domestic market	1400	81.5a	326	84.7a	198	71.7b
	EU	1077	62.7b	361	93.8a	166	60.1b
	Other markets	756	44.0b	230	59.7a	76	27.5c
Internal cooperation	With sister FS in host country	108	6.2b	20	5.2a	3	1.1b
	With foreign MNE units	82	4.7b	25	6.55a	2	0.8c
External innovation cooperation with:	Suppliers	157	9.0b	173	44.9a	23	8.3b
	Clients or customers	265	15.2b	148	38.4a	15	5.4c
	Competitors	105	6.0b	67	17.4a	13	4.7b
	Consultants	86	4.9b	111	28.8a	12	4.3b
	Universities	283	16.2b	108	28.1a	6	2.2c
	Public research institutes	111	6.4a	36	9.4a	5	1.8b

Note: Each subscript letter denotes a subset of cluster categories whose column proportions (Bonferroni method) do differ significantly from each other at the .05 level.

Source: own calculations in SPSS 21based on the individual micro data from questionnaire CIS 2006-2008 for Germany, Czech Republic and Romania.

To establish a hierarchy of each variable's importance, an analysis of the critical values between parameters was applied. The hierarchical level was analysed using linear regression. The mediation effect was tested for significance test of the indirect effect of the independent variable on the dependent variable via the mediator (Sobel 1982).

The equation to estimate the dependent variables is as follows:

$$y_{InnoProdPerf} = \beta_{10} + \beta_1 ExtInnoCoop + \beta_2 IntInnoCoop + \beta_3 EntSize + \beta_4 AbsCap + \beta_5 InnoMark + \varepsilon_{InnoProdPerf}$$

$$y_{InnoMark} = \beta_{20} + \beta_1 ExtInnoCoop + \beta_2 IntInnoCoop + \beta_3 EntSize + \varepsilon_{InnoMark}$$

$$y_{ExtInnoCoop} = \beta_{30} + \beta_1 IntInnoCoop + \beta_2 EntSize + \beta_3 AbsCoop + \varepsilon_{ExtInnoCoop}$$

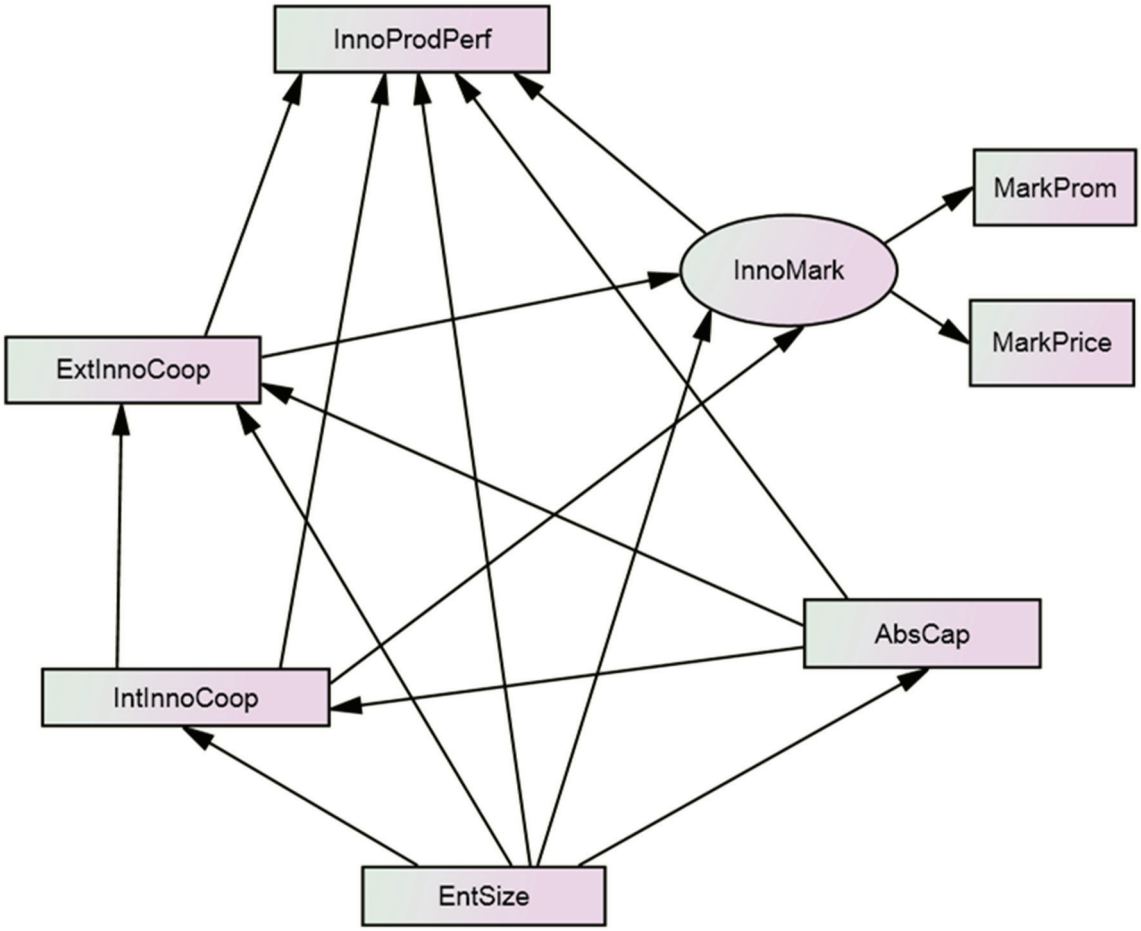
$$y_{IntInnoCoop} = \beta_{40} + \beta_1 EntSize + \beta_2 AbsCap + \varepsilon_{IntInnoCoop}$$

