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Úvodné slovo

Vznik a rozvoj akejkoľvek zmysluplnej veci či činnosti sa často spája s problémami, ale aj novými výzvami a myšlienkami. Začiatok a následný kvalitatívny progres medzinárodného vedeckého časopisu E+M Ekonomie a Management je nepochybne spätý s osobnou angažovanosťou a erudovanosťou doterajšej šéfredaktorky doc. Dr. Ing. O. Hasprovej, ktorej by som chcela týmto vyjadriť poďakovanie. Práve ona sa výrazne pričinila o to, aby sa medzinárodný vedecký časopis E+M Ekonomie a Management zaradil medzi uznávané a vyhľadávané časopisy, ktoré prinášajú nové, originálne vedecké poznatky. Koordinácia činnosti členov medzinárodnej redakčnej a vedeckej rady, ale aj ďalších pracovníkov, ktorí sa starajú o technickú stránku časopisu a rast jej kvality nie je ľahká. O to viac si vážim dôveru členov redakčnej rady, ktorú mi dali ako novej šéfredaktorke. Spolieham sa na ich otvorenosť, náročnosť a kritickosť, s ktorou som sa stretla počas doterajšej práce ako členka redakčnej rady. Uľahčením výkonu tejto zodpovednej pozície sú doterajšie výsledky, kvalita autorských príspevkov, zodpovedná práca recenzentov, ale aj pozitívne ohlasy čitateľov a pozícia časopisu v náročnom konkurenčnom prostredí uznávaných medzinárodných vedeckých časopisov registrovaných v databázach. Chcem zaželať všetkým svojim kolegom – členom redakčnej i vedeckej rady, technickým spolupracovníkom, ale aj prispievateľom a čitateľom – priaznivú a tvorivú atmosféru, sústavný nepokoj v „duši“ vedca, bohatstvo poznatkov, ktoré si možno vzájomne odovzdať aj zásluhou nášho, vedeckého časopisu E+M Ekonomie a Management, o zvyšovanie kvality a uznania ktorého sa budem starať v najbližších troch rokoch ako šéfredaktorka.

Foreword

The emergence and development of any meaningful things or activities are often not only associated with problems, but also with new challenges and ideas. The beginning and subsequent qualitative progress of the international scientific journal E&M Economics and Management is undoubtedly linked with personal involvement and erudition of the previous editor-in-chief Olga Hasprová, who I would like to thank in this place. She was the one who urged the international scientific journal E&M Economics and Management to be ranked among the most recognized and popular magazines that bring new, original scientific knowledge. Coordination of activities of members of the international scientific and editorial board, as well as other workers who take care of the technical part of the magazine and increase its quality is not easy. The more I appreciate the confidence of the members of the editorial board given to me as a new editor. I rely on their openness, complexity and criticality which I encountered during my previous work as a member of the editorial board. The results so far, the quality of contributions, responsible work of reviewers, as well as a positive feedback from readers of the magazine and position in a challenging competitive environment of the internationally recognized scientific journals listed in databases make it easier to do such a responsible work. I wish all my colleagues – as well as members of the editorial and scientific board, technical collaborators, but also contributors and readers – a favourable creative atmosphere, continuing unrest in the "soul" of a scientist, wealth of knowledge that we can give to one another also thanks to the scientific journal E&M Economics and Management, whose quality and recognition I will take care of in the next three years as an editor.

prof. Ing. Mária Uramová, PhD.
šéfredaktorka
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PŘÍČINY NEKONVERGENCE BÝVALÉ NDR

Luděk Kouba, Hana Křížová

Úvod

Transformace bývalé NDR zůstává fenoménem, který nadále čeká na své náležité vysvětlení. V roce 1990 panovalo všeobecné přesvědčení, že Východní Německo bude světlou výjimkou mezi středoevropskými postsocialistickými ekonomikami, která hladce překoná nástrahy transformace a rychle se stane součástí vyspělé západní Evropy. Předpoklady pro úspěšnou konvergenci se zdály být jednoznačné: Východní Německo bylo nejvyspělejší zemí bývalého Sovětského bloku; disponovalo dlouhou tradicí ekonomické i kulturní sounáležitosti se Západem, jakou se nemohla pochlubit žádná z dalších transformujících se zemí; a zcela jedinečnou výhodou se jevila být existence štědrého donátora a garanta reforem – sesterské Spolkové republiky.

V roce 2010 ovšem nezbývá než konstatovat, že dvě desetiletí trvající konvergenční proces přinesl trpké rozčarování. Bývalá NDR zůstává v řadě důležitých charakteristik, jak dokumentuje první část tohoto příspěvku, hluboko za očekáváním i situací ostatních zemí středoevropského regionu. Klíčová otázka tedy zní, jaké jsou příčiny nekonvergence bývalé NDR? Či ještě lépe, proč tato nekonvergence přetrvává tak dlouho? V literatuře pochopitelně nalezneme řadu faktorů, které přispěly k neuspokojivému vývoji uplynulých dvou dekád; jejich přehled nabízí druhá část příspěvku. Podle našeho názoru však nelze pomocí konvenčně uváděných, úzce ekonomických faktorů zdůvodnit onu dlouhodobost poklesu ekonomické aktivity v nových spolkových zemích. Původní vysvětlení, které předkládáme ve třetí části příspěvku, vychází z myšlenek představitele nové institucionální ekonomie Douglase Northa a spočívá v nekompatibilitě formálních a neformálních institucí (tzn. institucionální a právní rámec vs. způsob myšlení, tradice, systém hodnot atd.). Obecný transformační problém nekompatibility západních formálních institucí a východních neformálních institucí umocnila v případě Východního Německa jednak bezprecedentní rychlost transferu formálních institucí ze Západu, jednak sociálně-psychologické determinanty neformálních institucí, specificky působící pouze v bývalé NDR.

Cílem příspěvku je dokumentovat neúspěšný proces konvergence bývalé NDR a nabídnout vysvětlení, proč tato faktická nekonvergence přetrvává již dvě desetiletí.

1. Průběh (ne)konvergence nových spolkových zemí

1.1 HDP na obyvatele, fenomén transferových plateb a národní důchod

Dvacet let po sjednocení zůstává ekonomika východního Německa stále vzdálená západoněmecké úrovni. Podíváme-li se na základní ukazatel reálné konvergence, HDP na obyvatele dosahoval v roce 2008 ve starých spolkových zemích 32.231 €, zatímco v nových spolkových zemích (bez Berlína) pouze 22.130 € [20]. Lze tedy konstatovat, že zaostávání východu za západoněmeckou úrovní činí i nadále cca 31 %. Obr. 1 ukazuje, že hodnota HDP na obyvatele se mezi lety 1995 a 2009 přiblížila starým zemím o pouhých 4,3 % (z rozdílu 40,1 % na 35,8 %). Pokud by dosavadní dynamika konvergence pokračovala i do budoucna, bylo by možné očekávat sblížení hodnot západní a východní části Německa nejdříve kolem roku 2040.

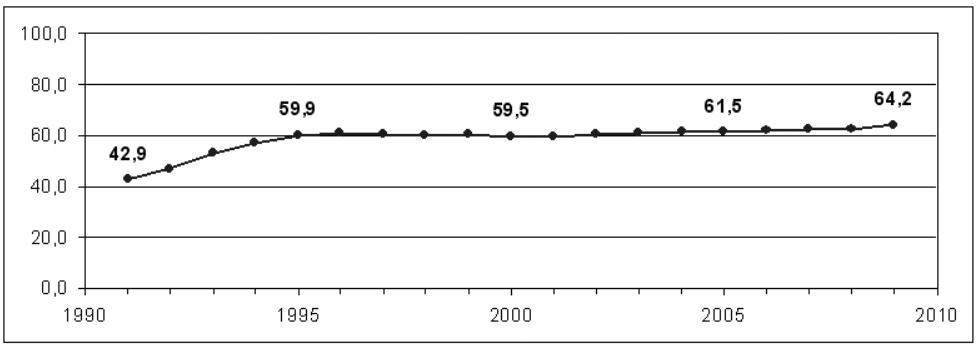
Navíc je nutné dodat, že v pozadí reálné konvergence bývalé NDR stojí trvalý úbytek obyvatelstva v nových spolkových zemích. Kühn [20] uvádí, že v období 2000 až 2005 se na vykazovaném růstu HDP na obyvatele podílel pokles počtu obyvatel dokonce 44 procenty.

Protože politicky determinovaná výše spotřeby v nových spolkových zemích od počátku transformačního a integračního procesu trvale převyšovala úroveň ekonomického výstupu, bylo nutné tento rozdíl pokrýt z vnějších zdrojů.

Finanční pomoc federální vlády ve formě jednosměrných transferů ze západních spolkových zemí na východ se stala jedním ze symbolů transformace ekonomiky bývalé NDR. Jedním z důsledků je odlišná výše ukazatelů hrubý domácí produkt a národní důchod.

Výše transferů v průběhu transformace postupně rostla z cca 100 mld. marek v roce 1990 na 150 mld. v roce 1994. Süppel a Rother [40, s. 377] uvádějí, že tyto sumy byly dále doplňovány přílivem soukromého kapitálu ve výši 50–60 mld. marek. Při vyjádření v eurech činila výše hrubých transferů 71 mld. v roce 1991 a trvale rostla až na 116 mld. v roce 2003. Pohybovala se tedy stabilně kolem 4 % německého HDP [23, s. 35].

Obr. 1: HDP na obyvatele; staré vs. nové spolkové země (staré země bez Berlína = 100)



Zdroj: Statistisches Bundesamt Deutschland [39]

Přitom je třeba upozornit, že pojem hrubé transfery představuje úhrnnou částku směřující z federálního rozpočtu do východních zemí. Busch a Müller [5] rozlišují tuto úhrnnou sumu na transfery všeobecné (dané větší rozlohou země a větším počtem obyvatel, což generuje vyšší požadavky na činnost vlády) a specifické (přímo spojené s transformačním a integračním procesem východoněmecké ekonomiky). Autoři tvrdí, že výše specifických transferů je výrazně nižší, což znamená, že přímo vyčíslené náklady transformace nejsou tak vysoké, jak se obvykle uvádí. Potřebu transferových plateb argumentuje např. Lehmann a kol. [22]. Podobně Mai [24, s. 7–8] nevidí výši transferů jako přehnanou; zmiňuje, že západní Německo za svoji podporu získá dodatečné odbytiště pro své výrobky, což přispívá k hospodářskému růstu a poklesu nezaměstnanosti.

Postupem času ovšem stále více sílí kritika transferových plateb, a to především v otázce způsobu jejich využití. Busch a Müller [5] považují za klíčový problém východoněmecké ekonomiky skutečnost, že z celkové výše transferů tvoří dominantní podíl výdaje přímo podporující spotřebu; podíl transferů určených na rozvoj produkční schopnosti ekonomiky vyčíslují na pouhých 20 % celkové částky. Výše transferů a zejména jejich struktura výrazně přispěly k zakonzervování negativních trendů zděděných z prvotní fáze transformačního procesu. Negativní dopady na pracovní trh nových spolkových zemí popisují např. Merkl a Snower [26].

Kritizovaná struktura transferových plateb se nicméně promítá do skutečnosti, že životní úroveňvýchodních Němců, měřená ukazovatelem reálný disponibilní důchod, je dlouhodobě znatelně vyšší, než jak ukazuje tradičně používaný ukazatel HDP na obyvatele.

Tab. 1: Reálný disponibilní osobní důchod za měsíc 1990–2008 (€, %)

	1990	1992	1997	2002	2007	2008
staré spolkové země (Eura)	1 343	1 351	1 373	1 478	1 461	1 444
nové spolkové země (Eura)	835	935	1 137	1 222	1 162	1 149
% západoněmecké úrovně	62,2	69,2	82,8	82,7	79,5	79,6

Zdroj: Goebel a kol. [11]

Jak uvádějí Goebel a kol. [11], rychlá konvergence tohoto ukazatele probíhala do roku 1997, kdy nové spolkové země dosáhly téměř 83 % západoněmecké úrovně. I tento ukazatel však vypovídá, že ve druhé polovině 90. let se konvergenční proces v podstatě zastavil. Pozoruhodné je, že v roce 2008 disponibilní důchod obyvatel východních zemí dokonce relativně poklesl pod 80% úroveň západních zemí.

1.2 Strukturální konvergence

V momentu sjednocení existovaly v ekonomické struktuře obou německých států obrovské rozdíly. V bývalé NDR byly výrazně zanedbané sektory charakteristické pro vyspělé západní ekonomiky jako zpracovatelský průmysl (pouze 40% podíl na tvorbě přidané hodnoty v porovnání se SRN, viz Röhl [36], finanční sektor nebo obchod a doprava. Naopak výrazně naddimenzovaná byla, podobně jako v ostatních centrálně plánovaných ekonomikách, odvětví primárního sektoru – těžební průmysl, energetika, zemědělství a lesnictví (250–300% podíl na tvorbě přidané hodnoty oproti SRN).

Podíváme-li se na současnou ekonomickou strukturu nových spolkových zemí hrubou optikou, je zřejmé, že ekonomika východní části Německa se z centrálně plánované ekonomiky sovětského typu stala kapitalistickou tržní ekonomikou: podíl zpracovatelského průmyslu na přidané hodnotě se blíží 80 % západoněmeckého podílu, finanční služby 85 % [36]. Naopak význam primárního sektoru se významně snížil, byť i vzhledem ke geografickým faktorům zůstává oproti Západu na vyšší úrovni.

Zcela specifickým vývojem prošlo v uplynulých 20 letech východoněmecké stavebnictví. Jak popisuje např. Tesch [41], v první polovině devadesátých let vykazovalo stavebnictví mimořádný boom, od té doby se ale objem výstavby výrazně zpomaluje. Tento vývoj byl do značné míry předurčen investicemi do zanedbané infrastruktury, které směřovaly na východ z veřejných rozpočtů SRN. Nepřiměřeně velký podíl stavebnictví na přidané hodnotě v první polovině devadesátých let kritizuje Dale [7], který považuje tento faktor za indikátor ekonomiky závislé na transferech. Tesch [41] také zmiňuje, že postupné omezování výstavby negativně ovlivňovalo zaměstnanost: v roce 1996 pracovalo ve východoněmeckém stavebnictví 1,2 mil. zaměstnanců, v roce 2003 už pouze 0,8 mil. zaměstnanců.

Budeme-li zkoumat strukturální konvergenci nových spolkových zemí důkladněji, zjistíme, že ke skutečně vyspělé tržní ekonomice má bývalá NDR stále daleko. Vedle výše uvedených údajů spočívá patrně nejvýznamnější rozdíl v nízkém stupni rozvoje tzv. znalostní ekonomiky. Röhl konstatuje, že [36, s. 8] „přes významné strukturální pokroky zůstávají stále deficity v oblastech zpracovatelského průmyslu náročných na technologii a služeb s vysokou úrovní znalostí". Podíl ve zmíněných oblastech důležitých pro regionální sílu hospodářství tvoří ve starých zemích 31 % zaměstnaných povinných platit sociální pojištění, v nových zemích je to o 10 % méně. Podrobnější srovnání nabízí následující tabulka.

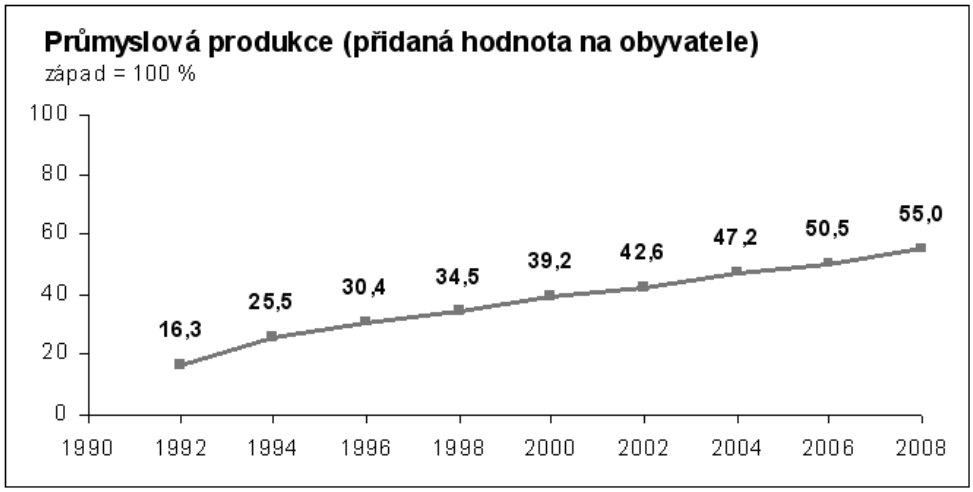
Tab. 2: Podíl zaměstnaných povinných k sociálnímu pojištění v procentech na všechny zaměstnané

	staré země	nové země
obory špičkové techniky (např. zdravotnická, řídící, data zprac. technika)	2,5	1,8
obory vysoké technologie (např. v chemickém průmyslu, strojírenství)	11,2	5,4
služby s vysokou úrovní znalostí	17,3	14,4
Celkem	**31,0**	**21,6**

Zdroj: Röhl [36]

Draheim [8] vidí jako hlavní problémy východoněmeckého hospodářství nízkou exportní kvótu a malou průmyslovou přidanou hodnotu. Tvrdí, že technický pokrok je sice důležitý, ale materiálním a ekonomickým základem hospodářství je průmysl. S průmyslovými centry roste doprava, obchod a služby spojené s podnikáním. Vysoká úroveň exportu znamená vysoký produkční potenciál, který pak ovlivňuje zaměstnanost, investice a HDP. Autor uvádí, že v roce 2003 podíl exportu na HDP byl ve starých zemích 39 %, v nových zemích 19 %. Exportní kvóta byla v tomtéž roce ve starých zemích 33,5 %, v nových zemích 14 % – tato hodnota patřila k nejmenším v Evropské unii. Rovněž vývoj přidané hodnoty v průmyslu zůstává nadále hluboko pod západoněmeckou úrovní.

Obr. 2: Vývoj průmyslové produkce v nových spolkových zemích 1992–2008 (%)



Zdroj: IG Metall [16]

Mluvíme-li o struktuře východoněmecké ekonomiky a jejím přibližování západoněmecké, je nutné zmínit také rozdílnou strukturu podniků na základě velikosti. V západním Německu pracuje mnohem více lidí ve velkých podnicích. Podíl podniků dané velikostní třídy v nových a starých zemích v roce 2008 udává tab. 3 (velikost je určena na základě počtu zaměstnaných v podniku).

Tab. 3: Průmyslové podniky podle velikostních kategorií (v procentech příslušné kategorie), rok 2008

	1–49	50–99	100–249	240–499	500–999	1000 a více
nové země	21,43	18,49	17,57	12,88	9,72	7,95
staré země	78,57	81,51	82,43	87,12	90,28	92,05

Zdroj: Kowalski [19]

Můžeme říci, že s rostoucí velikostí podniku klesá podíl zastoupení v nových zemích. Jak uvádí Kowalski [19], na základě podílu obyvatel žijících v nových zemích (cca 20 %) zastoupení malých podniků přibližně odpovídá, u podniků s 500–999 zaměstnanci by se počet podniků musel zdvojnásobit, v případě velkých podniků nad 1000 zaměstnanců dokonce téměř ztrojnásobit. Ragnitz [31] označuje malý počet velkých podniků jako jeden ze závažných problémů

východoněmecké ekonomiky. Malé firmy často vykazují nižší produktivitu, neboť nemohou využít výhodu velkovýroby nebo jim finanční omezení brání v inovacích. K tomuto názoru se přiklání i Wölfling [42]. Ten uvádí, že v západní části Německa silně roste s velikostí průmyslových podniků i produktivita. Ve východním Německu tuto závislost nepozoruje. U velkých podniků dosahuje produktivita v nových zemích 47 % západoněmecké úrovně. V případě malých podniků produktivity v obou částech Německa odpovídají. Problém tedy není jen v počtu velkých podniků, ale také v jejich produktivitě. Autor vidí nízkou produktivitu u velkých podniků jako hlavní příčinu produkční mezery. Wölfling také upozorňuje skutečnost, že na rozvoji velkých podniků závisí rozvoj menších specializovaných podniků a služeb, a tím také rozvoj v oblasti R&D.

1.3 Situace na východoněmeckém trhu práce

Nefunkční pracovní trh je dlouhodobě jedním z nejvážnějších problémů ekonomiky nových spolkových zemí. Jak uvádí Röhl [36] razantní růst mezd v devadesátých letech byl velkou přítěží pro podniky a pro celý pracovní trh v nových zemích, od roku 2000 však došlo ke stagnaci růstu mezd a od té doby se pohybují na 77 % západoněmecké úrovně. Ve srovnání se západní ekonomikou působí také nepříznivě vývoj podílu pracovníků v oblasti výzkumu a vývoje – tedy oblasti s vysokou přidanou hodnotou. Dale [7] z takového vývoje vyvozuje existenci „dvojího hospodářství“, kdy firmy na východě zaměstnávají pracovníky za méně peněz a na delší dobu a jsou závislé na know-how ze západu. Podíl založených a uzavřených podniků se k roku 2007 vyrovnal západním hodnotám. Vývoj základních ukazatelů oproti západoněmecké úrovni shrnuje následující tabulka.

Tab. 4: Ukazatele trhu práce 1991–2007 (východoněmecké hodnoty v % západoněmeckých hodnot)

	1991	1995	2000	2007
Obyvatelé	25	23	23	21
Mzda na zaměstnance	49	74	77	77
Produktivita: reálný HDP na výdělečně činnou osobu	42	65	69	77
Mzdové náklady na vyprodukovanou jednotku	119	114	112	101
Výzkum a vývoj – osobnostní vybavenost	49	42	42	61
Míra nezaměstnanosti	207	180	239	214
Založené podniky	271	143	87	98
Uzavřené podniky	122	144	92	94

Zdroj: Röhl [36]

Jednoznačně nejpalčivějším problémem východoněmeckého trhu práce je však vysoká míra nezaměstnanosti. Tab. 4 dokumentuje, že dlouhodobě převyšuje úroveň nezaměstnanosti na západě více než dvojnásobně. Podíváme-li se na procentuální vyjádření registrované míry nezaměstnanosti [3], lze konstatovat, že od roku 1992 neklesla pod 15% hranici, přičemž mezi lety 1997 až 2006 osciluje okolo 20% úrovně. Během následného vrcholu konjunktury došlo k poklesu k 15 %, ovšem s příchodem hospodářské krize nezaměstnanost na východě opět akcelerovala.