$$y_{AbsCap} = \beta_{50} + \beta_1 EntSize + \varepsilon_{AbsCap}$$

where β represents the estimated coefficients and ε the standard error.

A graphic presentation of the conceptual model of FS internal and external innovation cooperation, its determinants, and its impacts on product innovation performance is presented in Figure 1.

Figure 1: Conceptual model of FS internal and external innovation cooperation, its determinants and influence on product innovation performance



Source: own study.

3.3. Variables and their operationalization

Although numerous factors (both internal and external) influence FS innovation performance, the profile of the CIS data and the hypotheses tested by this paper determine the selection of dependent and independent variables. The indication for the introduction of product and/or process innovation was applied as a first filter variable. Another filter was the membership in foreign-based capital groups (MNE). The third filter is at least one indicator of the degree of FS's external innovation cooperation with host country actors. For a detailed description see Table 2.

Table 2: Description and construction of variables

Variable	Description and construction of variables
FSInnoAct	**Filter variable – "Capital Group Membership" and „FS Innovation Activity "**
„1" if a firm is a member of capital group; „0" otherwise and or „1" if the FS introduced product innovation; „0" otherwise and/or„1" if the FS introduced process innovation; „0" otherwise	
InnoProdPerf	**Dependent variable – „FS Product Innovation Performance"**
Fraction (varying from 0 to100%) of FS sales of products new to the market introduced in 2006-2008in total sales for 2008	
InnoMark	**Latent dependent variable – „FS Marketing Innovation"**
MarkProm	„1" if the FS introduced new media or techniques for product promotion (first time use of a new advertising media, a new brand image, introduction of loyalty cards, etc.); „0" otherwise
MarkPrice	„1" if the FS introduced new methods of pricing goods (first time use of variable pricing by demand, discounts systems, etc.); „0" otherwise
ExtInnoCoop	**Variable – "FS External Innovation Cooperation"**
ExtInnoCoo-Loc	Count if the declaration for: cooperation with host country actors (suppliers; clients; competitors; consultants; universities; research institutes)
ExtInnoCoo-pInt	Count if the declaration for: cooperation with international ountry actors (suppliers; clients; competitors; consultants; universities; research institutes)
IntInnoCoop	**Variable – "FS Internal Innovation Cooperation"**
IntInno-CooHost	Count if the declaration for: cooperation with other MNE units in FS host country
IntInnoCoop-Abroad	Count if the declaration for: cooperation with MNE units located abroad
AbsCap	**Variable – "FS Absorptive Capacity"**
Fraction (varying from 0 to100%) of FS in-house R&D spending in total sales for 2008	
EntSize	**Variable – "Size of the FS"**
"0" for a small firm; "1" for a medium size firm; "2" for a large firm	

Source: based on questionnaire CIS 2008 http://epp.eurostat.ec.europa.eu/portal/page/portal/microdata/cis

4. Research outcomes

Based on the data of FS located in Germany, the Czech Republic, and Romania, three structural models (for each respective country) of focal FS internal and external innovation cooperation, its determinants and influence on product innova-

tion performance, were built using the maximum matching estimation (AMOS 19 ML method).