Pokud dodáme, že úroveň zaměstnanosti dosahuje pouhých 60 % úrovně roku 1989, je zřejmé, že bývalá NDR zažívá bezprecedentní úpadek ekonomické aktivity.

2. Faktory nekonvergence nových spolkových zemí

V literatuře nalezneme zpravidla následující faktory, které podle jednotlivých autorů nejsilněji ovlivnily neuspokojivý průběh reálné konvergence nových spolkových zemí: odkaz komunismu, rychlé a nevhodné vytvoření měnové unie, neúměrný růst mezd a uvolněnou důchodovou politiku, masivní dezindustrializaci, neúspěšnou privatizaci nebo také jednání ve prospěch zájmů západoněmecké ekonomiky v období

po sjednocení. Na základě některého z těchto faktorů jsou pak identifikovány další, odvozené faktory, které negativně ovlivňují východoněmecké hospodářství, například nevhodná struktura hospodářství nových spolkových zemí nebo nízký počet velkých podniků.

Dale [7] vidí jako hlavní příčinu neúspěšného konvergenčního procesu rychlé vytvoření měnové unie a chybně stanovený směnný kurz – tento faktor podle něj vedl ke kolapsu relativně životaschopných kombinátů a tím k dezindustrializaci východního Německa. Za další faktor ovlivňující vývoj v nových zemích označuje špatnou politiku při privatizaci a korupční jednání.

Busch, Kühn a Steinitz [4] mají na faktory reálné konvergence východního Německa podobný pohled jako Dale. Autoři rovněž zmiňují vliv přistoupení východního Německa k EU v rámci sjednocení, čímž bylo jeho hospodářství šokově vystaveno vysoce konkurenčnímu prostředí.

Smolny [38] poukazuje zejména na nevhodně směřované investice a veřejné výdaje, kdy bylo podporováno především stavebnictví s nízkou produktivitou, resp. projekty s nízkou přidanou hodnotou a malým počtem pracovních míst.

Ragnitz [31] vidí hlavní příčinu neuspokojivé konvergence v nevhodném uplatnění lidského kapitálu, kdy kvalifikovaní pracovníci často provádějí práci neodpovídající jejich úrovni vzdělání. Dále pak také ve špatné průmyslové struktuře východoněmecké ekonomiky, malém počtu velkých firem a nedostatečně vybudované firemní síti.

Wölfling [42] považuje podobně jako Ragnitz za problém velikost východoněmeckých podniků, když zdůrazňuje nejen nedostatečný počet velkých firem, ale také nízkou produktivitu v těchto firmách (cca 50 % západoněmecké úrovně). Je tedy podle něj nutné zvýšit nejen jejich počet, ale také dosahovanou produktivitu. Wölfling taktéž zdůrazňuje, že bez velkých podniků není možné vybudovat funkční firemní síť a životaschopné malé a střední podniky; ty přitom považuje za klíč k rozvoji znalostní ekonomiky. Röhl [36] hodnotí pozitivně postupný růst podílu zpracovatelského průmyslu na přidané hodnotě, který se během uplynulých dvaceti let významně přiblížil západoněmecké úrovni. Rovněž však poukazuje na nízký počet pracovníků v oborech znalostní ekonomiky.

Draheim [8] naopak relativně marginalizuje význam technického pokroku, za hlavní problémy východoněmeckého hospodářství považuje nízkou exportní kvótu a malou průmyslovou přidanou hodnotu.

Merkl a Snower [26] vidí hlavní problém v situaci na pracovním trhu, která nemá tendenci se zlepšovat. Autoři popsali pasti, které brání jakémukoli zlepšení v této oblasti ekonomiky, například snižování kvalifikace vlivem chronické nezaměstnanosti, migrace mladých pracovníků, kteří si s sebou odnášejí i flexibilitu a všestrannost, nevhodná kapitálová vybavenost, atd.

Existence masivních transferů se na počátku 90. let rovněž zdála být mimořádnou komparativní výhodou východoněmeckého hospodářství proti ostatním transformujícím se zemím regionu. Z dnešního pohledu je jejich hodnocení značně problematické. Diskutována je jak výše, tak především struktura transferových plateb. Mai [24] hodnotí transferovou politiku jako nevhodnou v tom směru, že nemotivuje nové spolkové země k soběstačnosti a odpovědnosti. Dokonce naznačuje, že západ profituje z východoněmecké situace, kdy západoněmecké zboží má dodatečné odbytiště a téměř žádné konkurenty na východě. Podobně Busch a Mülle [5] poukazují na problematickou strukturu transferových plateb, kdy dominantní část pomoci má charakter spotřebních výdajů, které nerozvíjejí produkční potenciál východních zemí.

3. Role neformálních institucí v ekonomickém vývoji nových spolkových zemí

Je-li diskutován neúspěch konvergenčního procesu bývalé NDR, oprávněně zaznívají výhrady k jednotlivým oblastem hospodářské politiky v období transformace, ať už je to problematická měnová reforma, příliš velkorysá důchodová politika nebo kritizovaná forma privatizace. S obdobnými problémy se však v různých etapách (post)transformačního období potýkaly všechny bývalé centrálně-plánované ekonomiky střední Evropy. Českou republiku, Slovensko, Polsko, Maďarsko ani Slovinsko však přes více či méně problematická intermezza nepostihl bezprecedentní, dvě desetiletí trvající úpadek ekonomické aktivity, který můžeme pozorovat v nových spolkových zemích.

Naše vysvětlení délky faktické nekonvergence bývalé NDR, které doposud literatura nenabízí, spočívá ve zdůraznění významu neformálních institucí a jejich nekompatibility s institucemi formálními.

3.1 Význam neformálních institucí v rámci tzv. nových institucionálních směrů

Nová institucionální ekonomie, nová politická ekonomie i další tzv. nové institucionální směry výrazně akcentují formální pojetí institucí. To platí o řadě vlivných příspěvků zabývajících se problematikou ekonomického růstu a rozvoje, jejichž autory jsou Acemoglu, Johnson, Robinson [1], [2], Clague, Keefer, Knack a Olson [6], Engerman a Sokoloff [9], Hall a Jones [14], [15], Olson [29], Rodrik [33], [34], Rodrik, Subramanian a Trebbi [35] a další (blíže k tématu také viz Kouba [18]). Ve slavném příspěvku Mancura Olsona [29] přímo nalezneme explicitní zpochybnění významu kultury, tedy typického příkladu neformální instituce, pro ekonomický rozvoj. V příspěvku Acemoglua, Johnsona a Robinsona [2] jsou dokonce postaveny proti sobě hypotézy institucionální a kulturní. Přitom z historického pohledu je kultura jedním z tradičních témat široce vymezené institucionální ekonomie.

Patrně i z tohoto důvodu zůstává transformace bývalé NDR stranou zájmu hlavního myšlenkového proudu v rámci nových institucionálních směrů. Pokud bychom vycházeli výhradně z formálního pojetí institucí, nové spolkové země měly mít všechny předpoklady pro úspěšný hospodářský rozvoj a pro rychlou konvergenci se Západem. Momentem sjednocení totiž nové spolkové země převzaly kompletní institucionální rámec, resp. formální instituce vyspělé kapitalistické tržní ekonomiky SRN. Dvě desetiletí neúspěšného konvergenčního procesu proto znamenají významné zpochybnění teze, že formální instituce samy o sobě mohou být fundamentální příčinou úspěšného ekonomického rozvoje.

Prozkoumejme nyní pečlivě klíčovou, nejcitovanější definici institucí Douglase Northa [27], na kterou se ostatně – formálně – odvolávají i Acemoglu, Johnson a Robinson [2], Engerman a Sokoloff [9] nebo Rodrik, Subramanian a Trebbi [35].

North vymezuje instituce jako lidmi vytvářená omezení determinující politické, ekonomické a sociální vztahy. Tato omezení jsou tvořena formálními pravidly (ústava, zákony, vlastnická práva) a neformálními omezeními (tabu, zvyky, tradice, normy chování, konvence). Dochází tak ke spojení obou paralelních pojetí institucí amerického institucionalismu první poloviny 20. století: Northovy formální instituce vycházejí z právního pojetí (Commons), neformální instituce mají kořeny v sociální psychologii (Veblen).

North [27] i jemu myšlenkově blízcí autoři vyzdvihují význam kognitivní vědy, když považují za dlouhodobě klíčový zdroj změn proces učení se jednotlivců. Vedle individuálního učení se každého jednotlivce North, s odkazem na F. von Hayeka, hovoří také o kolektivním učení se. Jeho důsledkem jsou nahromaděné zkušenosti předchozích generací vtělené v kultuře každé společnosti. Tato na základě minulých zkušeností akumulovaná zásoba znalostí je zabudována do učení se každého z nás, a proto je základním zdrojem silného vlivu minulého vývoje na současnost a budoucnost, tedy fenoménu nazývaného path dependence.

V kapitole „Stabilita a institucionální změna" North konstatuje, že stabilita pramení jak z formálních pravidel, tak z neformálních omezení, a proto má institucionální změna z podstaty věci gradualistický charakter. North sice připouští možnost šokových změn institucionálního prostředí v revolučních časech, ovšem upozorňuje na zásadní problém: formální pravidla (zákony) lze v období významných politických a společenských změn měnit relativně rychle, což ovšem platí v daleko menší míře pro omezení neformálního charakteru. V důsledku tohoto nesouladu může vzniknout napětí mezi neformálními omezeními a novými formálními pravidly, která jsou vzájemně nekonzistentní. Předznamenejme, že tento problém je markantní právě v případě transformace bývalé NDR.

Northův přístup dále rozpracovává Mantzavinos, jehož teoretická argumentace ústí v tvrzení [25, s. 205]: „dostačující podmínky pro ekonomický růst existují pouze tehdy, když formální i neformální instituce společně utvářejí vhodný rámec pro jednání generující růst bohatství." Požadavek kompatibility formálních a neformálních argumentují pomocí historických příkladů Greifa [12] nebo Putnam [30], zajímavý příspěvek zabývající si transformačním obdobím střední a východní Evropy nabízejí Zweynert a Goldschmidt [43]. Blíže k tomuto přístupu, který nazýváme teorie růstu nové institucionální ekonomie *založená na northovském konceptu path dependence*, viz Kouba [17].

3.2 Transfer formálních institucí a jeho důsledky

Dlouhodobou stagnaci východního Německa lze podle našeho názoru (spolu)vysvětlit v duchu

Northova přístupu: implementované západoněmecké formální instituce se ukázaly být nekompatibilní s neformálními institucemi Východního Německa, tzn. se způsoby myšlení, zkušenostmi, kulturou, morálkou, resp. hodnotovým žebříčkem občanů bývalé NDR.

Pokud budeme chápat například sociální systém jako instituci, která nezanedbatelným způsobem ovlivňuje chování lidí, potom transplantace západoněmeckého sociálního systému do nových spolkových zemí zásadním způsobem narušila motivace tamějších obyvatel k ekonomické činnosti. Na západě nastavená výše sociálních transferů byla zcela neadekvátní úrovni příjmů vyplácených po desetiletí v bývalé NDR. Psychologický dopad na její obyvatele byl proto obrovský. Schatz [37, s. 8] popisuje důsledky situace, kdy na východoněmecké důchodce bylo pohlíženo stejně, jako kdyby platili tytéž příspěvky na sociální zabezpečení jako Západní Němci. Východoněmecké ženy si mohly vykazovat větší počet odpracovaných let než ženy na Západě, a proto byl jejich průměrný důchod paradoxně dokonce vyšší než důchod žen západoněmeckých.

Demotivace východoněmeckých občanů byla o to silnější, že zdejší trh práce procházel otřesem v důsledku kolapsu východoněmeckého průmyslu. Dále [7, s. 328] uvádí, že od roku 1989 do poloviny roku 1991 bylo propuštěno celkem 5,1 milionů zaměstnanců, tedy více než polovina ekonomicky aktivního obyvatelstva. Tyto miliony obyvatel nových spolkových zemí stály před obtížným krokem. Po desetiletích rigidní jistoty „celoživotního“ zaměstnání, byli tito lidé nuceni k aktivitě, rekvalifikaci, vzdělávání a nejistému hledání nového pracovního místa či dokonce oboru i své budoucí činnosti. Nabízející se alternativu v podobě štědrého státního zaopatření, která neměla v ostatních zemích regionu obdoby, využily více než tři miliony výdělečně činných osob, které do roku 1992 opustily trh práce [13, s. 92]. Dodejme, že oficiální údaje o míře nezaměstnanosti skutečný pokles výdělečně činných osob na území bývalé NDR nepostihují, neboť statisíce Východních Němců využily zjednodušené možnosti odejít do předčasného důchodu. Implementace paternalistického sociálního systému v nových spolkových zemích tak ve výsledku prohloubila po čtyřicet let budovanou závislost lidí na státu a nadále potlačila jejich smysl pro odpovědnost za svůj život.

3.3 Sociálně-psychologické determinanty neformálních institucí v nových spolkových zemích

Příznačným chováním velké části obyvatel středoevropských zemí s totalitními režimy byla snaha o průměrnost a nevybočování z davu, pasivita a odevzdanost, nízké sebevědomí a vzhledem k všudypřítomnému paternalismu i nedostatek osobní odpovědnosti. Pád režimu a následná společenská a ekonomická transformace přinášely ve všech zemích regionu řadu nových pozitivních výzev a příležitostí, které minimálně u mladší a vzdělanější části populace zásadním způsobem narušili zažité vzorce myšlení a jednání. Výraznou výjimkou je v tomto ohledu právě bývalá NDR, kde po krátké vlně euforie a optimismu byly negativní mentální charakteristiky paradoxně dále prohloubeny. Důvodem jsou podle našeho soudu následující specifické sociálně-psychologické determinanty neformálních institucí: pocit méněcennosti vůči Západním Němcům a nerealistická očekávání spojená se sjednocením, která byla razantně podporována sliby politických stran.

Pro Čechy nebo Slováky bylo uvědomění si míry zaostávání za vyspělou Evropou mnohem méně citlivé než pro Východní Němce. Zcela specifickým, frustrujícím faktorem bylo pro Východní Němce vědomí, že jsou se Západními Němci příslušníky jednoho národa, ale přitom jsou daleko chudší a podle svého přesvědčení i méně schopní. Vzhledem k výrokům typu „naši němečtí bratři“ lze hovořit o téměř doslovné analogii s psychickými komplexy méně schopného sourozence. Nedlouho po sjednocení se tak značná část Východních Němců začala cítit druhořadými občany. Dodejme, že k tomuto pocitu nemalou měrou přispívalo často nadřazené chování Západních Němců a kořistnické chování západních firem. Dale [7, s. 319–323] hovoří o „dezindustrializaci prostřednictvím privatizace“ a na konkrétních příkladech popisuje praktiky západoněmeckých firem, jak se zbavit potenciálních východoněmeckých konkurentů. Dale rovněž uvádí výzkumy z přelomu století [7, s. 330–331], podle nichž více než tři čtvrtiny Východních Němců věří, že nový systém s nimi zachází jako s občany druhé kategorie, a dvě třetiny mají pocit, že Východní Německo bylo „kolonizováno“.

Specifická byla rovněž očekávání, která měli Východní Němci na začátku transformace

ve srovnání s obyvateli ostatních středoevropských zemí. V České republice na samém počátku 90. let minulého století padala varování typu „reformy budou bolet“ nebo „čeká nás utahování opasků“. Přes optimistickou vizi „návratu do Evropy“ zde jasně zaznívalo varování společenských elit, že tato cesta nebude rychlá, ani jednoduchá a že krátkodobě je nutné počítat s poklesem životní úrovně. Důsledkem byla relativně umírněná očekávání české společnosti, díky nimž nepřevládla všeobecná frustrace s prvními transformačními obtížemi v roce 1990. Převážně optimistické vnímání transformačního období si česká společnost uchovala až do poloviny 90. let. V této souvislosti vyvstává otázka, zda právě umírněná očekávání a zdravý optimismus, projevující se vysokou mírou iniciativy a ekonomické aktivity (viz např. mimořádný rozvoj drobného podnikání a služeb) nejsou jedním z klíčových faktorů, jež přispěly k trvalému zakořenění základních principů tržní ekonomiky.

Naopak, euforie Východních Němců z pádu komunistického režimu byla umocňována vyhlídkou rychlého sjednocení a všeobecně pozitivní očekávání byla dále podporována nerealistickými proklamacemi západoněmeckých politiků. Kancléř Kohl sliboval, že mnoho Východních Němců si bezprostředně po sjednocení ekonomicky polepší a nikomu se nepovede hůře. Politici hovořili o srovnání životní úrovně v obou částech Německa v průběhu tří až pěti let (blíže viz Kurz [21]). Dále [7, s. 295] cituje vyjádření německého ministerstva financí z října 1990 o „srovnání důchodu na obyvatele na Východě a na Západě v roce 1994“. Paternalistický aspekt vyjádření adresovaných Východním Němcům shrnuje Frey [10, s. 65] pod heslem „Dáme vám peníze, jsme bohatí, postaráme se o vás.“ O to tvrdší byla posléze frustrace z nastalé reality.

3.4 Dílčí závěr: nekompatibilita západních formálních institucí a východních neformálních institucí

Historickým vývojem daný, odlišný způsob myšlení a deformovaný systém hodnot spolu s chybějícími zkušenostmi s životem v demokracii a tržní ekonomice způsobily, že se lidé na východě Německa nedokázali přizpůsobit „přes noc“ přenesenému institucionálnímu rámci SRN. Obecný transformační problém nekompatibility západních formálních institucí a východních neformálních institucí umocnila v případě Východního Německa jednak bezprecedentní rychlost transferu formálních institucí ze Západu, jednak sociálně-psychologické determinanty neformálních institucí, specificky působící pouze v bývalé NDR. Zejména pocit méněcennosti vůči Západním Němcům a nerealistická očekávání živená sliby politických stran představují faktory, jež se výraznou měrou podílely na frustraci, negativismu a odevzdanosti Východních Němců. Tyto charakteristiky se posléze projevily trvalým úpadkem produktivních činností obyvatel nových spolkových zemí, resp. dlouhodobě neuspokojivým průběhem konvergenčního procesu.

Závěr

Navzdory předpokladům představuje hospodářský vývoj bývalé NDR v uplynulých dvou desetiletích hluboké zklamání. Jak dokumentuje první část příspěvku, HDP na obyvatele nadále zaostává za západoněmeckou úrovní téměř o třetinu. Od poloviny 90. let se navíc konvergenční proces tohoto klíčového ukazatele v podstatě zastavil. Na statisticky vykazovaném růstu nových spolkových zemí se přitom ve značné míře podílel soustavný úbytek počtu obyvatel. Disponibilní osobní důchod, který je díky masivním transferům na zhruba 80 % západní úrovně, oproti přelomu tisíciletí dokonce mírně poklesl. Výhrady, především s ohledem na nízký stupeň rozvoje tzv. znalostní ekonomiky na východě, lze mít i k procesu strukturální konvergence. Samostatnou kapitolou je potom dlouhodobě nefunkční východoněmecký trh práce: úroveň zaměstnanosti se oproti roku 1989 pohybuje okolo pouhých 60 %, registrovaná míra nezaměstnanosti od poloviny 90. let kolísá mezi 15 a 22 procenty.

Hlavní výzkumná otázka tohoto příspěvku zněla, jaké jsou příčiny takto dlouhodobého úpadku ekonomické aktivity? Navíc, pokud si tuto skutečnost zasadíme do kontextu, že bývalá NDR je dlouhodobě politicky stabilní zemí, s vyspělým institucionálním a právním prostředím, s garantovaným systémem vlastnických práv, je součástí stabilního a ekonomicky se rozvíjejícího regionu atd.

Podle našeho soudu je za takto dlouhodobým neúspěchem něco víc, než (závažné) chyby v hospodářské politice, ke kterým došlo na počátku transformačního období (zdrcující

apreciace východoněmecké marky, neúměrný růst mezd či problematická privatizace). Za významný faktor dlouhodobé nekonvergence, tematickou literaturou doposud zcela opomíjený, považujeme nekompatibilitu transplantovaných formálních institucí, které vstoupily v platnost v nových spolkových zemích šokově dnem sjednocení, a neformálních institucí, jež byly hluboce poznamenány obdobím čtyřiceti let socialismu. Lidé vychování paternalistickým režimem bývalé NDR a obtížně hledající své místo v kapitalistické tržní ekonomice často využili možnosti nebývale štědrého sociálního systému implantovaného ze západní Spolkové republiky a rezignovali na snahu uplatnit se na sjednoceném německém trhu práce. Rovněž další faktory sociálně-psychologického charakteru, jako pocit méněcennosti vůči Západním Němcům a nerealistická očekávání živená sliby politických stran, přispěly k pesimismu a pasivitě Východních Němců, jež se zrcadlí v poklesu ekonomické aktivity a *má tak významný podíl na celkově neuspokojivém ekonomickém vývoji nových spolkových zemí*.

Řada institucionálních příspěvků se spíše kloní ke gradualistickému pojetí transformace. My jsme naopak přesvědčení, že v čase zásadních dějinných zvratů, jako byl pád socialistických režimů na sklonku 80. let minulého století, je třeba využít většinovou vůli společnosti k realizaci širokých a razantních reforem, neboť ve stabilních časech jsou reformy působením path dependence, většinové nechuti lidí ke změnám nebo vlivem nátlakových skupin zpravidla velmi obtížně prosaditelné. Neúspěch německého institucionálního transferu však i obecné tvrzení o prospěšnosti rychlé transformace do jisté míry relativizuje.

Výsledky uvedené v příspěvku jsou součástí výzkumného záměru VZ MSM 6215648904 „Česká ekonomika v procesech integrace a globalizace a vývoj agrárního sektoru a sektoru služeb v nových podmínkách evropského integrovaného trhu“, tématického okruhu 01 „Makroekonomická a mikroekonomická výkonnost české ekonomiky a hospodářsko-politická opatření vlády ČR v podmínkách evropského integrovaného trhu“ realizovaného za finanční podpory ze státních prostředků prostřednictvím MŠMT.

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Abstract

THE CAUSES OF NON-CONVERGENCE OF EAST GERMANY

Luděk Kouba, Hana Křížová

In 1990, East Germany had significant preconditions for successful economic development and rapid convergence: the former GDR was the most developed country in the former Soviet bloc and had a long tradition of cultural affiliation with the West. Moreover, its centrally planned economy obtained a complete institutional framework of a capitalist economy of the FRG at the moment of reunification and consecutively got long-term financial support from West Germany. Nevertheless, the real economic results during the last two decades have been a monumental disappointment: GDP per capita is still lagging behind West Germany by approximately 30 percent. The rate of growth remains constantly slow, especially in comparison with other post-communist countries. The rate of unemployment has been oscillating between 15 and 22 percent since 1995 etc. Thus a key question is: what are the main causes of such a long economic stagnation? The topical literature particularly deals with the following factors: too strong appreciation of the east currency (the so-called Ostmark), too high wage growth, problematic privatization and so on. However, from our point of view, the mistakes in economy policy in the early 1990s cannot explain such a long unsuccessful economic development. Besides, East Germany has an advanced and stable political, institutional and legal environment and is a part of an economically prosperous region. In our opinion, the incompatibility between West Germany formal institutions and East Germany informal institutions is another crucial cause of the long-lasting decline in the productive activities. After forty years of socialism, people in East Germany failed to behave according to the western rules. Moreover, we can see some social-psychological factors affecting specially East Germany. These factors (feelings of inferiority in relationship with West Germans, inadequately optimistic expectations) contributed to the consequent frustration and pessimism of East Germans that is reflected in low economic activity in East Germany.

Key Words: *East Germany, convergence, formal institutions, informal institutions.*

JEL Classification: *E01, O43, P27, P30.*

THEORETICAL AND PRACTICAL PROBLEMS OF ENVIRONMENTAL TAXATION IN CONDITIONS OF THE CZECH REPUBLIC

Zdeněk Hruška, Lilia Dvořáková

Introduction

Environmental taxation has been developing for decades and it started to gain its importance especially with the European Union extending and with the European Union environmental goals unification. Some EU countries introduced the environmental taxes even before the key EC Directive 2003/93 and some countries were made to tax system ecologization by this Directive and by EC Directive 2003/74 [6].

The target of the performed research was to identify the environmental taxing genesis, state and development in the Czech Republic and to find out how the Czech companies and households are aware of the environmental taxes issue. Another goal was to analyse and evaluate how the Czech households and businesses reacted to the environmental taxes introduction. The hereby presented research builds on and develops the results of the partial research in this field which were published by the authors in 2011. The authors present the current scientific knowledge in the environmental taxing field with the intention to contribute to the theoretical and practical development of this issue.

1. Methodics

The research was based on the Czech and foreign literature research and also on the statistics datas analysis mainly from the statements published by the administrator of the environmental taxes in the Czech Republic. Documents, valid legislation and reports published mainly by state institutions (The Ministry of Environment of the Czech Republic, Customs administration of the Czech Republic) and by the international organization European Environment Agency which currently associates thirty-two countries were taken into account. The research also contained analysis of datas and outputs which were the scope of the research.

The research itself was based mainly on documents analysis and two surveys. The questionnaires contained closed, semi-open, filter and inquiry questions. The first questionnaire was given to the households, the second modified questionnaire to the businesses in the Czech Republic. The researched sample was made by a hundred and two households and a hundred and ninety-three businesses. The research was made at households of various sizes living round the whole Czech Republic. The researched businesses were small, middle-sized and large companies operating also round the whole Czech Republic in various fields. Some of the companies operate in other states too. The survey was conducted through personal visits. The participants of questionnaire research in businesses were business owners and employees in positions of top and middle management.

2. Process of Environmental Taxes in the Czech Republic

The current environmental taxing does not have a long tradition in the Czech Republic. The first taxes, that at least partially resemble environmental taxes (which were not introduced for environmental reasons but we can assume the reason was mainly fiscal), appeared on the Czech state territory in the 20's of the last century. In Czechoslovakia taxes on ignitors, electrical sources of radiation, mineral oils, coal and motor vehicles [17] existed at that time. From 1882 in the Austro-Hungarian monarchy the kerosene tax was performed. After 1945

there were taxes on mineral oils, matches, coal, electrical sources of radiation [16]. Their introduction was caused mainly by the lack of these products. In 1949 a general tax was introduced and it basically replaced all indirect taxes [16]. From the 1st July 1964 the tax on motor vehicles was introduced and road motor vehicles were subject to it [18]. Although the Czech tax system did not contain enviromental taxes till 1992 it does not mean that the environmental damage charge was forgotten. For example in 1967 the emission fees were introduced as well as the fees on waste water discharge in 1979 [5].

If we sum up the above stated and we do not consider the environmental fees, until 1992 the tax system did not contain any special environmental tax scheme. The first legislation note on environmental taxes can be found in the collection of the Law 212/1992 about taxing system from the 15th April 1992. In the § 1 of this law the environment protecting taxes were stated as a part of the taxing system. Nevertheless the environmental taxes were introduced in the Czech Republic in 2008. The first real effort to tax the products with negative effect on the environment is dated to 1997. But the environmental taxes were not introduced again because the original plan to present the law in 1999 was not carried out [10]. The first official draft of the environmental tax reform was prepared by the Ministry of Environment in cooperation with the Ministry of Finance of the Czech Republic in 2000. This draft was discussed by the governmant in the first half of 2001. After the elections in 2002 the new government set one of its goals to build on the predecessors and perform the environmental tax reform which will follow the revenue neutrality principle. The environmental tax reform draft was made in 2003 but was changed a few times before it was implemented [5].

In January 2007 the new environmetal tax reform draft was discussed by the Czech government and the new energy products taxation was approved in May 2007 [5]. Environmental taxes were introduced in the Czech Republic with efficiency from the 1st January 2008 according to the collection of Law 261/2007 about public budgets stabilization. It was about the tax on solid fuels, tax on natural gas and some other gases and electricity tax. In other words these three taxes can be called together **„the enviromental triple tax“** [9]. We can assume that their introduction was caused mainly by the duties coming from the EC Directive 2003/96 which determines the minimal environmental taxes rates on selected materials. Or it was caused by the EC Directive 2004/74 which granted an exception to the Czech Republic just till 2007. The exception applied also to other countries (e.g. Poland, Hungary, Estonia, Slovenia) and was granted for the reason of possible economical and social difficulties caused by the new environmental taxes introduction. The exception applied exactly to natural gas, solid fuels and electricity. The EC Directive 2003/96 was approved mainly for protection of the internal market and for meeting the objectives of the Kyoto Protocol [12]. However the introduction of the three new environmental taxes was just a part of the environmental tax reform which is taking place in three stages and is planned to be completed in 2017. The process of the environmental tax reform is illustrated in figure 1 (pg. 21). The Czech Republic started the environmental tax reform quite late compared to e.g. nothern countries like Sweden, Finland or Denmark which started to carry out the enviromental tax reform already in the 80's of the last century. According to the Ministry of Environment the main goal of the environmental tax reform is to stimulate economical subjects to behaviour which leads to reducing the environmental damage and the damage caused to the population health. The subject to the tax are goods and services whose production and consumption leads to verifiable negative impact on the environment and human health. Environmental taxes are therefore correction taxes as we can see in above stated. According to Svatkova [15] the tax should represent the company costs to remove the negative externality or as Kubatova states [11] the environmental tax should internalize the externalities or in other words it should include them in the market costs. The key to reaching the targets of the environmental tax reform lies in aiming the environmental taxes on pollution or other problems connected to the environment [7]. The environmental taxes should also bring so-called double divident. The principle means two benefits. The first benefit is improving the environment and the second is gaining further income fot the state budget which can be later used to reduce

other distortionary taxes (for example taxing work, investments, consumption etc.) [7]. The environmental tax reform also includes setting some exceptions exempt from the tax. It is for example electricity from renewable sources (wind, solar or geothermal energy) or electricity used for public transportation of goods and people on railway, underground or tram [13].

The environmental tax reform should follow these basic criteria [1], [8], [11]:

- transfer the taxing from work and capital to the pollution sources,
- remove the elements of the taxing system which have negative impact on the environment,
- follow the principle „the polluter pays“,
- revenue neutrality.

The first stage of the environmental tax reform in the Czech Republic took place in 2008–2009 and it contained introducing the environmental taxes in accordance with the EC Directive 2003/96.

The second stage carried out in 2010–2013 should mean transfering selected environmental fees to environmental taxes and the examination of further regulation tools in the environmental field, at present the introduction of the carbon tax is being considered [13]. The impact of the environmental taxes introduction should be evaluated continuously in the second stage. The subjects to the research should be the impacts on the economics a its competitiveness, the impacts on individual groups of population, impacts on the unemployment rate etc. [15]. Another task of this stage should be to pay more attention to transport taxation in accordance with the criteria of the Kyoto Protocol which were negotiated on the 11th December 1997 in the Japanese city of Kyoto and to which the European Union and therefore the Czech Republic committed. In the Czech Republic only some selected vehicles are subject to the transport taxation for now and the flat motor vehicle tax is not planned yet. Furthermore the current motor vehicle taxation takes account of the environmental aspects minimally (as a percentual tax rate reduction, possibly its increase for vehicles registered till the end of 1989). We can see a possible problem for meeting the limits of the Kyoto Protocol. For example in Great Britain they introduced the company cars tax already after 2002 and this tax takes into account also the production of CO_2 emissions [14].

The last stage of the environmental tax reform is preliminarily dated to 2014–2017 when further changes in environmental taxing are considered. Further extension of environmental taxes is probable in the shape of transformation or transfer of some environmental fees to environmental taxes. For example it could be air transport tax, waste tax, wastewater discharge tax or packaging tax. In the third stage of the environmental tax reform we presume the revision and novelization of the EC Directive 2003/96 [13], [15].

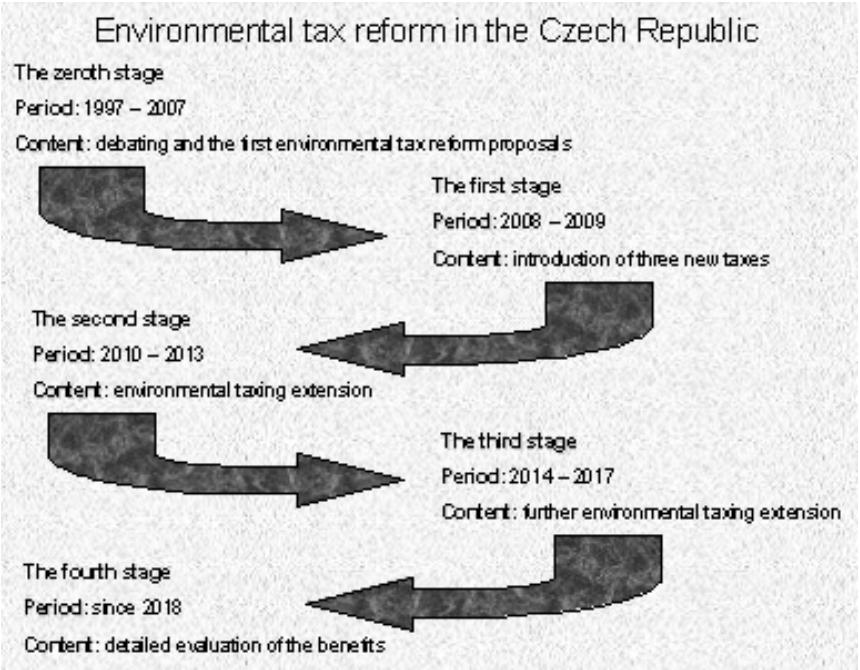
By a deeper conception of the environmental tax reform we can speak of **five stages.** The three already described stages, as figure 1 illustrates, are joined by other two stages. So called **zeroth stage** which took place in 1997–2007 and was the longest of all five stages and contained the first negotiation and real effort to introduce the environmental taxes and to enforce the environmental tax reform.

Considering the continuous development of all aspekts connected to the environmental taxation and the environment we can expect the continuation in the established trend even after the end of the third stage. It would be the **fourth stage** of the environmental tax reform when meeting the targets of the environmental tax reform should be revised in details and the existing benefits and negatives of the reform should be evaluated. Appropriate conclusions should be drawn from the analysis and they should determine which way the environmental tax reform would continue. Now we can speak of five stages of the environmental tax reform and according to the current development it is probable that it is not the final appearance of the reform.

The Ministry of Environment of the Czech Republic presents the main contribution of the environmental tax reform [13]:

- tool for meeting the targets of sustainable development,
- environmental improvement,
- human health improvement,
- increase of economy efficiency,
- work market recovery.

Fig. 1: Environmental Tax Reform in the Czech Republic



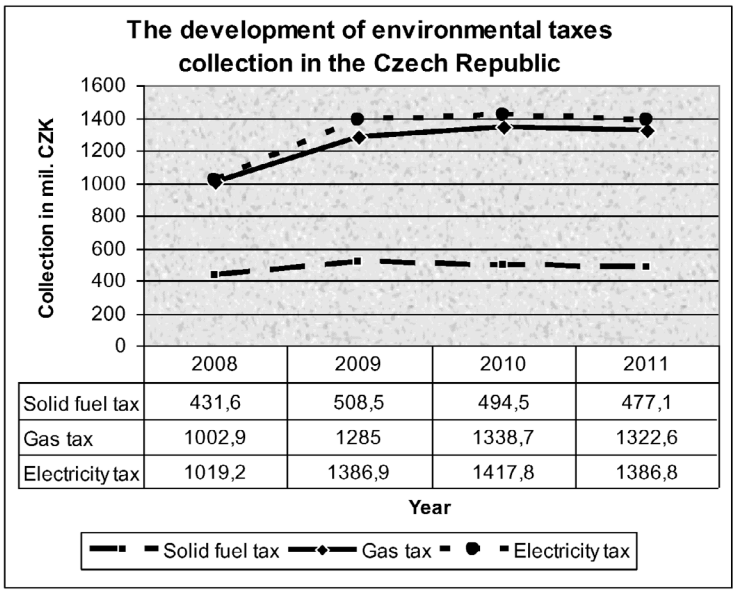
Source: own processing, [15]

The basic premise of the environmental tax reform is **revenue neutrality**. In the Czech Republic according to the Ministry of Environment of the Czech Republic the revenue neutrality was fulfilled at first by **social insurance rate reduction** from 8 % to 6.5 % and by **introducing the so-called flat tax on physical entity income** at 15 % and by **reducing the legal entity income tax** from 24 % to 21 %. Legal entity income tax was further reduced to 20 % and later to current 19 %. These steps can be considered insufficient just because the Ministery of Finance of the Czech Republic presented the main reason for the reduction of social insurance paid by employees the compensation of some tax rebates annulment and mainly because it does not apply to some population groups, for example retired people. If we want to hold on to the basic principle of revenue neutrality, the environmental tax reform should bring on one side the introduction and also increase of environmental taxes and on the other hand the reduction of work production factor taxation. As the final result the work taxation should be transferred to environment pollution and it should support the sustainable development. The environmental tax reform should also start the innovation development, greater use of renewable energy sources and therefore improve the environment [1], [4], [12]. The environmental tax administration in the Czech Republic is done by the **customs authorities** which can also issue two kinds of permissions. They are permission to acquire the exempt energy products and permission to acquire energy products without tax.

Figure 2 illustrates **the amount of collected revenue** from environmental taxes in the Czech Republic since their introduction in 2011. It its clear from the picture that the collection increased at first and in 2011 there was a decrease by all three environmental taxes which could be caused by the saving regulations and innovations introduction and by the consequences of the world economic crisis. According to the current development of the

environmental taxes collection till May 2012 in comparison with the same period last year we can assume further revenue decrease from the environmental taxes collection this year.

Fig. 2: The Development of Environmental Taxes Collection in the Czech Republic



	2008	2009	2010	2011
Solid fuel tax	431,6	508,5	494,5	477,1
Gas tax	1002,9	1285	1338,7	1322,6
Electricity tax	1019,2	1386,9	1417,8	1386,8

Source: own processing, [2]

3. Environmental Taxes and their Influence on Households in the Czech Republic

As mentioned above, the environmental tax reform should respect the principle of revenue neutrality. This principle has been partially followed in the Czech Republic but it does not apply to retired people households, unemployed, mothers on maternity leave, parents on parental leave, students, citizens on sick leave and others. The impact of the environmental tax reform on these groups' family budgets has been negative and we can say that they show signs of so-called **„revenue non-neutrality"** of the environmental tax reform. We can expect a hard impact of environmental taxes on households which do not have funds to invest in energy saving equipment. A different environmental taxes impact on households is connected with where they live, if they produce the heat themselves or if they use the central sources (so-called remote heating). As Ekins and Speck state [5], the introduction of the environmental taxes in the Czech Republic since 2008 has meant 10% increase in the price of coal, coke and semi-coke and 1% increase in the electricity price for the households.

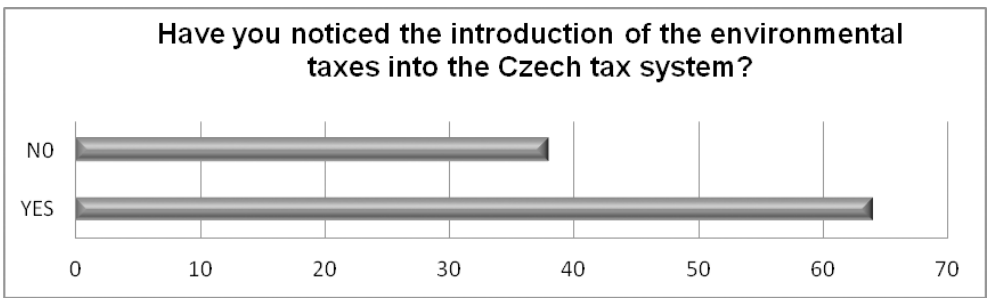
For the environmental taxes impact on households analysis a questionnaire survey was done by **102 households** from all the Czech Republic. **At the first step** of questioning we were detecting how many members an interviewed household has. We found out that one household has one member, twenty-six households have two members, twenty-one households have three members, forty-two households have four members and remaining twelve households have more than four members.

At the next step the target was to find out what kind of heating the households use. Out of the questioned households thirty-four use solid fuels (mainly coal and briquettes) for heating their flats and houses, eighteen use electricity, forty-nine use gas and fifteen use another kind of heating.

The third step of questioning should determine whether Czech households noticed the increase of energy prices and of what amount approximately. Out of the total amount of questioned households ninety-six households have noticed the increase in energy prices since 1st January 2008. However it is not clearly identified if it was a rise caused by common annual increase in energy prices or a rise for environmental taxes introduction reason. Most of the households (53) cannot determine the exact amount by which the price was increased monthly. Thirty-six households estimated the amount between 200–2000 a month and seven households even higher.

The crucial part of the survey was **the forth step** where the target was to find out if Czech households are aware of introduction of environmental taxes in the Czech taxing system. The results show that the state informed the public insufficiently about the ecologization of the taxing system because thirty-eight households out of the total number of respondents (37 %) did not notice the introduction of enviromental taxes in the Czech Republic at all, as you can see in figure 3. The result is very important because the environmental taxes should work as a **motivation factor** not only on businesses but also on households concerning the investments leading to energy saving and more environmental-friendly behaviour (e.g. purchase of solar panels, exchange the solid fuels heating for gas heating, investment in ecological boilers or investments in appliances with significantly lower electricity consumption or house insulation). If the environmental taxes should have a motivational influence the subjects must be aware of them. The households should be informed by the state not only about their existence itself but in the sense of which amounts are valid within the environmental taxes in energy products prices. At the same time the state should inform the households very **sensitively** so that they do not acquire a **negative attitude** towards the environmental taxes. Unfortunately as the performed research shows none of these were fulfilled in the Czech Republic.

Fig. 3: Awareness of Households about the Environmental Taxing in the Czech Republic



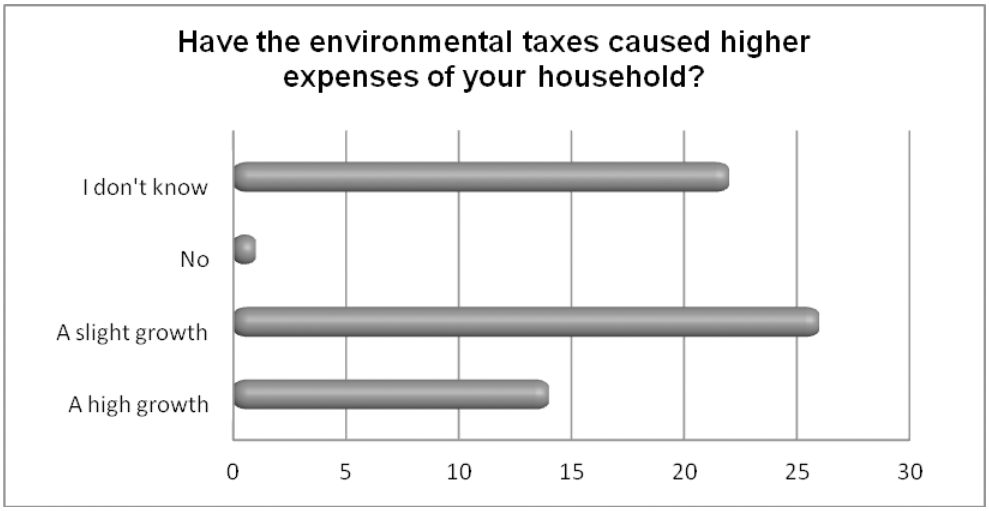
Source: own research

Bad awareness of Czech public about environmental taxing is confirmed by **the fifth step** of the research which investigates which environmental taxes relate to individual households. Some households which heat with solid fuels did not know that solid fuels have been taxed by the solid fuel tax since 2008. And on the contrary the households which use gas for heating wrongly believe that the gas price involves the gas tax. But gas for heating is exempt from this tax. All questioned households use electricity so it could be expected that most of them answer that the electricity tax applies to them. However only forty-eight households realize that they pay the environmental tax within the price of electricity.