All three models were fitted well to the data:

Germany: x^2 (5) = 7.86; p = 0.164; CMIN/DF = 1.571; CFI = 0.98; RMSEA = 0.018).

The Czech Republic: x^2 (5) = 8.08; p = 0.152; CMIN/DF = 1.617; CFI = 0.99; RMSEA = 0.040).

Romania: x^2 (5) = 9.72; p = 0.965; CMIN/DF = 0.194; CFI = 1.00; RMSEA = 0.000).

The standardized estimates for the depending paths and the hierarchy of relationships of variables are presented in Table 3.

Table 3: Standardized estimates for the structural model and hierarchy of variables in country cross-section

Variables			Standardized estimates and their statistical significance for FS based in:		
			Germany	Czech Republic	Romania
The hierarchy of the variables that determine Product Innovation Performance					
InnoProdPerf	<---	*EntSize* (**H1a**)	-0.063b**	0.086a	-0.079a
InnoProdPerf	<---	*AbsCap* (**H2a**)	0.028b	0.100a*	0.007b
InnoProdPerf	<---	*IntInnoCoop* (**H3**)	0.082b***	0.020b	0.074a
InnoProdPerf	<---	*ExtInnoCoop* (**H4**)	0.162a***	-0.102a	-0.017b
InnoProdPerf	<---	*InnoMark* (**H8**)	0.215a***	0.018b	0.110a
The hierarchy of the variables that determine Internal Innovation Cooperation					
IntInnoCoop	<---	*EntSize* (**H1c**)	0.043b**	0.105a*	0.078b*
IntInnoCoop	<---	*AbsCap* (**H2b**)	0.162a***	-0.024b	0.327a***
The hierarchy of the variables that determine External Innovation Cooperation					
ExtInnoCoop	<---	*EntSize* (**H1d**)	0.130b***	0.088b	0.010c
ExtInnoCoop	<---	*AbsCap* (**H2c**)	-0.042c	0.097b*	-0.153b***
ExtInnoCoop	<---	*IntInnoCoop* (**H5**)	0.312a***	0.438a***	0.964a***

The hierarchy of the variables that determine Marketing Innovation					
InnoMark	<---	*EntSize* (**H1e**)	0.049b	-0.149b*	-0.124a
InnoMark	<---	*IntInnoCoop* (**H6**)	0.116a*	0.198b**	-0.021b
InnoMark	<---	*ExtInnoCoop* (**H7**)	0.174a***	0.325a***	0.178a
Variables that determine Absorptive Capacity					
AbsCap	<---	*EntSize* (**H1b**)	0.086***	0.129*	0.149*
Marketing Innovation and different types of marketing innovation					
InnoMarkPro-mo	<---	*InnoMark*	0.452a***	0.643a***	0.701a***
InnoMarkPrice	<---	*InnoMark*	0.372b***	0.631a***	0.654a*

Note: Significance at: ***p< 0,001, **p<0,01, * p<0,05.

Each subscript letter denotes a subset of cluster categories whose column proportions (Bonferroni method) do differ significantly from each other at the .05 level.

Source: own calculations in AMOS 21.

When analysing the hierarchy of explanatory variables for product innovation performance of focal FS located in Germany, it was revealed, that the best predictor was the introduction of marketing innovation (*InnoMark*), which allowed for a significantly better explanation of the variance of the dependent variable than external innovation cooperation (*ExtInnoCoop*) and internal innovation cooperation (*IntInnoCoop*). FS size (*EntSize*) has a significant but adverse influence on product innovation performance of focal FS in Germany. In FS located in the Czech Republic, FS absorptive capacity (*AbsCap*) was the only variable significantly and positively explaining the variance of product innovation performance. As for FS established in Romania, the influence of all variables on product innovation performance was insignificant.