In **the sixth step** sixty-four households which had noticed the introduction of environmental taxes in the Czech taxing system later answered the question if introducing the environmental taxes caused their higher expenses within the energy products price rise. Figure 4 shows the results when twenty-seven households (42 %) noticed a slight growth, fourteen a high growth

(22 %) and twenty-one households (33 %) are not able to identify the growth as a result of introducing the environmental taxing. Only two households stated that the introduction of the environmental taxes into the Czech tax system did not cause their higher expenses. It shows that there are great differences in the awareness about environmental taxing among Czech households. During the **additional inquiries** among those households which had noticed the introduction of environmental taxes a very important knowledge was found out. They found out about the introduction of enviromental taxing mainly from massmedia and a great majority of them had to look for the price increase caused by the environmental taxes introduction themselves.

Fig. 4: Influence of the Environmental Taxes on Households' Expenses in the Czech Republic

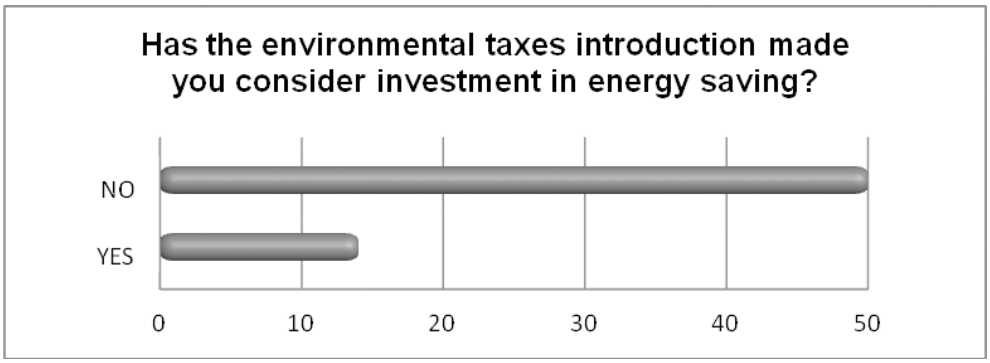


Source: own research

The seventh step had a target to find out if Czech households are motivated by introducing the enviromental taxes to changes in energy consumption and production. It means mainly the purchase of solar panels for electricity production which is used also for heating and investments which are stated above. As figure 5 illustrates, fifty households haven't made any changes. Fourteen of them invested mainly in the purchase of solar panels or energetically less demanding appliances (especially fridges and washing machines). An interesting result is that nearly half of the interviewed households think that the enviromental tax included in the electricity price is much higher than it really is and after the introduction of enviromental taxes they invested mainly in energy-saving household appliances. This was found out by semi-open questions also by households which use solid fuels heating. These households preferred investing in energy-saving household appliances to investing in a more ecological way of heating.

A part of the research was to find out how Czech households see the ecologization of the Czech tax system. An unclear result appeared by this **eighth step**. As figure 6 illustrates twenty-seven households (37 %) out of seventy-four responding (this question was answered by ten households which have not noticed environmental taxes introduction but thanks to the questionnaire they got this information) understands the environmental taxes as a tool for the state to increase fiscal income. Twenty-four households (32 %) see the environmental taxes as a necessary tool for environment protection and for enforcing the sustainable development, the rest of respondents do not have a clear opinion. Even

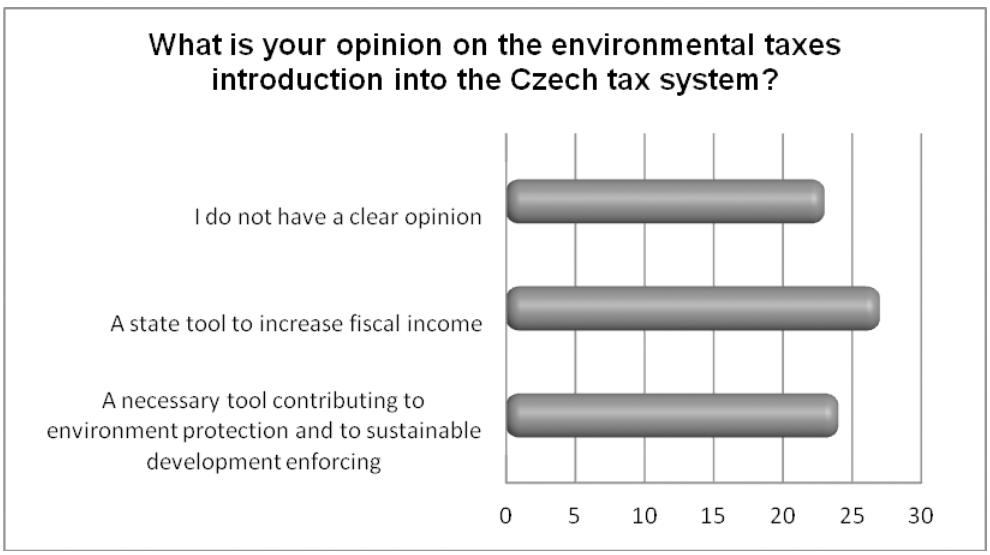
Fig. 5: Influence of the Environmental Taxes on Households in the Czech Republic



Source: own research

here the problem of bad awareness of the households about the ecologization of the Czech tax system steps forward, when the environmental taxes should serve mainly as a state environmental policy tool to protect the environment. However the problem starts by the environmental taxes approval into the Czech tax system itself when their introduction in the Czech Republic was not done for environmental reasons but because of the EC Directive 2003/96. As the performed research proves the awareness of the Czech households is on a very bad level even regarding the basic principles of the environmental taxes, mainly about their revenue neutrality principle.

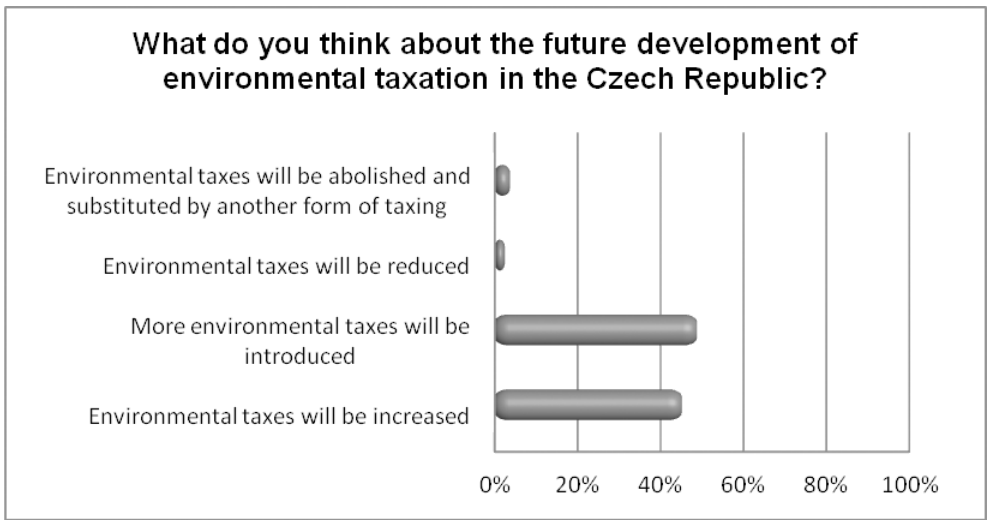
Fig. 6: The Opinion of Czech Households on the Environmental Taxation



Source: own research

A relatively clear result is coming from the last **ninth step** of the research when the target was to find out the opinion of households on the future development of environmental taxation. The interviewed households are definitely expecting further increase in enviromental taxes and extending their amount. This result is illustrated in figure 7. We can expect that these households will adjust their expenses in family budgets, they will follow the suggesting and approving process of legislative changes concerning the enviromental taxes, they will take the change of heating system into account and they will be better prepared for possible increase of current enviromental taxes or introducing new kinds of enviromental taxes. Only two of the questioned households think that enviromental taxes will be reduced and three households stated the opinion that enviromental taxes will be abolished and substituted by another form of taxing.

Fig. 7: Czech Households' Opinion on the Future Development of Environmental Taxation



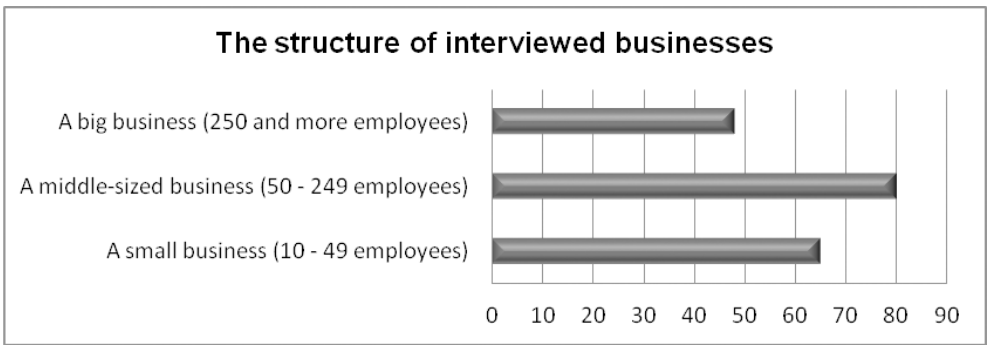
Source: own research

4. Environmental Taxes Influence on Businesses in the Czech Republic

To find out how the environmental taxes influence Czech businesses a questionnaire research was done by **193 businesses** in the Czech Republic. The research consisted of **four steps**. According to the number of employees (see fig. 8) there were sixty-five small businesses, eighty middle-sized businesses and fourty-eight big businesses out of the total amount of questioned businesses. The respondent structure contained businesses working across the whole range of the national economy.

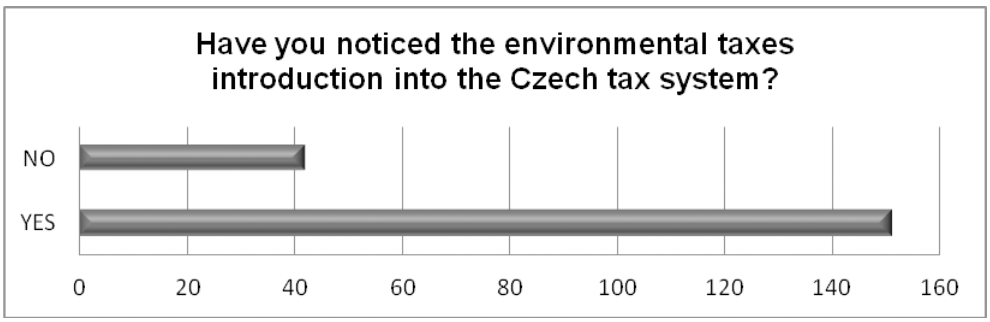
The target of **the first step** was to find out if the Czech businesses have noticed the environmental taxes introduction into the Czech tax system. The first step of the research has brought a serious result when one hundred and fifty-one businesses have realized the environmental taxes introduction and forty-two (22 %) do not know of their existence after more than four years (see fig. 9). As well as by the households, the state informed the businesses insufficiently. The businesses which did not learn about the environmental taxes introduction then probably had a more difficult situation compared to their competitors who were aware of the intended Czech tax system ecologization and could prepare themselves for this step properly. The state authorities should have informed the businesses about the environmental tax reform already after the entry to the European Union. The businesses should have

Fig. 8: The Structure of Interviewed Businesses



Source: own research

Fig. 9: Awareness of Czech Businesses about the Environmental Taxes



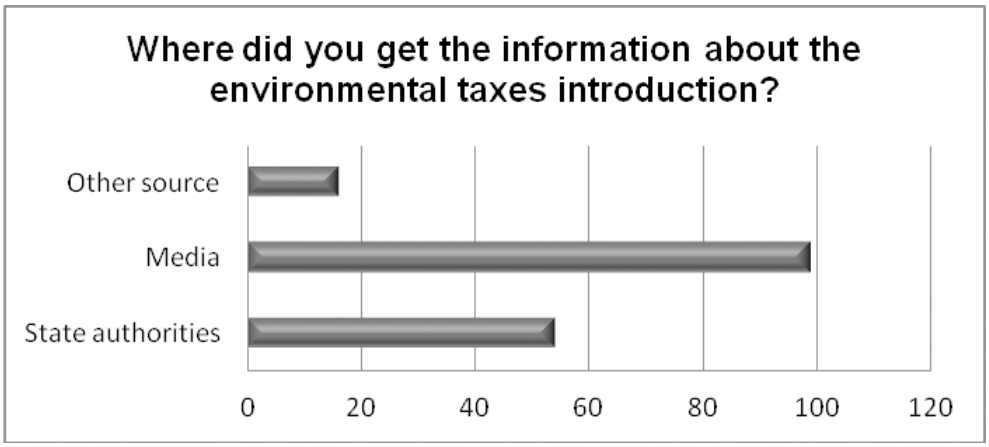
Source: own research

been informed about the exception coming from the EC Directive 2004/74 which lasted till the end of 2007 so as they could get ready for the environmental taxes introduction appropriately.

A part of the first step was also the detection where the businesses got the information about the environmental taxes introduction into the Czech tax system, if they did so. As figure 10 proves only fifty-four businesses received this information from the state authorities. Ninety-nine businesses got the information from the media and sixteen businesses found out about the environment protecting tax introduction from other sources (tax advisor, valid legislation, internet, training, suppliers, accountant, professional literature, professional seminars). Some of the interviewed businesses stated more sources. As already presented above, the state failed in its informational responsibility towards households and also businesses.

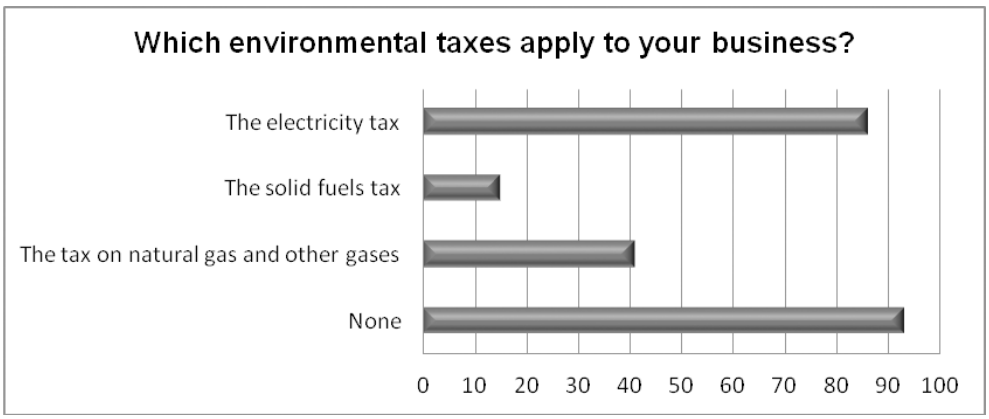
The second step of the research included the detection which environmental taxes apply to the businesses which noticed their introduction. Some businesses marked more options (more environmental taxes), on the other hand others said that no environmental taxes concern them. The graphical result overview of the second step is demonstrated in figure 11. We could expect that almost all the interviewed businesses pay the electricity tax. Nevertheless only eighty-six businesses answered that the electricity tax applies to them. The bad awareness of Czech businesses was confirmed again because we can expect that most of the

Fig. 10: **The Information Source about the Czech Tax System Ecologization for the Businesses in the Czech Republic**



Source: own research

Fig. 11: **The Environmental Taxes in Czech Businesses**

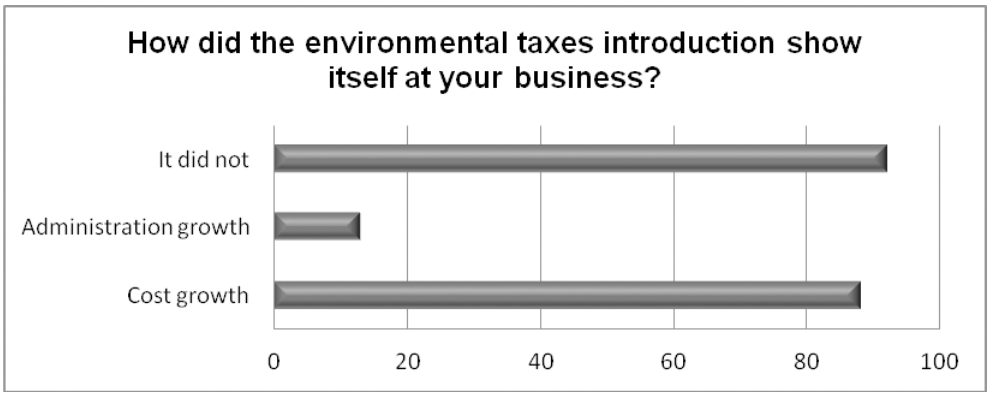


Source: own research

interviewed businesses use the electricity (not exempt from tax) for their activities and therefore they pay the environmental tax within the electricity price. Ninety-three businesses marked the answer that no environmental taxes apply to them. The tax on natural gas and some other gases concerns forty-one businesses according to the survey. The solid fuel tax was marked by fifteen businesses.

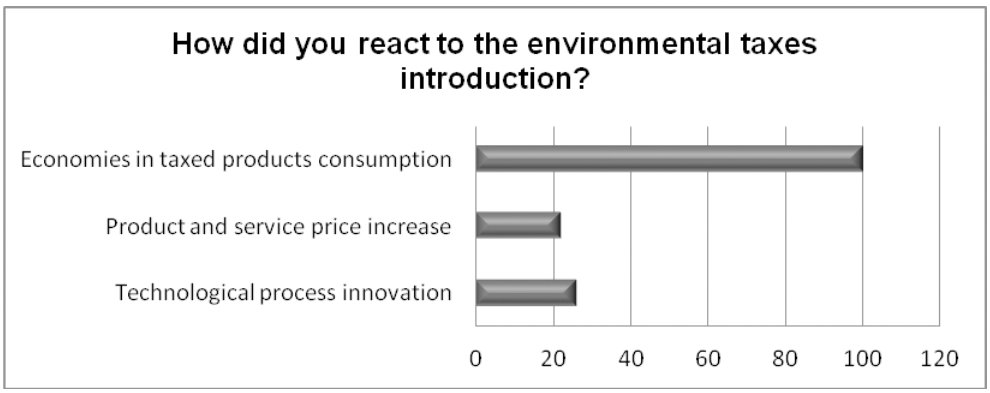
The target of **the third step** was to find out how the environmental tax introduction showed itself at those Czech businesses which noticed the environment protecting taxes introduction (see figure 12). Total eighty-eight businesses noticed the cost growth because of the environmental taxes introduction into the Czech tax system. For thirteen businesses it meant the administration growth and it did not show at all at ninety-two businesses.

Fig. 12: The Environmental Taxes Influence on the Businesses in the Czech Republic



Source: own research

Fig. 13: The Czech Businesses Reaction to the Environmental Taxes Introduction



Source: own research

The last step of the research was supposed to find out how the businesses, which noticed the environmental taxes introduction in the Czech tax system, reacted to this act. The result was positive because one hundred businesses reacted by economies introduction. Twenty-nine businesses reacted by technological process innovations and only twenty-two businesses (15 %) increased the product or service prices (see figure 13). As the final result the environmental tax reform could lead to increasing the number of innovations, which can be called eco-innovations. The eco-innovations according to the European Environment Agency [3] present the technological development generating products, equipment or processes leading to environment pollution reduction and to reduction of non-renewable natural sources use.

Conclusion

The research results in the area of implementation of environmental taxation in the Czech

Republic brought new qualitative and quantitative information for the development of the theory and practice in the area of environmental taxation.

The environmental tax reform has been going on in three stages in the Czech Republic but we can speak of **five stages** altogether. The environmental taxes can serve as a very **effective tool** for improving the environment as well as for the state economics development if all the rules and principles of the environmental tax reform are followed. As the previous text shows, it is especially important to follow **the principle of revenue neutrality** and to connect the environmental taxes introduction with work tax reduction. The environment improvement can be gained by **taxation of negative externalities** which cause pollution and by **motivating** the households and businesses to steps leading to non-renewable sources comsumption reduction and to environmental burden reduction.

The performed research showed that the crucial problem of the environmental tax reform is mainly **non-sufficient awareness** of the households and businesses in the Czech Republic about its progress and especially about its reasons. These subjects could hardly make steps improving the environment. The research performed among households uncovered that **37 %** of interviewed households are not aware of the environmental taxes existence even after more than four years. The result among businesses was also dismal (22 % businesses do not know about environmental taxes). The research proved the failure of the state in informing on the environmental tax reform and also in other steps, for example when the businesses learned about the environmental taxes mostly from the media. The research also shows that most of the interviewed households were not motivated to investments leading to the environment improvement (energy saving products, change of house heating, etc.) by the environmental taxing. Only 32 % interviewed households understands the environmental taxes as a necessary tool to environment protection and most of the interviewed households expects their further growth or extension. A positively evaluated result of the research can be that only **15 %** of the interviewed businesses increased their product and service prices because of the environmental taxes introduction into the Czech tax system.

By the ecologization of the Czech tax system the state authorities should also consider the low-income households and households which do not directly apply to the work taxation reduction and therefore the environmental taxes impact them in full height. The state authorities should also **inform the households and businesses better** about the Czech tax system ecologization and they should inform in a way to motivate the subjects to steps leading to environmental improvement. From the performed research we can assume that in the Czech society there has been a resentment towards any taxes and new taxes introduction is followed by disapproving attitude of households as well as businesses. To inform and to change the attitude towards the environmental taxes the state could use a whole scale of tools from the marketing field. This area might be the subject of further research.

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Abstract

THEORETICAL AND PRACTICAL PROBLEMS OF ENVIRONMENTAL TAXATION IN CONDITIONS OF THE CZECH REPUBLIC

Zdeněk Hruška, Lilia Dvořáková

The paper presents the research results in the field of environmental taxation in the conditions of the Czech Republic which was performed in 2011 and 2012. At first the theoretical analysis of environmental taxation genesis, current state and development in the Czech territory is carried out. Then the environmental tax reform in the Czech Republic is examined when the theory is supplemented by authors' own knowledge. At present the environmental taxation belongs to important tools of the state fiscal policy to gain further state budget income, to improve the environment and also to implement the concept of sustainable development. The principles of the environmental tax reform, which are researched in the paper, must be followed to accomplish these.

In the next part of the paper the research results on the environmental taxation influence on households in the Czech Republic are presented and the focus is to determine the awareness of Czech households about environmental taxes. The Czech households reactions to the environmental taxes introduction are also researched. Important results of the performed survey of a hundred and two households are analysed in the paper.

The paper also analyses and evaluates environmental taxation in relation to businesses operating in the Czech Republic. A survey of a hundred and ninety-three firms was carried out for this purpose. The results showed serious facts mainly concerning the awareness and reactions of Czech businesses to the Czech tax system ecologization. The content of the paper includes a formulated recommendation to the state authorities in the future stages of the ongoing environmental tax reform in the Czech Republic. Their detailed analysis including the environmental taxes impact on economics and its competitiveness will be the scope of research in the following period.

Key Words: *environmental tax reform, environmental taxes, household, business, revenue neutrality principle.*

JEL Classification: *H23, H31, H32.*

ENVIRONMENTAL PERFORMANCE AND RESPONSIBLE CORPORATE GOVERNANCE: AN EMPIRICAL NOTE

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Introduction

Incorporating eco-sustainability criteria into the corporate agenda means assigning the natural environment such attributes as power, legitimacy, urgency and proximity [10]. The complexity and interconnectedness of global ecosystems make it difficult for managers to determine specific impacts on these systems; but that is only an excuse for trivial sustainability reporting and dubious triple-bottom-line assessments. And it is the very relationship between accountability in the form of disclosure and 'shareholder value' that has kept the business-case controversy alive [15].

There is also a second thing of vital importance, which we dare say has never been empirically tested: the effect of managerial discretion on environmental performance. Since legitimacy is now universally considered a vital resource for the organization [8], it is natural to hypothesize that in the long run those who do not use the power in a responsible manner will tend to lose it. Donna Wood [36] proposes a hierarchical view of corporate social responsibility (CSR) principles, with legitimacy being the root principle, public responsibility the second principle, and managerial discretion the last. Thus, in her formulation, reactive firms are motivated only by legitimacy, responsive firms by legitimacy and public responsibility – i.e. the outcomes related to their primary areas of involvement with society – and interactive firms by all three principles. However, on environmental matters these layers of responsibility tend to blend together, hence rendering empirical investigation a daunting task.

If we think in terms of reductions in greenhouse gas emissions, it is a mystery what amount is owed to simple compliance with state regulation, and what proportion is exclusively an outcome of the managers' decisions as moral actors [5]. Moreover, some authors completely disregard the possibility of discovering anything other than the profound reluctance of business leaders to be held even remotely accountable for their actions [26]. Hence it can be hypothesized that environment-centered, rather than business-centered, enterprises are still rare birds.

The present contribution seeks to capture the relationship between greenhouse gas emissions and company financial performance. The data were extracted from corporate annual and sustainability reports of Europe's largest industrial groups over a period between 2004 and 2007. The study's hypotheses are collated from a literature review spanning almost a quarter of a century, and panel data analysis is conducted using a variety of econometric methods and model specifications. The results are mixed, with pollution levels in some cases decreasing with better financial performance, while in others being positively related to profitability. The results are not robust across industries, and to several model misspecifications. Owing to the uniqueness of the database in use and to the complexity of the econometric analysis, our findings are another proof of the controversy surrounding the relationship between firm financial and environmental performance.

1. A literature Review: The Environmental Performance / Financial Performance Relationship

Correlational analysis has produced some interesting results, even if we believe that the statistical issues associated with inflated Type I errors and assumption testing have not been

properly addressed. Pava & Krausz [27] suggested that there is almost no evidence that socially responsible firms perform worse than other firms; in fact, most of the evidence pointed to a stronger financial performance of responsible firms, but also to a disproportion in size compared to the control group. Preston & O'Bannon [28] computed 270 correlations in both contemporaneous and lead-lag form for a date set covering an 11-year time period; they found support for the hypothesis that there is a positive association between social and financial performance in large US firms, especially for the case of financial performance influencing social responsiveness. On the same note, Waddock & Graves [33] evaluated the linkage between financial and social performance, using CSR as both a dependent and independent variable; they found that social responsibility positively depends on financial performance, but, at the same time, good financial ratios are correlated with lagged social performance, possibly forming a virtuous circle. Griffin & Mahon [16] corroborate these results by arguing that they found no firms in the high corporate social performance and low financial performance group.

A large number of studies have envisaged corporate environmental (and social) performance as an explanatory variable for such outcomes as stock valuation and market risk. In this respect, Konar & Cohen [19] found that poor environmental performance has a significant negative effect on the intangible-asset value of publicly traded firms, while the effect of toxic emission levels tends to be both statistically and economically significant. The above evidence is supported also by Freedman & Patten [12] who suggest that companies with worse pollution performance suffered more negative market reactions than firms with lower emissions; on the other hand, voluntary environmental disclosure appears to mitigate the negative impact of actual performance information, which is consistent with the findings of Murray et al. [23]. Finally, the evidence brought by Ziegler et al. [38] is somewhat neutral: the stock market rewards investment in clean sectors with a premium, while the environmental and social behavior of managers does not diminish the stock performance of the corporation. However, it should be noted that their results indicate that a stronger sustainable behavior does not have a positive effect either, such that no explicit incentives for socially desirable activities can be clearly identified.

The studies using accounting measures of profitability on the dependent variables' side can be separated into two groups: the former dealing with the broader issue of social performance, and the latter using the more restrictive indicators of environmental performance as explanatory variables. The inquiry of Lopez et al. [20] shows that the effect of CSR practices was negative in the short-term, but positive effects on profitability were noticed several years after the inclusion of a company in a sustainability index. Perhaps unexpectedly, a composite measure of corporate social performance (CSP) may exhibit no relationship with traditional accounting measures of profitability, but component dimensions, like the environmental performance, actually might [21]. And it is quite common for researchers nowadays to proceed to itemize each CSR aspect, i.e. the environment, consumers, human rights, in order to gain more control over the analytic process.

Among all CSR dimensions, environmental performance has always been a focal point of research, partly because sustainability is becoming more and more of a newspaper headline, and partly because pollution levels and ratings are more easily quantifiable and comparable than other social performance measures. When profitability is measured with regard to return-on-assets (ROA), Russo & Fouts [29] suggest that "it pays to be green", and that this relationship strengthens as industry growth increases. Conversely, Balabanis et al. [2] found that environmental protection, while carrying a higher cost for the firm, is also a low profitability driver for subsequent periods. This result is consistent with the reported findings of Wagner et al. [34], which resonate with the traditionalists' predictions [14] on the uniformly negative relationship between environmental performance and economic performance. Supporting evidence seems to pile up, according to Telle [31] who produces evidence that the previously-reported positive effect of plant-level environmental performance on accounting performance (return on sales) tends to dissolve when unobserved plant characteristics are accounted for using a random effects model for panel data. Finally,

Van der Laan et al. [32] actually say that, apparently, a good reputation for being concerned with the environment leads to real monetary losses. Consequently, it seems that attaining a positive reputation requires investments up to a point where marginal returns may eventually outweigh marginal costs, thus rendering the conclusion that "it pays to be green" premature.

The relationship between environmental (and social) performance and accounting figures is still controversial, but researchers have come to agree that the legitimizing nature of environmental disclosures is boldly expressed whenever sustainability efforts are presented in monetary terms [7]. Beyond mere disclosure there lies a whole world of uncertainty, and researchers have had to deal with it ever since the first inquiries into the problematic relationship between corporate sustainability and firm economics.

2. Sample Selection and Variable Description

2.1 The Identification and Measurement Issue

Applied researchers are sometimes forced to ignore the theoretical consequences of introducing a new concept (e.g. environmental performance); more often, they will be tempted to adopt a less rigorous, but more down-to-earth exploratory effort of pinning down all visible implications. Therefore, the most important design and methodology issue related to environmental (and social) performance is the real-life identification of the actual construct [17].

For the purpose of this paper, the issue of performance indicator (or content) validity was paramount. That is why we hand-collected raw emissions data from the corporate annual reports of the largest European industrial groups. These data, expressed in uniform units of measurement, are used without subsequent rankings or classifications, in order to be able to draw valid conclusions on the relationship between emission levels and financial performance. We caution the reader not to immediately extrapolate pollution levels to the more comprehensive concept of environmental performance; in our view, the very careful determination of our performance indicator is a major strength, but also a limitation of this particular research design.

In their sustainability reports, large business groups generally disclose consolidated amounts of greenhouse gas emissions for all their subsidiaries and range of activities. Data are self-reported by all facilities within the consolidation perimeter, based on estimates or on actual measurements, depending on the production process, and refer exclusively to the carbon footprint of the facility, and not that of the products themselves. Thus we may question the reliability of the disclosed figures, just as we sometimes doubt "the true and fair view" generated by the accounting department. Nevertheless, the European Union policy has been designed to address greenhouse gas emission measurement and reporting issues, as well as allowance trading.

Since the United Nations Framework Convention on Climate Change entered into force on 21 March 1994, the European Union launched a debate on the suitability and possible functioning of greenhouse gas emissions trading within the EU borders. The Kyoto Protocol and its binding targets for 37 industrialized countries and the European community for reducing greenhouse gas (GHG) emissions, was implemented in conjunction with the Sixth Community Environment Action Programme which provided for the establishment of a Community-wide emissions trading scheme by 2005. The regulatory output – mainly Directive 2003/87/EC establishing a scheme for greenhouse gas emission allowance trading – was especially designed to ensure sound reporting and robust verification for the activities of the operators which fall under the national allocation plan. However, of greatest interest to our research is the discussion of how companies can fulfill a complete, consistent, transparent and accurate monitoring and reporting of greenhouse gas emissions, in accordance with the guidelines laid down in the Decision 2004/156/EC, as amended by Decision 2007/589/EC5.

In the aforementioned Decision, the European Commission puts forward six monitoring and reporting principles: completeness, consistency, transparency, trueness, cost effectiveness, and faithfulness, which resemble the International Accounting Standards Board's (IASB) Conceptual Framework, or the Global Reporting Initiative's (GRI) Sustainability Reporting Guidelines. Next, it describes the calculation and measurement-based methodologies for the determination of

emissions, alongside a detailed monitoring plan to be prepared by the operator (company or plant management), and checked and approved by the competent authority. Specific CO_2 emissions calculation formulae are also provided for combustion emissions (based on fuel consumption) and process emissions (based on material consumption). Finally, control and verification procedures require that the operators shall establish, document, implement and maintain effective data acquisition and handling activities for the monitoring and reporting of greenhouse gas emissions. Overall, the European Commission has created the regulatory framework for the provision of reliable data, produced by certified measurement systems employing transparent methodologies.

This brief overview of relevant Community regulation was intended to convince the reader that, even if the data are collected from corporate sustainability reports, we can be reasonably assured that the calculation of emissions is at least free from material misstatements. Moreover, all the companies in our sample have established EN/ISO 14001 environmental management systems aimed at achieving the organization's environmental policy defined by the top management. Consequently, we strongly believe that the collected data, although not perfectly free from bias or non-conformities, are the best available at the moment in terms of relevance and reliability.

2.2 Sample Description

Our balanced panel data consist of 77 European business groups, for which the performance indicators were extracted over a four-year period, between 2004 and 2007, with a total of 308 observations. The parent company of each group is listed on a European market, and included in the Dow Jones STOXX sector indices available for Europe. We used the index component lists as of the end of August 2008, for the following classifications according to the companies' primary source of revenue (sector codes are between brackets): Industrials (2000), Basic Materials (1000), Oil & Gas (0500) and Healthcare (4500). These sectors are environmentally sensitive; we expected therefore a higher level of environmental performance disclosure from their constituents. Table 1 contains a list of all sample companies and the country of incorporation for the parent of the group.

The dependent variable (GGE) is an environmental performance measure, namely consolidated greenhouse gas emissions for a whole financial year. It is expressed in kilotons of CO_2 equivalent, and it was extracted from annual corporate sustainability reports beginning with 2004. The application of this selection criterion revealed profound differences in the quality of environmental disclosure among higher polluting sectors (see Table 2): companies activating in the production of Basic Materials exhibit higher levels of sustainability disclosure compared to the Oil & Gas and Healthcare sectors. However, maybe not surprisingly, Oil & Gas producers are as large a polluter as cement or steel industry members. These discrepancies are food for thought, as the literature has not documented until now the Europe-wide propensity for corporate environmental disclosure, in the context of sector analysis. The sample is representative, firstly because it tracks the largest by market capitalization of the European quoted business groups, and secondly because it encompasses companies from 16 Western and Central European countries, of which U.K. companies occupy more than a quarter of the sample (25.9 %), followed by France (12 %) and Switzerland (11 %).

Another element of novelty is represented by the configuration of a binary variable capturing the quality of sustainability governance. All listed companies are required to compile a corporate governance statement for the reporting year, but some do disclose more on their practices related to sustainability. Our binary variable is an interaction term between the presence of a particular governance structure, and the level of assurance of any company's annual sustainability report. Firstly we collected data on the presence of such board-level or managerial structures dealing with environmental protection, or more generally with sustainable development issues; 63 of a total of 77 companies have some kind of responsibility governance structure in place (e.g. the Sustainable Development Committee, or the Director of Sustainable Affairs). Secondly, we checked whether each company's latest sustainability report had been subject to independent assurance [1], [9], [24]. We considered a report to have received assurance only if the auditors' opinion made clear comments on the environmental data, not just on the presentation

Tab. 1: **A List of the Companies Included in the Analyzed Sample, their Country of Incorporation and CSR Score (i.e. the responsible governance binary variable)**

Company	Country	CSR	Company	Country	CSR
ABB	CH	1	K + S	DE	0
Abertis	ES	1	Lafarge	FR	1
Acciona	ES	1	LONMIN	GB	1
ACS	ES	1	Metso	FI	0
Aéroports de Paris	FR	0	MONDI	GB	1
Air Liquide	FR	1	Norsk Hydro	NO	1
AMEC	GB	0	Novartis	CH	1
Anglo American	GB	1	Novo Nordisk	DK	0
Arkema	FR	0	Novozymes	DK	0
AstraZeneca	GB	1	OMV	AT	1
Atlas Copco	SE	0	Outokumpu	FI	1
BAE Systems	GB	0	Premier Oil	GB	0
Balfour Beatty	GB	1	Repsol YPF	ES	1
BASF	DE	0	Rhodia	FR	1
Bayer	DE	1	Rio Tinto	GB	1
BG Group	GB	1	Roche	CH	1
BHP Billiton	GB	1	Royal Dutch Shell	GB	0
BP	GB	1	Ruukki	FI	0
Brisa	PT	1	Saint-Gobain	FR	0
Cairn Energy	GB	1	Sanofi-Aventis	FR	1
Ciba	CH	0	Scania	SE	0
CIMPOR	PT	0	SKF	SE	1
Clariant	CH	0	Smith & Nephew	GB	0
Cobham	GB	0	Smiths Group	GB	0
CRH	IE	1	Solvay	BE	0
DSM	NL	1	StatoilHydro	NO	0
ENI	IT	1	Stora Enso	FI	1
Eramet	FR	0	Syngenta	CH	1
Gamesa	ES	1	Titan Cement	GR	1
Georg Fischer	CH	1	TNT	NL	1
Givaudan	CH	0	Travis Perkins	GB	0
GlaxoSmithKline	GB	1	Umicore	BE	0
Grifols	ES	0	UPM Kymmene	FI	0
HeidelbergCement	DE	0	Vallourec	FR	1
Holcim	CH	0	Volvo	SE	0
Holmen	SE	1	Wärtsilä	FI	0
Imerys	FR	1	Xstrata	GB	1
Italcementi	IT	1	Yara	NO	0
Johnson Matthey	GB	0			

Source: own

Note. The CSR score is the interaction between the presence of a governance structure dealing specifically with sustainability and the opinion of the independent auditor concerning the reliability of the data in the environmental reports.

Tab. 2: Sample Constituents per Sector

Sector	Index constituents per sector	Sample firms per sector	Percentage of selected companies per sector	Percentage of final sample
Industrials	120	23	19.16	29.80
Basic Materials	47	36	76.59	46.76
Oil & Gas	40	9	22.50	11.68
Healthcare	33	9	27.27	11.68
Total	**240**	**77 (final sample)**	**-**	**100 %**

Source: own

Tab. 3: Financial Accounting Indicators, Grouped into Several Classes (Part 1)

Class	Ratio	Formula
1. Asset utilization measurements	*Asset age (AA):* indicates the extent to which a company has continued to replace its existing assets with new ones on an ongoing basis. A high value indicates a high proportion of modernized property, plant and equipment (PPE).	Carrying value of PPE / Original cost of PPE
	Investment turnover ratio (ITR): signals the ability of a company to convert its debt and equity into sales. A high ratio indicates a high level of efficiency in creating sales.	Sales / (Shareholders' equity + Long-term liabilities)
	Sales per person ratio (SPP): high degrees of employee efficiency are bound to result in strong profitability.	Annualized revenue / Full-time equivalents
2. Operating performance measurements	*Operating income to sales ratio (OIS):* reveals the return from standard operations, excluding the impact of extraordinary and discontinued operations.	Operating income / Revenue
	Net income to operating income ratio (NOI): quantifies the effect of financing and other elements on the reported operating income.	Net income from continuing operations / Operating income
3. Cash flow measurements	*Cash flow from operations (CFO):* can be used to determine the extent to which cash flow differs from the reported level of operating income.	Cash flow from operating activities / Operating income
	Cash flow return on assets (CFR): is used to calculate the amount of cash that a company is generating in proportion to its asset level.	Cash flow from operating activities / Total assets

Tab. 3: Financial Accounting Indicators, Grouped into Several Classes (Part 2)

Class	Ratio	Formula
4. Liquidity measurements	*Current ratio (CR):* is used by lenders to determine whether a company has sufficient liquidities to pay its debt.	Current assets / Current liabilities
	Cash ratio (CSH): uses only cash and short-term marketable securities in the numerator, so it is the best way to see what proportion of liabilities can be paid immediately.	Cash and short term investments / Current liabilities
	Short-term to long-term debt (SLD): reveals the proportion of total debt that is coming due for payment in the near term.	Total short-term debt / Total debt
5. Capital structure measurements	*Debt to equity ratio (DTE):* reveals the extent to which company management is willing to fund its operations with debt, rather than equity.	Total debt / Equity
	Funded capital ratio (FCR): shows the proportion of fixed assets that are being funded by long-term funding, which is defined as long-term debt and stockholders' equity.	(Stockholders' equity + Long-term debt) / Non-current assets
6. Return on investment measurements	*Return on assets employed (ROAE):* is considered critical for determining a company's overall level of operating efficiency. We use net income from continuing operations.	Net profit / Total assets
	Operating return on equity (ROE): is used by investors to determine the amount of return they are receiving from their capital investment in a company.	Operating income / Equity
	Earnings per share (EPS): is the standard used to compare the financial results of publicly held companies.	Net income / Number of shares outstanding

Source: own

of the report or on the implementation of environmental management systems. Consequently, the interaction between the presence of sustainability governance structures and the presence of independent assurance resulted in an objective and original dichotomy coded *CSR*, awarding one point for socially responsible governance, found in 42 companies, and none for the remaining 35 firms (see Tab. 1 for the distribution of the binary score for the entire sample).

Company size is the most common control variable to be found in the literature [25]. In our study, it is operationalized through two indicators: consolidated total assets (*TA*), expressed in millions and converted to the Euro at year-end exchange rates; and number of full-time equivalent employees (*EMP*) at the end of the fiscal year, as disclosed within the annual reports. It is expected that these two measures of company size in absolute terms to be highly correlated with pollution levels, in order to explain static inter-firm differences.

Another measure bound to capture the variation between companies is a five-year average of the industry return on assets (*IROA*), as suggested by Russo & Fouts [29]. Following the guidelines offered by Reuters.com, we classified our four-sector companies into 28 industries, for which *IROA* was already present on the mentioned website. One disadvantage of this indicator is that it aggregates asset returns for companies on five continents, thus diminishing its relevance for the European territory.

To test the relationship between environmental performance and financial performance, we collected data for fifteen accounting performance measures (see Table 3 for a detailed presentation). We believe that this is to date the most comprehensive financial performance database in use for this type of study [16], mainly because we encompassed a range of performance measurement spanning six broad classes [6]. It is worth noting that companies' adoption of the International Financial Reporting Standards (*IFRS*) led to comparable data for 2004, for which listed European firms were required to issue 'in compliance' financial statements; thus, accounting data before 2004 was not suitable for our study, due to lack of comparability.

3. Hypotheses, Methodology and Results

3.1 Sustainability Governance and Firm Performance

The literature has not documented until now the effect of sustainability governance on actual pollution levels. We use our dichotomous variable *CSR* to capture board involvement in sustainability issues, but only as far as a binary variable can go. Therefore, we do not expect high sensitivity to environmental and social challenges, but rather a bird's-eye view on the two groups that exhibit CSR involvement or CSR indifference. We will formulate our first two hypotheses as follows:

H_a^1: Companies involved in CSR activities at board level will be smaller polluters than CSR indifferent firms.

H_a^2: Sustainability governance has an impact on the enterprises' financial performance levels.

The results are displayed in Table 4. Naturally, we use classical parametric t-tests to assess the differences between the two groups. However, we do not rely fully on these tests, as several assumptions must be validated. Firstly, Levene's test indicates that the homogeneity of variance assumption is generally not violated, with the exception of three financial performance measures (*OIS*, *SLD*, and *EPS*). Even so, the parametric t-test includes Welch's correction for unequal variances, as a measure of precaution. Secondly, the normality assumption is violated for almost every variable. We use Shapiro-Wilk's statistic to test the null hypothesis that the two groups are extracted from normally distributed populations in the context of each performance measure. We strongly reject that null hypothesis, and consequently use nonparametric tests of differences between two independent means (Mann-Whitney) for our hypotheses.