H1a suggesting a positive influence of FS size on product innovation performance, was rejected for FS located in all countries. The positive and significant influence of FS size on the variance of absorptive capacity (**H1b)** was confirmed in all countries. The analysis revealed that FS absorptive capacity is significantly and positively related with product innovation performance (**H2a**) only in FS based in the Czech Republic**.**

Linear regression models were built to investigate the impact on product innovation performance of FS internal innovation cooperation with other MNE units based in the host country (**H3a**) as compared to those located abroad (**H3b**). The analysis of FS based in Germany confirmed, that both internal cooperation with local MNE units (Beta = 0.16; p < 0.001) as well as with MNE units located abroad (Beta = 0.04; p = 0.068) are positively related with product innovation performance (p< 0.001). Moreover, FS internal cooperation with other MNE

units located in the host country has a significantly higher impact on product innovation performance than internal innovation cooperation with MNE units located abroad.

For FS based in the Czech Republic the regression was not statistically significant ($p > 0.05$). For FS located in Romania it was observed, that together with internal cooperation with MNE units located abroad (Beta = 0.142; $p < 0,01$), the level of product innovation performance rises, whereas it declines together with cooperation with MNE units located in the FS host country (Beta = - 0.249; = 0,061). Thus, **H3a** was supported only for FS located in Germany, whereas **H3b** was supported for FS based only in Romania. See Table 4 for details.

Table 4: The impact of FS internal innovation cooperation with MNE units in FS host country and with MNE units located abroad on product innovation cooperation of focal FS

Internal innovation cooperation		Beta	Tolerance	VIF
DE	With other MNE units in FS host country	0.161***	0.949	1.054
	With MNE units located abroad	0.044t	0.949	1.054
CZ	With other MNE units in FS host country	-0.013	0.900	1.111
	With MNE units located abroad	0.005	0.900	1.111
RO	With other MNE units in FS host country	-0.249[t]	0.203	4.928
	With MNE units located abroad	0.352**	0.203	4.928

Note: Significance at: ***p< 0,001, **p<0,01, * p<0,05.

t- relation at the level of statistical tendency (p=0.055).

Source: own calculations in SPSS 21.

Regression models were also built to explain the impact of various external innovation cooperation partners on FS innovation performance. The resulting analysis has shown that both the host country and foreign actors (except for foreign government and public research institutes) play an important and significant role as FS partners in Germany**.** For FS based in the Czech Republic, international consultants and private R&D institutes played a significant role as external cooperation partners, whereas the role of host country universities as well as foreign clients was identified only at the level of statistical tendency. See Table 5 for details.

Table 5: Regression models for external cooperation in country cross-section

External cooperation partners		Beta	Tolerance	VIF
DE	Suppliers of equipment, materials or software (nat.)	0.097a***	0.848	1.180
	Suppliers of equipment, materials or software (internat.)	0.064a***	0.848	1.180
	Clients or customers (nat.)	0.147a***	0.723	1.384
	Clients or customers (internat.)	0.049b**	0.723	1.384
	Competitors or other enterprises in your sector (nat.)	0.069a***	0.895	1.117
	Competitors or other enterprises in your sector (internat.)	0.081a***	0.895	1.117
	Consultants, commercial labs, private R&D institutes (nat.)	0.058a***	0.922	1.084
	Consultants, commercial labs, private R&D institutes (internat).	0.084a***	0.922	1.084
	Universities or other higher education institutions (nat.)	0.161a***	0.857	1.166
	Universities or other higher education institutions (internat.)	0.077b***	0.857	1.166
	Government or public research institutes (nat.)	0.206a***	0.851	1.175
	Government or public research institutes (internat.)	-0.028b*	0.851	1.175
CZ	Suppliers of equipment, materials or software (nat.)	0.024a	0.878	1.139
	Suppliers of equipment, materials or software (internat.)	0.006a	0.878	1.139
	Clients or customers (nat.)	-0.014b	0.825	1.212
	Clients or customers (internat.)	0.047a^{t}	0.825	1.212
	Competitors or other enterprises in your sector (nat.)	0.009a	0.887	1.127
	Competitors or other enterprises in your sector (internat.)	0.022a	0.887	1.127
	Consultants, commercial labs, private R&D institutes (nat.)	0.028a	0.913	1.096
	Consultants, commercial labs, private R&D institutes (internat).	0.048a*	0.913	1.096
	Universities or other higher education institutions (nat.)	0.044a^{t}	0.933	1.071
	Universities or other higher education institutions (internat.)	0.026a	0.933	1.071
	Government or public research institutes (nat.)	0.022a	0.980	1.020
	Government or public research institutes (internat.)	0.003a	0.980	1.020