Total assets (*TA*) and number of employees (*EMP*) are significantly larger for CSR involved companies; also, it appears that CSR involvement leads to a lower capacity to convert corporate debt and equity into sales (*ITR*). On the other hand, sustainability governance appears to discriminate between corporate profitability levels, as operating income to sales (*OIS*) and earnings per share (*EPS*) are significantly higher for those companies which adopt

Tab. 4: Parametric and Nonparametric Tests of Differences between CSR Involved and CSR Indifferent Companies

Var.	Variance: Levene's[1] *df*	Normality: Shapiro-Wilk[2] z-score		Parametric t-test using Welch approx. for unequal variances				Nonparametric Mann-Whitney U test			
				Mean (Std. Dev.)		*t* statistic	Effect size[3] Cohen's *d*	Sum of ranks		z-score	Effect size[4] Rosenthal's *r*
	(1, 306)	Non-CSR	CSR	Non-CSR	CSR			Non-CSR	CSR		
GGE	0.10	9.01**	8.79**	10993 (23776)	12718 (21426)	-0.66	.07	19429	28157	-2.82**	.16
TA	2.20	9.14**	8.39**	15676 (30030)	23825 (30560)	-2.35*	.27	18165	29421	-4.45**	.25
EMP	1.18	7.76**	6.41**	35288 (41058)	45372 (40888)	-2.15*	.24	19314	28271	-2.97**	.16
AA	0.77	3.42**	2.66**	45.86 (12.27)	53.72 (12.79)	-5.50**	.62	17469	30116	-5.34**	.30
ITR	1.21	6.20**	7.56**	146.65 (79.35)	110.18 (73.92)	4.14**	.47	25614	21972	5.12**	.29
SPP	0.65	8.77**	8.80**	0.42 (0.48)	0.41 (0.42)	0.12	.02	20677	26909	-1.22	.07
OIS	4.40*	2.93**	10.43**	13.18 (8.54)	20.19 (41.94)	-2.11*	.23	19522	28064	-2.71**	.15
NOI	1.42	5.44**	10.09**	61.83 (22.87)	60.74 (59.65)	0.21	.02	21019	26566	-0.78	.04
CFO	2.46	10.27**	8.73**	47.38 (488.77)	106.57 (98.30)	-1.40	.16	20193	27393	-1.87	.11
CFR	0.01	1.33	4.64**	10.35 (5.40)	11.04 (5.70)	-1.09	.12	20850	26735	-1.02	.06
CR	2.67	3.81**	5.53**	150.40 (45.24)	146.61 (58.23)	0.64	.07	22500	25085	1.12	.06
CSH	1.12	6.66**	8.76**	32.03 (26.91)	37.92 (38.45)	-1.57	.17	20327	27259	-1.67	.09
SLD	8.16**	5.38**	5.98**	32.66 (25.73)	28.77 (21.10)	1.42	.16	22221	25365	0.75	.04
DTE	3.32	7.45**	8.74**	70.64 (59.77)	59.78 (109.87)	1.10	.12	22561	25025	1.19	.07
FCR	2.96	5.32**	5.46**	100.89 (26.14)	96.79 (30.43)	1.27	.14	23438	24148	2.32*	.13
EPS	7.70**	8.13**	9.27**	2.13 (3.37)	3.57 (6.50)	-2.49*	.29	19270	28315	-3.03**	.17
ROE	0.03	6.97**	6.99**	29.82 (21.51)	27.65 (21.10)	0.88	.09	21687	25898	0.07	.01
ROAE	0.23	2.94**	8.27**	6.97 (4.95)	7.25 (6.58)	-0.68	.07	21718	25868	0.11	.01

Source: own

Notes. * $p < .05$; ** $p < .01$, all two-tailed. For all tests, Non-CSR firms have 140 observations, while CSR firms have 168 observations.
[1] A significant Levene's statistic indicates that the populations from which the two groups are extracted have dissimilar variances.
[2] A significant z-score for the Shapiro-Wilk test indicates that the underlying populations have non-normal distributions.
[3] Effect size indicated by Cohen's d has the following thresholds: > .20, > .50, and > .80 for a small, medium and large effect, respectively.
[4] Effect size thresholds for Rosenthal's r are the following: > .10, > .30, and > .50 for a small, medium and large effect, respectively.

independently audited CSR policies. It must be noted that the statistical effects for the financial performance indicators remain within the 'small' interval. In that sense, parametric and nonparametric tests are consistent mainly because they all report statistical results of lesser practical importance, and thus not very conclusive.

However, the nonparametric tests capture two more points of divergence between our two groups. Firstly, CSR indifferent companies appear to have a higher proportion of fixed assets funded from long-term capital (*FCR*), but to a very small effect. And secondly, CSR involved enterprises are bigger polluters (*GGE*), thus rejecting hypothesis H_a^1, but to a small statistical effect. The parametric t-test does not capture this difference in means, which may be due to the extremely high positive skewness of pollution levels for our sample.

All in all, if we take the effect size as a definitive criterion, we can say little about the differences to be found between the two groups. The small to medium effect concerning asset age (*AA*) may be due to the particularities of each sector, but the sample size does not permit us to investigate any further. Conversely, the higher levels of investment turnover (*ITR*) found to belong to CSR indifferent firms are not implicitly connected to bottom line profitability. But most importantly, sustainability governance appears to fail the challenge of increased pollution; alternatively, CSR policies may not be destined to address environmental issues, but to repair legitimacy through disclosure. Statistics will never provide a definitive answer to this dilemma, hence legitimacy will remain unobservable.

3.2 Regression Analysis: Results and Discussion

The panel structure gives us the unique opportunity of having "more informative data, more variability, less collinearity among variables, more degrees of freedom and more efficiency" [3]. Our formulation of an alternative hypothesis for regression analysis is:

H_a^3: Greenhouse gas emission levels are significantly related to contemporaneous financial performance, after controlling for unobserved individual and sector characteristics.

The random-effects model is appropriate for our panel data structure [13]. In spite of a possible self-selection bias resulting from size or industry attributes, we can safely consider our sample to be randomly extracted from the population of large European companies. In this situation, it is natural to use subject-specific parameters to represent the heterogeneity among subjects. Panel-data theorists [37] recommend using the random-effects model in studies where the time dimension is small ($T = 4$ in our case), because fewer degrees of freedom are necessary to account for the subject-specific parameters. This specification also has the advantage of accommodating group fixed effects, like industry or CSR dummies.

Thus, the estimation of the random-effects model assumes that the dependent variable is a normally distributed independent random variable, conditional on the error components. Since the distribution of the untransformed *GGE* was positively skewed (skewness = 2.64, kurtosis = 9.50), we use the logarithmic transformation on *GGE*, which imposes to change the interpretation of regression coefficients from absolute to relative changes in the dependent variable. Visually inspecting the distribution of *Log of GGE* suggests normality, but the more formal Shapiro-Wilk test rejects the null hypothesis ($W = 0.97$, $p < .001$); however, we must remember that tests such as the above tend to declare non-normality based on very small deviations in large samples [11].

Correlation analysis is a preliminary step in discussing the implications of multicollinearity in regression analysis. Table 5 displays the parametric (Pearson's r) and nonparametric (Spearman's ρ) matrix for the dependent and covariate variables. We use both types of correlation measures because we believe that in some cases the parametric assumption of Pearson's test may be violated. The results are qualitatively identical, with high correlations (greater than .60) between the untransformed *GGE* and firm size indicators, i.e. *TA* (total assets) and *EMP* (number of employees). On each side of the table, only five more significant correlations are above the .60 threshold, notably those between *ROAE* and three other variables: *OIS*, *CFR*, and *EPS*. Overall, it appears that *GGE* is not significantly related to any variables except the firm size proxies, while the financial performance measures are largely independent of each other. Since *TA* and *EMP* are highly correlated ($r = .58$, $\rho = .81$), we will use them alternatively in our model building. In

Tab. 5: Parametric and Nonparametric Correlation Matrix for the Dependent and Covariate Variables

	GGE	TA	EMP	IROA	AA	ITR	SPP	OIS	NOI	CFO	CFR	CR	CSH	SLD	DTE	FCR	EPS	ROE	ROAE
GGE		.63**	.33**	.06	.03	-.08	.41**	.01	-.07	.02	.15	-.18	-.10	.02	.04	-.23**	.04	.12	.03
TA	.60**		.58**	.32**	.07	-.02	.60**	-.01	-.04	.02	.16	-.20	-.03	.16	.00	-.26**	-.04	.16	.04
EMP	.47**	.81**		-.05	.04	.03	.01	-.08	.01	.01	.03	-.21	-.03	.01	.11	-.24**	-.04	.12	-.02
IROA	-.08	.10	-.03		.27**	-.03	.49**	.23**	-.02	.04	.37**	.12	.14	.15	-.15	-.02	-.04	.26**	.27**
AA	-.02	.13	.00	.24**		-.40**	.00	.21	.10	.05	.26**	-.11	.12	-.13	.23**	-.08	-.02	.17	.18
ITR	-.12	-.14	.13	.02	-.51**		.13	-.23**	-.02	-.01	-.17	-.04	-.23**	.14	-.14	.07	-.06	.04	-.05
SPP	.26**	.26**	-.14	.43*	.01	.04		.05	-.08	.02	.27**	-.10	-.06	.05	-.11	-.12	-.07	.25**	.13
OIS	.10	.10	-.15	.36*	.48**	-.53**	.14		.06	.02	.17	.28**	.52**	-.10	-.01	.04	-.01	.38**	.69**
NOI	-.18	-.11	-.09	-.04	.05	-.06	-.06	-.01		.05	.05	.11	.06	.01	.31**	.19	.15	.05	.26**
CFO	.02	.02	-.01	-.19	.09	-.31**	-.14	-.12	.14		.05	.02	.03	.04	.00	.00	.03	.07	.08
CFR	.17	.09	.02	.44*	.27**	-.10	.21	-.67**	.00	.09		.14	.20	-.06	-.12	.11	.06	.49**	.57**
CR	-.10	-.32**	-.27**	.13	-.19	.07	.09	.04	.22	-.03	.20		.66**	-.09	-.20	.63**	.25*	.06	.40**
CSH	-.04	.01	.02	.12	.15	-.20	-.13	.30**	.09	.10	.32**	.41**		-.05	-.13	.31**	.17	.13	.44**
SLD	-.02	.00	.03	.10	-.14	.20	.09	-.09	.04	-.04	-.02	-.12	-.11		-.12	-.05	-.02	-.12	-.09
DTE	.06	.07	.08	-.37**	.13	-.15	-.29**	-.14	-.16	.15	-.34**	-.34*	-.20	-.20		-.02	.07	.32**	-.05
FCR	-.31**	-.35**	-.29**	-.02	-.15	.21	-.03	-.07	.31**	-.12	.06	.73**	.24**	-.12	-.14		.19	.02	.29**
EPS	.34**	.26**	.21	-.01	.01	-.08	.10	.15	.08	-.02	.14	.19	.11	.02	-.04	.08		.06	.15
ROE	.16	.12	.17	.34**	.14	.19	.11	.56**	-.18	-.40**	.55**	-.04	.08	-.09	-.02	-.08	.10		.61**
ROAE	.06	-.01	-.04	.38**	.16	.06	.17	.63**	.36**	-.31**	.69**	.34**	.25**	-.01	.37**	.31**	.27**	.62**	

Source: own

Notes. ** p < .01, using the Bonferroni correction. Pearson's *r* coefficients are above the diagonal line; below the diagonal line are Spearman's ρ correlation coefficients.

order to improve the predictive ability of the models by means of approaching normality in the firm size proxies, we use *Log of TA* and *Log of EMP*, which are also highly correlated with each other (r = .78, ρ = .81).

The results of regression analysis will be discussed in the context of several model specifications. Table 6 shows the base model estimation with all 15 financial performance indicators as predictors, plus the CSR binary variable; industry fixed effects are included in the extended specification; finally, the addition of company size control variables serve to complete the model building process. The story behind the changes in explanatory power can be summarized as follows: the base model is better at explaining the variation within the entities (R^2 within = .1854), but does a very unsatisfactory job at explaining the differences between companies (R^2 between = .0747). As expected, the industry fixed effects improve explanatory power only for the differences between the units (R^2 between = .4059). When taking into account the number of employees for each firm-year observation, we manage to better explain the variation within each company (R^2 within = .3104), and also between the sample firms (R^2 between = .6451). The alternative specification with total assets as a proxy for company size explains more of the variation within the units (R^2 within = .3680), but less of the differences between companies (R^2 between = .6118).

A very interesting result, which is consistent across all specifications, is that return on equity (*ROE*) is positively and significantly related to increases in pollution levels. On the other hand, responsible governance (*CSR*) appears to make no difference in pollution control. When including the industry fixed effects, the base category is set to the Industrials sector, which is not significantly different from Healthcare in terms of greenhouse gas emissions. However, companies belonging to the Basic Materials and Oil & Gas industries have visible high-polluter profiles, but emission levels seem to be significantly lower for firms belonging to industries with a higher 5-year average profitability (*IROA*). It is somewhat puzzling to notice that sales per person (*SPP*) is positively related to emission levels when the number of employees is used as a control variable, but negatively related when *Log of TA* is used as a proxy for firm size. Capital structure measures (*FCE* and *DTE*) are both negatively linked to pollution levels; in the case of debt to equity ratio (*DTE*), emissions appear to decrease for a positive change in the proportion of debt over equity; conversely, pollution levels are increasing for a lower proportion of fixed assets funded through long-term capital. Finally, satisfactory sales efficiency (*ITR*) and return from operations (*OIS*) are linked to significant decreases in pollution levels.

For the base model specification, the results are not robust across industries (see Table 7). The most important remark is that the sign of some significant coefficients is not consistent across models; notice the incompatibilities for the *ROE* and *ROAE* predictors. The signs are consistent, but the coefficient standard errors too high for variables such as asset age (*AA*), investment turnover ratio (*ITR*), operating income per sales (*OIS*), net income to operating income ratio (NOI) and funded capital ratio (*FCR*). The evidence is overwhelmingly though in favor of a negative relationship between financial performance and emission levels. Only the 23 companies belonging to the Industrials group seem to increase their sales per person (*SPP*) and earnings per share (*EPS*) while also becoming bigger polluters. Surprisingly, responsible governance (*CSR*) is also related to higher pollution levels for firms activating in the Oil & Gas sector. The predictive ability of the four industry-tailored models is also extremely inconsistent, with two of them explaining almost 100 % of variation between entities (Oil & Gas and Healthcare), and the Industrials model explaining almost nil. Overall, it appears that industry-specific heterogeneity is a major obstacle in obtaining reliable estimates of model coefficients.

We used the Huber [18] / White [35] / sandwich estimator implemented in the Stata software [30] to compute robust variances, in order to give accurate assessments of the sample-to-sample variability of the parameter estimates even when the model is misspecified. The results presented in Table 8, under the *Heteroscedasticity robust models* heading, are consistent with the previous findings, in that industry dummies, industry profitability and size proxies are all highly significant. However, sales per person (*SPP*) has an inconsistent sign when alternate company size measures are used, and only the operating income to sales ratio

Tab. 6: Panel Data Regression Analysis in Contemporaneous Setting (dependent variable: natural logarithm of Greenhouse gas emissions)

Vars	Base model with CSR fixed effects	With industry fixed effects	With company size control variables	
			No. of employees	Total assets
Intercept	7.013 (< .01)**	6.57 (< .001)**	0.4666 (.557)	1.8556 (.005)**
CSR dummy	0.6356 (.164)	0.4377 (.266)	0.2070 (.486)	0.1770 (.562)
BM dummy		2.71 (< .001)**	2.71 (< .001)**	2.52 (< .001)**
OG dummy		4.84 (< .001)**	4.53 (< .001)**	4.06 (< .001)**
HC dummy		1.31 (.076)	0.7242 (.196)	0.5074 (.380)
IROA		-0.2748 (.003)**	-0.1985 (.005)**	-0.2046 (.005)**
Log of EMP			0.6254 (< .01)**	
Log of TA				0.5728 (< .01)**
AA	0.0033 (.352)	0.0041 (.236)	-0.0001 (.958)	-00023 (.457)
ITR	-0.0008 (.105)	-0.0006 (.159)	-0.0016 (< .01)**	-0.0002 (.651)
SPP	0.2076 (.040)*	0.1600 (.109)	0.2342 (.013)*	-0.2511 (.012)*
OIS	-0.0007 (.444)	-0.0009 (.358)	-0.0015 (.092)	-0.0031 (.001)**
NOI	-0.0002 (.432)	-0.0002 (.439)	-0.0002 (.367)	-0.0002 (.384)
CFO	-0.0001 (.950)	-0.0001 (.882)	0.0001 (.698)	-0.0001 (.819)
CFR	0.0011 (.780)	0.0013 (.728)	0.0005 (.880)	0.0041 (.249)
CR	-0.0015 (.021)*	-0.0016 (.011)*	-0.0010 (.104)	0.0001 (.844)
CSH	0.0010 (.284)	0.0011 (.234)	0.0011 (.192)	0.0007 (.368)
SLD	-0.0002 (.704)	-0.0003 (.650)	0.0008 (.266)	0.0004 (.535)
DTE	0.0002 (.525)	0.0002 (.353)	-0.0002 (.443)	-0.0007 (.011)*
FCR	0.0001 (.859)	0.0004 (.618)	-0.0010 (.227)	-0.0024 (.012)*
EPS	0.0026 (.643)	0.0019 (.722)	0.0014 (.782)	-0.0069 (.170)
ROE	0.0046 (<.01)**	0.0047 (< .001)**	0.0047 (< .01)**	0.0049 (< .01)**
ROAE	-0.0002 (.734)	-0.0014 (.841)	0.0018 (.782)	0.0074 (.246)
Wald χ^2	50.66** (*df* = 16)	103.87** (*df* = 20)	241.48** (*df* = 21)	249.78** (*df* = 21)
R^2 within†	.1854	.1870	.3104	.3680
R^2 between††	.0746	.4059	.6451	.6118
R^2 overall†††	.0747	.4049	.6433	.6105

Source: own

Notes. * p < .05; ** p < .01.
We specified random-effects models using the feasible GLS estimator.
For each model, we present the unstandardized coefficients, with their p-values between parentheses.
† R^2 within indicates explained variation of emissions during the four-year period, for each company.
†† R^2 between indicates explained variation between companies.
††† R^2 overall is defined as the squared correlation between observed and predicted values.

Tab. 7: **Regression Results for the Base Model with CSR Fixed Effects, Grouped by Sector (dependent variable: natural logarithm of Greenhouse gas emissions)**

Vars	Industrials (23 companies)	Basic materials (36 companies)	Oil & Gas (9 companies)	Healthcare (9 companies)
Intercept	4.9924 (< .001)**	8.9755 (< .001)**	22.77 (< .001)**	24.36 (< .001)**
CSR dummy	0.2241 (.750)	0.1073 (.852)	0.8684 (.002)**	0.3259 (.680)
AA	0.0052 (.542)	-0.0049 (.350)	-0.1373 (< .001)**	-0.0519 (.008)**
ITR	-0.0006 (.460)	-0.0020 (.004)**	-0.0021 (.776)	-0.0487 (< .01)**
SPP	2.5388 (.006)**	0.0128 (.948)	0.2553 (.429)	1.3962 (.877)
OIS	-0.0013 (.931)	-0.0027 (.567)	-0.0490 (< .001)**	-0.1649 (.021)*
NOI	0.0011 (.524)	0.0001 (.801)	-0.0833 (< .001)**	-0.1070 (< .01)**
CFO	0.003 (.458)	0.0001 (.682)	0.0046 (.066)	0.0010 (.832)
CFR	0.0191 (.065)	-0.0038 (.404)	-0.1218 (.039)*	0.0561 (.515)
CR	-0.0045 (.060)	-0.0001 (.901)	0.0011 (.902)	-0.0020 (.857)
CSH	0.0059 (.023)	-0.0001 (.931)	-0.0057 (.475)	0.0070 (.572)
SLD	-0.0007 (.718)	-0.0005 (.675)	0.0053 (.341)	-0.0089 (.346)
DTE	0.0004 (.458)	-0.0012 (.025)*	-0.0156 (.065)	-0.0062 (.302)
FCR	0.0011 (.637)	-0.0036 (.007)**	-0.0215 (.336)	-0.0520 (.008)**
EPS	0.0265 (.044)*	-0.0025 (.637)	0.0589 (.684)	0.1825 (.512)
ROE	0.0139 (.003)**	0.0073 (< .001)**	-0.0603 (< .001)**	-0.0128 (.640)
ROAE	-0.0706 (.014)*	0.0060 (.384)	0.5425 (< .001)**	0.5017 (.003)**
Wald χ^2 (df = 16)	61.44**	99.49*	757.46**	121.89**
R^2 within†	.5511	.5317	.0114	.0471
R^2 between††	.0000	.3556	.9948	.9526
R^2 overall†††	.0014	.3228	.9755	.8561
No. Obs.	92	144	36	36

Source: own

Notes. * p < .05; ** p < .01.
We specified random-effects models using the feasible GLS estimator.
For each model, we present the unstandardized coefficients, with their p-values between parentheses.