RO	Suppliers of equipment, materials, or software (nat.)	0.058a	0.840	1.190
	Suppliers of equipment, materials, or software (internat.)	-0.018a	0.840	1.190
	Clients or customers (nat.)	-0.010a	0.819	1.222
	Clients or customers (internat.)	0.024a	0.819	1.222
	Competitors or other enterprises in your sector (nat.)	0.032a	0.886	1.129
	Competitors or other enterprises in your sector (internat.)	-0.012a	0.886	1.129
	Consultants, commercial labs, private R&D institutes (nat.)	0.003a	0.883	1.132
	Consultants, commercial labs, private R&D institutes (internat).	-0.072a	0.883	1.132
	Universities or other higher education institutions (nat.)	0.018a	0.883	1.132
	Universities or other higher education institutions (internat.)	-0.011a	0.883	1.132
	Government or public research institutes (nat.)	0.034a	0.948	1.054
	Government or public research institutes (internat.)	0.017a	0.948	1.054

Note: Significance at: ***p< 0,001, **p<0,01, * p<0,05 Each subscript letter denotes a subset of cluster categories whose column proportions (Bonferroni method) do differ significantly from each other at the .05 level. t-relation at the level of statistical tendency (p=0.055).

Source: own calculations in SPSS 21.Thus, hypothesis **H4**, indicating a positive relation between external innovation cooperation and product innovation performance, was supported for all actors for FS based in Germany and only for consulting firms in the Czech Republic.

A positive influence of marketing innovation on product innovation performance (**H8**) was revealed only for FS based in Germany.

The analysis of hierarchy of explanatory variables explaining internal innovation cooperation (*IntInnoCoop*) has shown that the level of absorptive capacity allows for a significantly better explanation of internal innovation cooperation (**H2b**) than FS size for FS based in Germany and in Romania. **H2b** was supported for FS located in those countries but rejected for FS located in the Czech Rep. Hypothesis **H1c** suggesting the positive influence of FS size on FS internal innovation cooperation was supported for all country models. See Table 3 for details.

Internal innovation cooperation appeared to be the best predictor of the variance of external innovation cooperation **(***ExtInnoCoop*) for all FS under study. The analysis revealed the significant, positive influence of FS internal innovation cooperation on external innovation cooperation of focal FS located in all investigated countries (**H5** has been supported). The positive influence of FS absorp-

tive capacity on external innovation cooperation (**H2c**) was revealed for FS located only in the Czech Rep., whereas for FS based in Romania the negative influence of absorptive capacity on FS external innovation cooperation was identified. Moreover, the analysis has supported the hypothesis **H1d** suggesting a positive influence of FS size on external innovation cooperation but only for FS based in Germany. For FS located in the Czech Republic and in Romania, this hypothesis was rejected as the influence, though positive, was not significant.

Structural equation models have also revealed a variance for local FS based in Germany and in the Czech Republic concerning the introduction of marketing innovation is better explained by external innovation cooperation (**H7**), than by internal innovation cooperation (**H6**). **H6** and **H7** were supported for FS based in Germany and in the Czech Republic. Hypothesis **H1e** suggesting the positive influence of firm size on marketing innovation, was rejected for all countries.

The variance of latent dependent variable "Marketing Innovation" was in all cases better explained by promotion innovation than by price innovation. Table 6 presents a summary of hypotheses verification.