Tab. 8: **Robust Regression Results for the Models with Company Size Control Variables** (dependent variable: natural logarithm of Greenhouse gas emissions)

Vars	Heteroscedasticity robust models		Autocorrelated residuals models	
	No. of employees	Total assets	No. of employees	Total assets
Intercept	0.4666 (.606)	1.8556 (.010)*	-2.2984 (.004)**	-0.8041 (.270)
CSR dummy	0.2070 (.483)	0.1770 (.555)	0.1017 (.600)	0.0482 (.808)
BM dummy	2.711 (< .001)**	2.5242 (< .01)**	2.7393 (< .01)**	2.4766 (< .01)**
OG dummy	4.535 (< .001)**	4.0617 (< .01)**	4.4282 (< .01)**	3.7637 (< .01)**
HC dummy	0.7242 (.108)	0.5074 (.316)	0.4733 (.196)	0.1116 (.768)
IROA	-0.1985 (< .01)**	-0.2046 (.001)**	-0.1742 (< .01)**	-0.1775 (< .01)**
Log of EMP	0.6254 (< .01)**		0.8813 (< .01)**	
Log of TA		0.5728 (< .01)**		0.8587 (< .01)**
AA	-0.0001 (.961)	-0.0023 (.502)	0.0012 (.794)	-0.0031 (.507)
ITR	-0.0016 (.033)*	-0.0002 (.743)	-0.0023 (.001)**	-0.0001 (.922)
SPP	0.2342 (.028)*	-0.2511 (0.019)*	0.3181 (.030)*	-0.4495 (.005)**
OIS	-0.0015 (.083)	-0.0031 (.003)**	-0.0024 (.081)	-0.0051 (< .001)**
NOI	-0.0002 (.693)	-0.0002 (.705)	-0.0001 (.767)	-0.0001 (.780)
CFO	0.0001 (.473)	0.0001 (.716)	0.0001 (.823)	-0.0001 (.932)
CFR	0.0001 (.909)	0.0041 (.419)	0.0023 (.681)	0.0075 (.189)
CR	-0.0010 (.096)	0.0012 (.850)	-0.0006 (.514)	0.0012 (.201)
CSH	0.0011 (.169)	0.0007 (.391)	0.0006 (.642)	-0.0001 (.926)
SLD	0.0008 (.279)	0.0004 (.593)	0.0014 (.177)	0.0010 (.358)
DTE	-0.0002 (.650)	-0.0007 (.112)	0.0002 (.669)	-0.0005 (.278)
FCR	-0.0010 (.296)	-0.0024 (.033)*	-0.0011 (.437)	-0.0032 (.028)*
EPS	0.0014 (.787)	-0.0069 (.270)	-0.0036 (.642)	-0.0152 (.057)
ROE	0.0047 (.078)	0.0049 (.068)	0.0045 (.008)**	0.0051 (.003)**
ROAE	0.0018 (.813)	0.0074 (.365)	0.0095 (.338)	0.0214 (.035)*
Wald χ^2 (df = 22)	4064.20**	3632.87**	437.42**	414.14**
R^2 within†	.3104	.3680	.2813	.3332
R^2 between††	.6451	.6118	.6929	.6722
R^2 overall†††	.6433	.6105	.6901	.6694
$rho_{AR(1)}$			.3088	.3215

Source: own

Notes. * p < .05; ** p < .01.
We specified random-effects models using the GLS estimator.
For each model, we present the unstandardized coefficients, with their p-values between parentheses.
$rho_{AR(1)}$ is the estimated first-order autocorrelation coefficient, which is significantly different from 0; F(1,76) = 22.07

(*OIS*) seems to be negatively related to increasing pollution levels. Otherwise, financial performance appears to be largely immune or indifferent to greenhouse gas emission levels, when the reported standard errors are robust to some kinds of misspecification.

For the same models as above (see Table 8), we fitted the cross-sectional time-series regression models when the disturbance term is first-order autoregressive [4], which is appropriate since the random-effects model can accommodate covariates that are constant over time. Again, return on equity (*ROE*) is positively related to pollution intensity, while operating efficiency and investment turnover are negatively correlated to levels of greenhouse gas emissions. These specifications are better than the heteroscedasticity robust models in terms of overall predictive ability; we notice a 5% increase in overall R^2 for models using the size proxies alternatively. The autoregressive models are able to capture more of the variation between the entities, and less of the particularities of each period within the performance of individual companies.

Limitations and Conclusions

In the following paragraphs we survey the limitations of our study. The panel data is spanning a period between 2004 and 2007; hence, this rendered a possible time series analysis irrelevant. Moreover, period fixed effects specific to an event study were also disregarded due to the impossibility to clearly define the particularities of emission levels of one year over another. In this sense, there appears to be no systematic patterns over our period of interest in the quantities of carbon equivalent emissions. As a clear-cut limitation of our study, we should mention the lack of more developed dynamic models; this difficulty would be easily surpassed in a few years' time, when more comprehensive data is to accumulate.

The companies included in the sample are representative of their industries, but also of their country of origin; they are large contributors to national GDP, as well as important tax payers and employers. However, country differences are likely to become unobservable in this type of study, and for this sample of 77 entities it does not appear possible to trace the company's environmental performance to the incorporation country's governmental involvement in eco-sustainability.

There is always the question of data reliability: these multinational groups operate on five continents. We do not have one hundred percent certainty that the collection methods are consistent across production sites, that the final amounts fairly present a consolidated view of the polluter's profile, or that the assurance statements are written in good faith. Since all the information is self-reported, the credibility of our empirical research goes as far as the quality of the data extracted from corporate reports.

The main limitation of the present study is the inclusion of only the greenhouse gas emissions as the indicator of environmental performance. Economic impacts on the natural environment cannot be limited to carbon dioxide emissions, which are only a part of the total share of responsibility companies have towards protecting the earth. One could argue that waste management, toxic releases, noise and odor, water withdrawal and discharges, as well as the complex impact on biodiversity should also be used as environmental performance indicators. The present paper has presented empirical evidence on greenhouse gas emissions and their relationship to financial performance mainly due to the availability of panel data for this indicator. Even so, the sample could suffer of selection bias, because only companies with data for four consecutive years were included in the econometric analysis. Nevertheless, future studies should also analyze relevant data from other areas of environmental impact, such as effluents, waste, water, energy, materials, biodiversity or eco-efficiency.

To briefly summarize our contribution, it is necessary to highlight the relevance of this new dataset, containing aggregated greenhouse gas emission figures, as well as IFRS-compliant financial performance indicators, in a complex panel design focused on EU enterprises. We conducted several types of analyses, tailored to capture the sign and strength of the relationship between environmental and financial performance. We also introduced an innovative measure of responsible governance, as an interaction term between board-level innovations and the level of independent assurance. Our results are mixed, largely dependent on different model specifications and the several procedures to obtain robust

standard errors. As expected, there is no definitive conclusion on the aforementioned relationship. Responsible governance seems to have an insignificant contribution to real sustainability performance, as well as to the economic welfare of the firm. Overall, we support McWilliams & Siegel's [22] contention that CSR attributes – here including emission reduction efforts – will have higher costs, but also higher revenues, resulting in a neutral relationship between CSR activity and firm financial performance.

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Abstract

ENVIRONMENTAL PERFORMANCE AND RESPONSIBLE CORPORATE GOVERNANCE: AN EMPIRICAL NOTE

Voicu D. Dragomir

Does it pay to be green? This question is by no means new or surprising; but what is really puzzling is that dedicated research efforts have failed to provide consistent evidence on this issue. Therefore, the 'business case' for sustainability is controversial, despite the fact that companies are more and more under pressure to standardize and expand their voluntary ethical practices. The research design serves the purpose of answering some of these questions: 77 large industrial European companies were included in a highly-relevant new dataset, containing aggregated greenhouse gas emission figures, as well as universally-accepted financial performance indicators. On these balanced panel data we conducted several types of analyses, tailored to capture the sign and strength of the relationship between environmental and financial performance. We also introduced an innovative measure of responsible governance, as an interaction term between board-level innovations and the level of independent assurance. Our results are mixed, largely dependent on different model specifications and the several procedures to obtain robust standard errors. As expected, there is no definitive conclusion on the aforementioned relationship. Responsible governance seems to have an insignificant contribution to real sustainability performance, as well as to the economic welfare of the firm. Overall, we support the results to be found in the prior literature, in that CSR attributes – here including emission reduction efforts – will bear higher costs, but also higher revenues, resulting in a neutral relationship between CSR activity and firm financial performance. Owing to the uniqueness of the database in use and to the complexity of the econometric analysis, our findings are another proof of the controversy surrounding the relationship between firm financial and environmental performance.

Key Words: *Greenhouse gas emissions, European Union, financial performance, sustainability, environmental performance, corporate governance, corporate social responsibility.*

JEL Classification: *G3, L25, M4, Q5.*

INNOVATIVE CAPACITY & PERFORMANCE OF TRANSITION ECONOMIES: COMPARATIVE STUDY AT THE LEVEL OF ENTERPRISES

Zsuzsanna K. Szabo, Michal Šoltés, Emilia Herman

Historical Background

The present tendencies are expanding worldwide due to three main directions: the globalization which implies increased international competitiveness [20], technological changes (introduction of ICT led to the need for qualified employee, therefore knowledge has become a necessity [25], [26]), organizational behaviour, ICT, knowledge, innovation are considered priorities. Developed countries and the OECD recognized that some common themes are emerging, the need "for policy coherence in dealing with development for leadership from developing countries and for partnerships with shared risk as well as a focus on key sectors for social and economic development. The related theme is innovation." [24]

The historical background, the circumstances which bring innovation to the forefront are important in the study of the innovation performance of countries. To evaluate the necessities and to formulate adequate policies, it is important to know the role of the government, businesses and individuals in the innovation process. In the last decades, different approaches to development with various degrees of success have been observed all over the world. However, all economies have started to face the same problems; they are trying to deal with the increasing poverty and inequality in the global economy. The problems worsen due to the economic, financial crisis, nowadays economies are still recovering or are still feeling the prolonged crisis, fact which continues to influence the public and private sector resources and which has a significant impact on further development. Sustainable development and equal opportunities are new challenges that need to be approached and solved immediately.

The potential of digital aids in providing information and services to citizens is widely recognized by many countries. The penetration of Information and Communication Technologies (ICT) influences the changes of the human existence, the interaction between people, the way of interaction within the society and the way in which societies involve individuals [2], [8]. A growing number of studies and research papers show that innovation has a significant role in the social and economic development assuring economic competitiveness. This means activities which create value through knowledge and became a priority issue. In this respect, policies must follow priorities such as: diffusion of knowledge, enlargement of the innovation support, mission oriented strategies, upgrading human resources, access to skills and competencies, abilities to learn, promotion of organizational change, technological change, productivity, and competitiveness [19]. Starting from the Lisbon strategy and its objectives to make Europe "the most competitive and dynamic knowledge-based economy in the world" a lot of policy initiatives were promoted. In March 2002, the European Commission in Barcelona [56], recognized that financial support for research and innovation is needed. In 2003, "The action plan investing in Research" was formulated by Danuta Maria Hübner, MEP, Chair of the Committee on Rural Development at the European Parliament. On 14 October 2011, she declared that "innovation is the only way to go for Europe … growth will not happen without the commitment of the private sector, but despite the fact that innovation may principally be a task for private entrepreneurs, it is up to public authorities to create conducive regulatory frameworks to provide guarantees that reduce the risk that

naturally accompanies innovation. In fact, innovation-led growth is increasingly place-based, with regions and cities taking the lead. Regions and cities are places where universities and talents, entrepreneurial spirit, social innovation, attractive lifestyles and innovation funding schemes come together."

1. The Relevance and Role of Innovation in Economic Growth – Short Review of the Literature

The relevance of the innovation was recognized already in the 18th century when its different features were formulated: Adam Smith in his well-known work *"An Inquiry into the Nature and Causes of the Wealth of Nations"* [39], made a remark on the new generation of specialists who could improve productivity through knowledge. Friedrich List predicted infrastructure, institutions which would contribute to the development of the manufacture through creation and allocation of knowledge [7]. Joseph Alois Schumpeter showed that innovation is a great force of the economic activity [27], [36]. In order to analyze and study the innovation, it is very important to define this concept. A brief analysis of innovation in contemporary society is presented by Jon Sundbo [40]. His book presents the development of the innovation theories, an analysis of the innovation concept. Various approaches to the concept are presented in the literature starting from the papers which treat this subject based on the definiton of Schumpeter (published in 1934), in a classical way as Everett Rogers [10], [14] did, to the modern approach, studies published after 1970 when the innovation started to be considered a priority theme ([35], [23], [43] and others). Moreover, approches from the narrowest to the broadest definition can be found. Abernathy and Utterback were among the first who distinguished the radical innovation and incremental innovation in 1978. A review of the innovation literature was published recently by Kevin Shihping Huang and Yu-Lin Wang [21]. Laird D. McLean's paper presents a review of the existing literature, the major contributions on organizational culture and creativity and innovation, supports and impediments to organizational innovation, a synthesis of the work of Theresa M. Amabile, Rosabeth M. Kanter and Van de Ven, Angle and Poole. [28] "…The organization is a business that is bringing creativity to life through innovative products and services that customers desire, therefore fulfilling customers' needs, creating jobs, and contributing to the economy, or whether the organization is the local government using ideas in a creative way to meet the needs of community, therefore increasing the quality of life, organizational creativity and innovation play an integral role in serving all of us." Studies published in the last decade by Cassiolato [4]; Rosenberg [34]; Castellacci [5]; Fagerberg [11], [12]; Fagerberg, Maryann Feldman, Martin Srholec in [13] showed that innovation is the engine of the growth, being an important element of the development achievements. Annotated bibliography about the regional performance measurement and asset mapping of innovative systems in the United States was compiled by Eric Bowen, Zheng Tian, Junbo Yu, James Riggle, Randy Jackson and Shaoming Cheng in 2010 [3]. Many researchers followed, improved and deepened Schumpeter's argument: John Kenneth Galbraith [15], Richard M. Goodwin [16] developed a technique for the modelling of economic activities, a tri-dimensional model to study the interaction between the business cycles and economic growth. Albert O. Hirschman [18] studied the economic development theories. Paul Romer was selected, in 2010, among the Foreign Policy's Top 100 Global Thinkers and he is recognized for his work in the field of the theory of growth and innovation [33]. Gene M. Grossman [17] contributed to the growth theory regarding the role of the innovation in the growth. He analyzed innovation and growth in the global economy, and studied the resources which lead to long term economic growth. In the last period, the number of studies that prove the role of innovation in socioeconomic transformation of developing countries has increased. The innovation activities in developed and developing countries must be treated in a different manner. In Europe, the first programs which promoted innovation and SMEs started after 1980 [52]. Publicly available databases (Eurostat, EIS, IUS) and international survey results (CIS) show that, between European countries, there are big discrepancies concerning the innovation performances on many indicators.

2. Comparative Analysis on Innovation Performance of Transition Economies

In transition economies, the world-wide financial and economic crisis effect started to be felt only in the second half of 2008 and, in a short period, the economic output and production have sharply declined in the whole CEE. At the end of 2010, the economic crisis seemed to be over, however Romania will continue to feel longer the impact of the economic crises. The World Economic Forum provides detailed evaluations of the productive potential of the economies worldwide. The current Report ranks 142 economies using a very comprehensive set of parameters. [37], [38], [22]. The competitive performance of the countries is analyzed by the Global Competitiveness Index, it was introduced by Xavier Sala-i-Martin in 2004 and the countries rank is published annually by World Economic Forum, using different indicators grouped by 12 pillars. Based on the 12 pillars value, the countries are classified in different development stages such as: factor driven, efficient-driven and innovation-driven economies. Romania and Bulgaria were enrolled as efficient-driven economies.

The rank of Romania is getting worst compared with 2009, because the country drop off 14 positions. It is remarkable that Romania lost very much due to the 11th and 12th pillars concerning innovation and sophistication factors, reaching only the 106th place from 144 analyzed countries. Estonia, Hungary, Lithuania, Latvia, Poland were classified in the state of transition, converting from the efficiency-driven stage to the innovation-driven stage, while the Czech Republic and Slovakia based on the competitiveness index turned already to innovation-driven economies.

To understand this situation, we have to remark that transition in Romania started in 1990 and was more difficult than in other Central and Eastern European countries. [44] The EBRD indicators show the duration of each of the three transition stages (Table 1) and it can be observed that the evolution in the case of Romania was very slow. Czech Republic in 1995, Hungary and Poland in 1996 and the Slovak Republic in 2000 became members of the OECD because these countries reached OECD standards. The impact of transition stages on SME development was studied by different researchers. [1]

Tab. 1: EBRD Transition Report

	Stage 1	Stage 2	Stage 3
Romania	1989–1993	1994–1998	1999–2004
Poland	1989	1990–1992	1993–1994
Hungary	1989–1990	1991–1992	1993–2004
Bulgaria	1989–1992	1993–1998	1999–2004
Slovakia	1989–1990	1991–1993	1994–2004

Source: [1], [48]

The Innovation Union Scoreboard divided the EU Member States into four groups based on their summary innovation performance characterized by the Summary innovation Index (SII). [46] The transition economies of Central, South and East European countries belong to moderate innovators group (Czech Republic, Hungary, Poland, Slovakia) and to modest innovators group (Bulgaria, Romania).

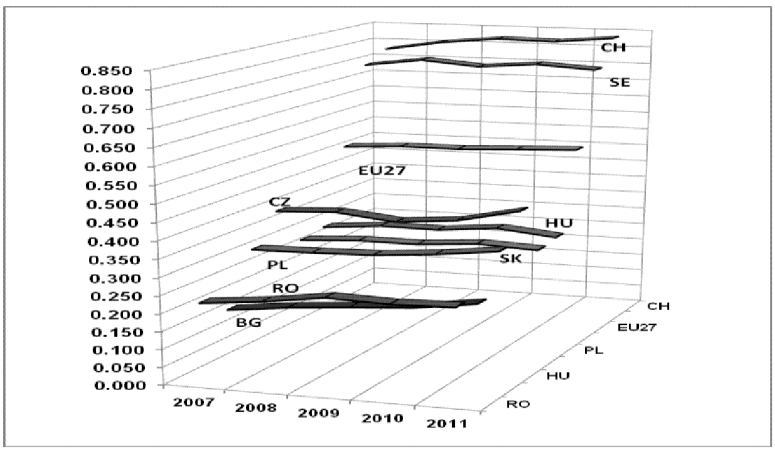
Tab. 2: Transition Countries Rank in EU27 According to their Innovation Performance

	Modest innovators		Moderate innovators			
	BG	RO	PL	SK	HU	CZ
Innovation performance in EU27	26	24	23	22	19	17
Innovation performance in Europe	32	29	27	26	22	20
Average country growth performance	8.6 %	5 %	1.8 %	2.5 %	2.1 %	3.2 %
	Growth leader	Moderate growers				

Source: [46]

The innovation performance of the countries presented in the report is based on 25 different indicators grouped into 8 innovation dimensions characterizing 3 main types of indicators enablers (the main drivers of innovation), firm activities (innovation effects at the level of the firm) and outputs (the effects of firms' innovation activities). Based on the SII, the transition countries are situated far below the EU27 average. The innovation leader in EU27 is Sweden and the European leader is Switzerland.

Fig. 1: Innovation Performance Based on SII



Source: [46]

The innovation leader countries have high performances in all 8 dimensions. The distance between the moderate, modest innovators and leaders is significant in the dimension of intellectual assets and linkages & entrepreneurship, which shows insufficiency at the level of the firms. The modest innovators and also the moderate innovators are behind the leaders in the dimension of innovators, what means weak effectiveness of firm innovativeness. The gap is very high also in the dimension of open, excellent, attractive research systems and finance and support, which indicates the weakness of the main drivers of innovation in the transition countries. Another negative aspect for Romania is the slow growth in innovation performance. Among the modest innovators, Bulgaria was ranked as the growth leader in innovation performance. The growth in innovation performance for the EU27 was calculated based on data including a 5 year period.

In order to improve the situation, long and also short term policies are needed at the level of each country. In order to evaluate the necessities, a brief analysis is needed in the case of all 25 indicators, used in the calculation of the summary innovation index (SII). Table 3 presents the countries' ranking on each innovation dimension.

Tab. 3: Transition Countries Rank in EU27 According to the 8 Innovation Dimensions

		RO	BG	HU	CZ	PL	SK	Number of countries above EU27 average
Enablers	Human resources	**26**	21	20	18	14	11	17
	Research system	**25**	22	20	19	**26**	23	12
	Finance and support	22	**26**	20	19	18	23	9
Firm activities	Firm investments	13	20	18	10	15	**26**	11
	Linkage & entrepreneurship	**25**	**26**	20	17	24	22	14
	Intellectual assets	**27**	23	20	21	22	24	7
Outputs	Innovators	23	24	**25**	8	**26**	21	13
	Economic effects	16	**25**	5	9	21	17	10

Source: [46]

In case of Romania and Bulgaria adequate policies are needed to encourage development in almost all innovation dimensions. On the dimension of open, excellent, attractive research systems both Romania and Poland are behind the majority of EU Members' States. On the intellectual assets dimension all transition countries must work to improve it. Hungary must improve the innovators dimension thus must introduce policies which encourage the innovative SMEs activities. The best position between the analyzed countries has Czech Republic but its SII value is also under EU27 average.

To verify the relationship between the innovation dimensions and SII, GCI and NRI indices, a regression analysis was applied. Using the regression analysis, we can show how one or more independent variables can be used to predict a dependent variable. In order to discover the strength of the relationship between the independent and dependent variables, the Spearman rank correlation, ρ, was calculated. The ρ closer to -1 or 1 means a stronger correlation. The quality of prediction is measured by the value of R^2. The R^2 value closer to 1.0 means better quality of prediction. In social science research, any R^2 value above 0.5 is considered good. Data in Table 4 show the relationship between the linkages & entrepreneurship (L&E) dimension and the considered variables. The calculated Spearman rank correlation is significant at the 0.01 level.