5. Discussion and concluding remarks

Our focus was to assess the direct and indirect influence of selected firm-specific factors, as well as its internal and external relationships on foreign subsidiary product innovation performance in countries that differ in their level of economic development and overall innovativeness (as described by the Innovation Union Scoreboard). A general observation supported by our study is that numerous modelling factors (independent variables) positively, and more significantly, influence product innovation performance of FS located in Germany than FS in the two less innovative CEE transition economies. This confirms results of other studies (see e.g. Kokko/Kravtsova 2008; Damijan et al. 2010; Dellestrand/Kappen 2012), suggesting that the differences in overall economic development and innovativeness levels among FS host countries affect knowledge transfer and innovation activities of FS, although those factors cannot be viewed as the only ones that explain FS innovation activity (see: research limitations).

As to the influence of the FS-specific characteristics, we revealed that FS size has a positive influence on FS absorptive capacity and on FS internal innovation cooperation in all surveyed countries. Using Fisher's r-to-z transformation, we demonstrated that there are no differences between analysed countries in terms of strength of this influence.

Table 6: Hypotheses verification – a summary

Hypothesis	Germany	Czech Republic	Romania
H1a. FS size positively influences FS product innovation performance.	(-)**	NS	NS
H1b. FS size positively influences FS absorptive capacity.	(+)***	(+)*	(+)*
H1c. FS size positively influences internal innovation cooperation	(+)**	(+)*	(+)*
H1d. FS size positively influences external innovation cooperation	(+)***	NS	NS
H1e. FS size positively influences FS marketing innovation.	NS	(-)*	NS
H2a. FS absorptive capacity positively influences product innovation performance.	NS	(+)*	NS
H2b. FS absorptive capacity positively influences internal innovation cooperation.	(+)***	NS	(+)***
H2c. FS absorptive capacity positively influences external innovation cooperation.	NS	(+)*	(-)***
H3**.** FS internal innovation cooperation with MNE units based in host country (H3a), and with foreignactors (H3b) is positively related withFS product innovation performance.	(+)*** with other MNE units in FS host country	NS	(+)** with MNE units located abroad
H4. External innovation cooperation with suppliers; clients; competitors; consultants; universities; research institutes is positively related with FS product innovation performance.	(+)*** For all actors	(+)* For consultants	NS
H5. FS internal innovation cooperation positively influences external innovation cooperation.	(+)***	(+)***	(+)***
H6. Internal innovation cooperation with (H13a) host country actors; with (H13b) foreign actors positively influences FS marketing innovation.	(+)*	(+)**	NS
H7. External innovation cooperation positively influences FS marketing innovation.	(+)***	(+)***	NS
H8. Marketing innovation positively influences product innovation performance.	(+)***	NS	NS

Note: Significance at: ***p< 0,001, **p<0,01, * p<0,05; (+) positive effect of the variable; (-) negative effect of the variable. NS – Non-significant relation.

However, we did not find that FS size positively influenced product innovation performance in FS located in the Czech Republic and Romania. This observation is in line with outcomes of earlier studies by Damijan et. al. (2010), of EU new member states. Somewhat surprisingly, we revealed an adverse relationship between FS size and product innovation performance in Germany-based FS. We found that absorptive capacity (own R&D) has a direct positive influence on product innovation performance only in FS based in the Czech Republic. This may result from the relatively higher share of larger FS, and the higher fraction of FS coming from medium and high technology level industries, in the Czech sample as compared to other country samples.

As to the influence of FS innovation cooperation on product innovation performance (the focus of our study) we revealed a significant positive influence of internal relationships with both local and foreign partners, as well as of FS external linkages on product innovation only in Germany-based FS. External linkages with all cooperation actors, located both in the host country and abroad, directly influenced product innovation performance of Germany-based FS and also strengthened the relationship between internal cooperation and FS innovation performance. These results suggest a relatively stronger and more effective internal and external embeddedness of FS in Germany as compared to FS located in the two examined CEE transition economies.

Analysis of FS located in Romania (the least innovative country in our sample) revealed a positive and significant influence of FS absorptive capacity on internal innovation cooperation with MNE units located abroad, and a negative influence of FS absorptive capacity on external innovation cooperation. In this context, the positive influence of FS cooperative links with MNE units located abroad on FS innovation performance may suggest that Romania-based FS have closer links with other MNE units (including HQ) than with external actors based in Romania, as a consequence of the low attractiveness of local partners.

These research outcomes are in line with the results of studies suggesting that knowledge transfer is more extensive between actors that offer valuable knowledge (Ambos et al. 2006; Johansen 2007; Phene/Almeida 2008). Moreover, the knowledge available in less advanced, i.e. transition economies is perceived as less valuable than knowledge that flows from developed economies (Ambos et al. 2006). This may prevent FS based in less developed host countries from deep local (external) embedding, or at least in some dimensions of embedding, e.g., technological embedding. On the other hand, it encourages FS to maintain extended linkages within MNE networks (Srholec 2009).

It is important to note, that the significant positive influence of internal innovation cooperation on external innovation cooperation for FS in all surveyed countries was disclosed, which may support the argument that knowledge accumulat-

ed due to internal linkages is necessary for further assimilation and diffusion of externally gained knowledge, and for strengthening FS position within an MNE.

A significant positive influence of FS external relationships on marketing innovation in FS in Germany and the Czech Republic, and a weaker influence of FS internal relationships on marketing innovation in these countries, may suggest that those FS are more independent as far as marketing strategy and innovative marketing are concerned, and evidence an increased effectiveness of new marketing solutions developed in cooperation with host country partners. A significant positive influence of FS marketing innovation on product innovation in Germany-based FS may suggest that these FS are able to exploit synergies between product innovation and innovative marketing solutions better than FS based in the CEE countries examined.

In our view, this research has enhanced the knowledge on influence of FS internal and external relationships on FS product innovation performance in different host country innovation environments. Moreover, we highlighted the less investigated issue of FS marketing innovation cooperation and its impact on product innovation performance.

The general conclusion from the study is that the relatively lower attractiveness of CEE transition economies as a potential source of knowledge will continue to discourage MNE/FS engagement in deeper innovation cooperation with local partners in the years to come. However, cooperation in various areas of innovation activities (not only R&D-related) should be encouraged to leverage the innovative capabilities of potential relationships between actors, and unexplored opportunities resulting from cooperation-related synergies.

It should be noted that our study was based on representative samples of small, medium, and large manufacturing FS from surveyed countries. The structural equation models based on these samples reveal a high convergence with the empirical data; thus the presented results substantially reflect FS business practices. Taking into account our research objectives, we are aware of the limitations caused i.a. by the structure of the CIS data, such as a lack of information on the strategic motives of MNE for FDI, FS age, the forms of FDI, the share of foreign equity, the levels of FS autonomy, FS dominant value-creation activities, and the lacking information on qualitative dimensions of FS relationships that are necessary to more fully assess the depth of FS embeddedness. Studies on innovation performance of FS located in CEE transition economies based on other data sources prove, for instance, that the market and efficiency seeking as predominant motives for FDI in this region result in lower intensity of technological innovation activities of FS located in CEE transition economies as compared to economies with higher developed EU member states, including Germany (e.g. Günther et al. 2010). Morschett/Schramm-Klein (2011) revealed that efficiency seeking FS located in CEE countries seem to be more successful, and

the high-performing FS realize more complete value chains. Those FS are tightly integrated with their MNEs. Knowledge flows from HQ to FS prevails over FS to HQ flows, and knowledge sharing with peer subsidiaries is less significant. It is worth noting that the studies on firm innovation prove the significance of multiple sources of knowledge development and innovation; R&D is not the only source of innovation for firms (Mairesse/Mohnen 2010). This is particularly the case for firms in low- and medium tech industries, for which non-R&D activities such as technology acquisition and the use of modern machinery, organizational innovation, and marketing are significant sources of innovative solutions (Potters 2009; Santamaria et al. 2009). Research also shows the interrelationships between process and product innovation and positive influence of process innovation on product innovation (Raymond/St-Pierre 2010). On the other hand, especially for SMEs in low-tech, mature industries the significance of product innovation for a firm's performance seems to be lower as compared to process innovation (see, e.g. Kirner et al. 2009 study of low tech firms in Germany). As the share of low- and medium tech industries in CEE transition economies is relatively high, these factors also influence the MNE/FS innovation strategies in this region and affect FS collaborative practices.

Therefore, in future studies additional variables should be included in models explaining the various determinants and dimensions of internal and external FS relationships and their impact on FS innovation performance.

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