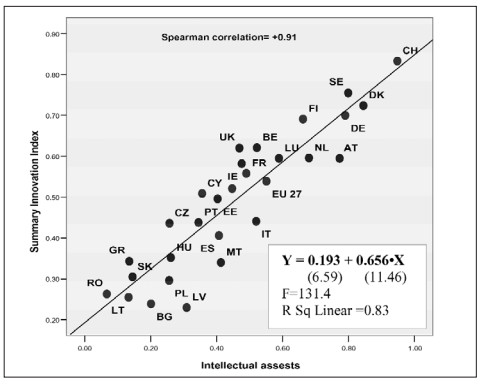
Tab. 4: The Calculated Spearman Rank Correlation

ρ	SII	Research System (RS)	Finance and support	Firm invest-ments	Intellectual Assets (IA)	Innovators	NRI	GCI	GDP/capita
L&E	0.893	0.811	0.755	0.647	0.718	0.641	0.796	0.729	0.714

Source: Own calculations

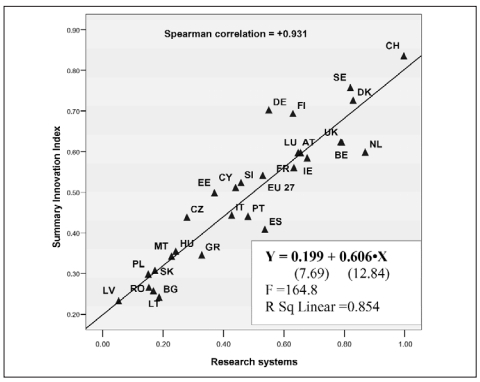
Examining the results, the analysis reveals a significant relationship between SII index, the intellectual assets (IA) score, open, excellent, attractive research systems score (RS). The regression model between the intellectual assets, open research system and SII score is linear and the obtained results are presented in Figure 2, Figure 3.

Fig. 2: Direct Correlation between IA and SII



Source: Own calculations

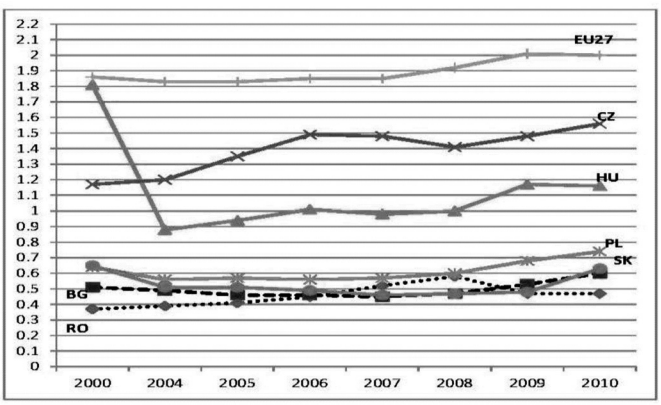
Fig. 3: Linear Correlation between IA and SII



Source: Own calculations

The open, excellent, attractive research systems innovation dimension is included in the category of the indicators that form the main drivers of innovation and which was calculated based on the following indicators: international scientific co-publications, top 10 % most cited scientific publications and non-EU doctorate students. Thus the score depends on the indicators which with own, national forces can be improved slowly because of the mentality and culture problems. To improve the score on short term, not only in Slovakia and Romania but in other CEE countries as well, European policies should encourage the scientific partnerships of universities and research centres also from developed economies. The penetration of the CEE countries' scientific publications in the most cited international scientific journals can be increased through the improvement of the quality of education and research institutes. Another weakness of the transition countries presents the low level of GDP expenditure on R&D comparatively with the EU-27 average (figure 4).

Fig. 4: The Level of GDP Expenditure on R&D



Source: [49]

The intellectual assets innovation dimension calculation is based on different forms of intellectual property rights, trying to capture the innovation efforts at the level of the firm and it uses the following indicators: PCT patent applications, PCT patent applications in a societal challenges (climate change, mitigation, and health), community trademarks and community designs. In this respect, the CIS Survey analysis has shown that in Romania the innovation effort is very low. The patent applications to the EPO, in 2008, were 1.7 per million of inhabitants in Romania and 9.2 in Slovakia. The EU-27 average in this indicator was 119.5. (Eurostat) [53]

The Spearman rank correlation coefficient calculated by SPSS has shown the correlation between the 8 innovation dimensions of Summary innovation index, labour productivity and the GDP/capita. The calculation was made using data on EU-27 member states, EU-27 average and Switzerland. The obtained Spearman rank correlations between the considered variables are presented in the table 5.

Tab. 5: Correlation between Innovation Dimensions and Economic Development

Spearman rank correlation	SII	Labour productivity	GDP/ capita
Human resources	0.70	0.63	0.63
Open, excellent, attractive research systems	**0.92**	**0.87**	**0.93**
Finance and support	0.67	0.41	0.48
Firm investments	0.66	0.26	0.36
Linkage & entrepreneurship	0.88	0.61	0.70
Intellectual assets	**0.92**	**0.80**	**0.87**
Innovators	0.61	0.56	0.58
Economic effects	0.74	0.62	0.68

Source: Own calculations

According to Eurostat, "Labor productivity per person employed (EU-27 = 100) is ratio between GDP expressed in purchasing power standards (PPS) and the number of persons employed. GDP per person employed is intended to give an overall impression of the productivity of national economies expressed in relation to the European Union (EU-27) average. If the index of a country is higher than 100, this country's level of GDP per person employed (http://epp.eurostat.ec.europa.eu) is higher than the EU average and vice versa. The understanding of the driving forces behind labour productivity, in particular the accumulation of machinery and equipment, improvements in organization as well as physical and institutional infrastructures, improved health and skills of workers ("human capital") and the generation of new technology, is important for formulating policies to support economic growth. Labour productivity estimates can serve to develop and monitor the effects of labour market policies. For example, high labour productivity is often associated with high levels or particular types of human capital, indicating priorities for specific education and training policies". [50]

Next, we analysed the Global innovation Index (GII). The GII 2011 has been published by INSEAD eLab since 2007 [51]. It recognizes the key role of innovation, its contribution to economic growth and ranks 125 countries worldwide, accounting for 93.2 % of the world population and 98 % of the world GDP. The evaluation of the innovation capacity is based on 79 indicators grouped in 7 categories (institution, human capacity and research, infrastructure, market sophistication, business sophistication, science outputs, creative outputs). The worldwide leader is Switzerland and Sweden is situated in the 2nd place. The ranking of the transition economies based on SII and GII index is presented in Table 6. According to GII, Romania is placed behind Bulgaria and the Czech Republic is situated behind Hungary.

Tab. 6: Innovation Performance and Capacity

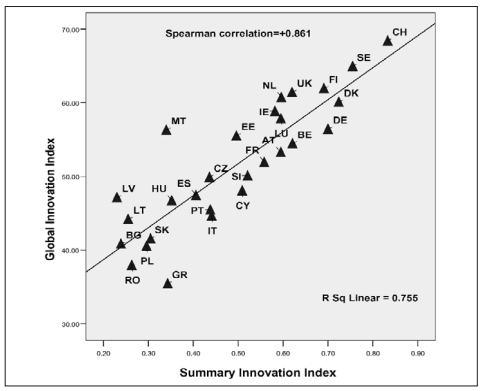
	BG	RO	PL	SK	HU	CZ
Innovation performance in EU27 (SII)	26	24	23	22	19	17
Innovation performance in Europe (SII) 34 country	32	29	27	26	22	20
Innovation capacity (125 country) Global innovation index 2011	42	50	43	37	25	27
Global innovation index 2012 (141 economies)	43	52	44	40	31	27

Source: INSEAD, Global Innovation Index 2011, 2012

Concerning human capital and research, in 2011 Romania was ranked 65th, for business sophistication occupied position 71 (in this category the innovation linkages was ranked 107th) and for creative outputs it occupied the 64th position with the creative intangibles in 102nd position. In the case of Slovakia, the creative outputs were ranked in 63rd position; the worst situation is in the category of creative intangibles where it was ranked in 91st position.

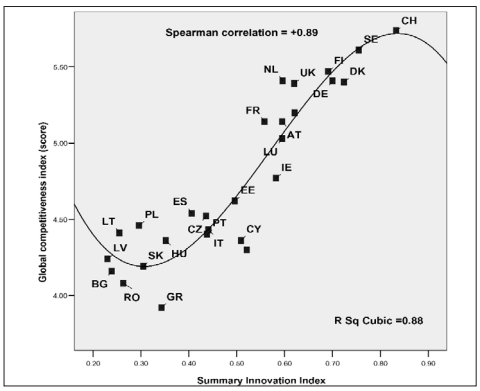
The Spearman rank correlation coefficient calculated by SPSS shows a strong linear correlation between SII and GII rankings, thus for a high SII, the GII score is high as well. See Figure 5.

Fig. 5: Linear Correlation between SII and GII



Source: Own calculations

Fig. 6: The Correlation between SII and GCI



Source: Own calculations

In order to analyse the impact of the innovation on the economic development, the Spearman rank correlation was calculated. The result suggests that a critical level of innovation must be achieved. Only if the SII value is greater than a given threshold (we propose for this the value of 0.4) the innovation outputs contribute to economic development. (Figure 6)

Next, we will analyse the readiness level of the transition countries using the Network Readiness Index (NRI). The NRI is defined as a nation's or community's degree of preparation to participate in and benefit from information and communication technology developments. It has been published since 2000–2001. The NRI was introduced by Kirkman et al in 2002 and it was redefined by Dutta et al in 2003. The 2012 report [9] analysed the economies using 10 pillars. Previous reports calculated the NRI with 3 component indexes (environment, readiness, usage) including totally 9 subindexes (pillars).

Tab. 7: Network Readiness Index

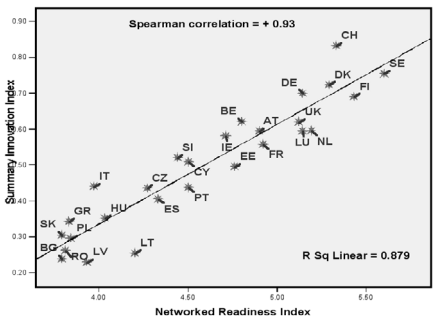
	Number of countries	BG	RO	PL	SK	HU	CZ
2006–2007	122	72	55	58	41	33	34
2007–2008	127	68	61	62	43	37	36
2008–2009	134	68	58	69	43	41	32
2009–2010	133	71	59	65	55	46	36
2010–2011	138	68	65	62	69	49	40
2011–2012	142	70	67	49	64	43	42

Source: [9]

Starting from 2010, Slovakia lost in rank comparatively with Poland, but the Slovak declining tendency was indicated by the SII score as well.

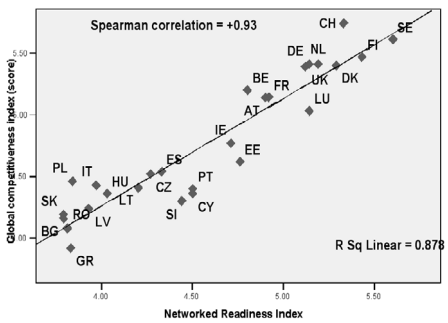
For countries with high NRI score, the SII is also high (Figure 7). Linear correlation was also obtained between the countries competitiveness index and NRI, respectively SII and GDP (Figure 8, Figure 9).

Fig. 7: Linear Correlation between SII and NRI



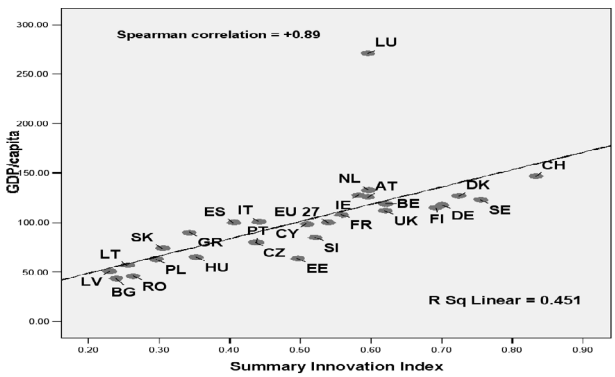
Source: Own calculations

Fig. 8: Correlation between NRI and GCI



Source: Own calculations

Fig. 9: Correlation between SII and GDP



Source: Own calculations

3. Innovative Capacity & Performance of Enterprises

A growing number of studies and research papers show that the economic recovery largely depends on innovation, on the innovation capacity of enterprises. Different studies proved that technology and innovation increase the economic competitiveness and have a significant role in social and economic development. The SII score is calculated based on three main types of indicators, from which two are based on the innovative efforts at the level of the enterprise (firm activities with 9 composite indicators grouped in three categories: firm investments, linkage & entrepreneurship and intellectual assets) and on the firm's innovative activities effect (outputs with 8 composite indicators grouped in two categories: innovators and economic effects).

In order to analyze how the innovative capacities of the enterprises can be increased, the Spearman's rank correlation coefficient was calculated. The obtained results, the strength of relationships between the enumerated variables are presented in Table 8.

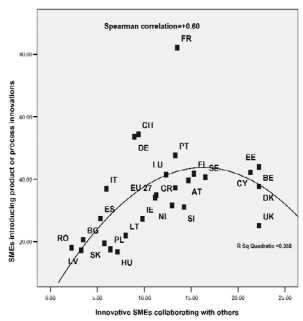
Tab. 8: Spearman Rank Correlation in the Sample

		Spearmar Rank Correlation
Population completed tertiary education	Innovative SMEs collaborating with others	0.51
Population completed tertiary education	SII index	0.59
Population completed tertiary education	NRI index	0.67
KIA employee	GDP/capita	0.93
KIA employee	Labour productivity	0.86
Innovative SMEs collaborating with others	SMEs introducing product/process innovations	0.60
Innovative SMEs collaborating with others	SII index	0.66
International scientific co-publications	Innovative SMEs collaborating with others	0.65

Source: Own calculations, [46]

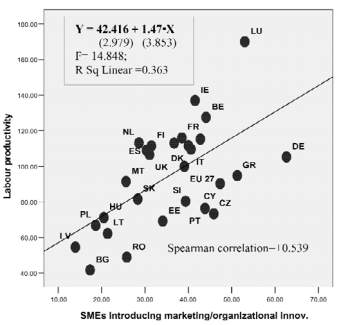
Next, Figure 10 shows SMEs introducing product/process innovations vs. innovative SMEs collaborating with others for EU-27 and Europe leader countries and Figure 11 the SMEs introducing marketing/organizational innovation vs. labour productivity. The analysis shows that the collaboration between innovative SMEs has a positive impact on the innovation activities of the enterprises. In this respect, a supreme value can be determined. Figure 10 presents that, even if we increase the intensity of the collaboration, after a point, named threshold, it won't have any effect on the innovation growth.

Fig. 10: SMEs Introducing Innovations vs. Innovative SMEs Collaborating with Others



Source: Own calculations

Fig. 11: SMEs Introducing Marketing/ /Organizational Innovation vs. Labour Productivity



Source: Own calculations

Starting from 1990, the number of SMEs in transition economies has grown significantly over the years. This phenomenon means not only increase in their number, but also the diversification of their activities.

In Romania, more than 99 % from all enterprises are micro, small and medium size enterprises. Since 2008, the SMEs in Romania have been confronted with big difficulties. The world crisis began to show its effects in Romania in October 2008. These effects became perceptible first by companies. The private sector, the SMEs, took austerity measures before the public sector. A survey result, realized by the CNIPMMR, for the period from October 2008 to March 2010 shows that 49.71 % of SMEs reduced their activity, only 7.3 % enlarged their activities and the percentage of bankruptcy was 27.91 %. [41], [42], [32], [6], [29], [31].

The level of innovative SMEs and their activities in summary innovation Index (SII) are incorporated in linkage & entrepreneurship and in the innovators dimensions, with the rank 25 and 23 from 27 EU Members' state. (Table 3) The analysis of the innovative SMEs is in compliance with the Oslo manual [32] using the CIS Survey data. The data for Romania are presented in table 9.

Tab. 9: The Evolution of Innovative Enterprises in Romania

	2002–2004	2004–2006	2006–2008	2008–2010
Innovative enterprises (%)	19.9 %	21.1 %	33.3 %	30.8 %
The number of innovative enterprises	5136	5970	9986	8116

Source: Own calculations based on CIS Survey data [30]

In Romania, the source of information of innovative SMEs is represented by universities only with 4.1 % in the period of 2004–2005, respectively, with 5.1 % in the period of 2006–2008. Moreover, research centres represented only 3.5 % of innovative SMEs information source in 2004–2006, respectively 3 % in the period of 2006–2008. The weakness of SMEs innovativeness is caused partially by the facts presented above.

Tab. 10: The Evolution of the Main Types of Innovation of Entreprises in Romania

Innovative SMEs		2002–2004	2004–2006	2006–2008	2008–2010
Technological innovator	Product innovator	472	525	710	631
	Process innovator	1203	1169	1965	948
	Process and product innovator	3461	4276	3073	2054

Source: NIS [47], Press communication no. 124, 30.06.2008; no. 269 2010; no. 153 28.07.2010; no. 29 8.02.2012; own calculations

Tab. 11: The Weight of Cooperation Activities of the Romanian Innovative Firms

Cooperation 2006–2008	The weight of cooperation	The number of enterprises with cooperation
National level	12.9 %	177
European level	7.6 %	104
USA	1.4 %	19
China, India	0.8 %	11
Others	0.6 %	8

Source: [30]

The cooperation, which is a composite indicator of linkage & entrepreneurship dimension, is another weakness of the Romanian innovative SMEs. In the period 2004–2006, only 17.3 % (1033 firms), respectively 13.8 % (1378 firms from the total 9986 innovative firms) of firms between 2006–2008 had concluded cooperation agreements.

The lack of funds for innovation, high innovation costs, and the lack of experience are considered barriers. The distribution of innovative SMEs at NUTS 1 level is presented in Table 12.

Tab. 12: The Regional Distribution of Innovative Firms in Romania

NUTS 1	The weight and number of innovative firms 2004–2006		The weight and number of innovative firms 2006–2008
North-West and Central region	20.7 %	1236	29 %
North-East and South-East region	34.7 %	2071	45.9 %
South-Muntenia and Bucureşti-Ilfov	16.8 %	1003	34.2 %
South-West-Oltenia and West	12.1 %	722	22.6 %

Source: [30]

In Slovakia, 99.2 % of entreprises are SMEs and 0.8 % are large entreprises. The structure of active entreprises in 2010, based on SBA Fact Sheet 2010/2011 [54] was the following: 71.0 % micro, 25.4 % small and 2.8 % medium sized. In this period, the SME sector lost about 12 % of its workforce and large entreprises lost about 11 % of their employees. EIS 2009 [55] shows that 21.4 % of Slovak SMEs introduced innovation of products or processes and 21.5 % implemented organizational or marketing innovation. In Slovak Republic the barriers of innovation activities on the level of firms are the following: the high costs of innovation (reported by 21.5 % of SMEs), the absence of financial resources in entreprises (reported by 18.5 % of SMEs), absence of financial resources outside of entreprises (reported by 11.8 % of SMEs), uncertain demand for innovation products (11.6 % of SMEs) and the absence of qualified human resources (reported by 8.7 %).The Slovak Republic is situated also behind advanced countries concerning the innovation efficiency and the effective transfer of R&D results to innovation processes. A detalied report was published in 2010. [45]

Conclusions and Recommendations

According to the estimates, over 90 % of the enterprises feel the recession. Official data show that the business environment deteriorated. In 2009, the decreasing tendency was more accentuated; 10 times more enterprises suspended their activities than in the same period of 2008. The economic situation of firms continued to deteriorate in 2011, restructuring plans and further market contractions led to the bankruptcy of many enterprises. In Romania, companies concentrated their strategies on the reduced costs of the resources and not on the improvement of productivity.

The Europe 2020 Strategy was formulated with the aim to help Europe “to come out stronger from the crisis and to turn the EU into a smart, sustainable and inclusive economy delivering high levels of employment, productivity and social cohesion”. In this respect, 3 priorities, and totally 7 flagship initiatives were formulated. The flagship initiatives represent catalyst of each priority theme.

All the flagship initiatives: innovation, education, information society, climate, competitiveness, labour market – present challenges for all post communist countries and they require short and long term strategies. Policies must encourage the main drivers and enablers of innovation. In this respect, the quality of the education system must be improved, the enrolment in tertiary education must increase (especially in engineering and natural sciences), and the funds for higher education and research must be increased.

On the other hand, to strengthen the SME sector, entrepreneurship must be encouraged. The teaching of entrepreneurship has to take into consideration that there is a difference, in terms of economic and cultural background, between the advanced EU countries and the newcomers, where entrepreneurship and enterprising is still a relatively new phenomenon. In addition to the Lisbon strategy and the Oslo Agenda, the primary aim in transition country view is to promote entrepreneurship, assist in the creation of new SMEs and strengthen the private SME sector [45]. Strengthening the linkage & entrepreneurship innovation and the intellectual assets dimension, which depend more on qualified human resources, can increase the innovation effects at the level of the firm.

Social inclusion in Europe is a major challenge and the Universities can play a key role here. In this respect, it is crucial to build up a university network supporting dynamic cultural change across society. Thus, suitable local, regional and national strategies are needed in correlation with the local particularities.

Another target must be *the stimulation of technology transfer and the commercialization of the academic research.* EC Final Proceedings (2006), proposes that all institutes which are interested in entrepreneurship education should implement the following measures: improve partnership between universities and SME sector, improve partnership between regional government, high schools and SMEs, enable students to achieve practical experience in small enterprises during their study, involve successful entrepreneurs in the education process (for example inviting guest speakers), create conditions for establishing practical teaching centres at small enterprises (SME companies), bring education closer to the real life.

In this respect, Universities should be proactive not only in elite communities, or where individuals can afford education, but also within outreach community programs to encourage entrepreneurship.

To *increase economic competitiveness, the development of the innovation infrastructure* and the dissemination methods of research results for industrial and commercial applications should be encouraged. The compatibility of research projects with industrial policies should be ensured. To increase the competitiveness of human resources employed in SMEs, financial measures should be instituted to support researchers' mobility to the business environment.

In Romania a special attention should be paid to the *increase of competitiveness of production and services* from the agricultural and forestry sector.

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Abstract

INNOVATIVE CAPACITY & PERFORMANCE OF TRANSITION ECONOMIES: COMPARATIVE STUDY AT THE LEVEL OF ENTERPRISES

Zsuzsanna K. Szabo, Michal Šoltés, Emilia Herman

In the last decades, different approaches to development with various degrees of success have been seen all over the world. However, in the last period, all economies started to be confronted with the same problems. They are still recovering from the economic and financial crisis, what continues to influence the public and private sector resources and has a significant impact on further development. It is widely recognized, through a growing number of studies and research papers that the economic recovery largely depends on the improvement of the SME sector and research and development. Technology and innovation play a significant role in social and economic development. As resource of economic competitiveness, the SME sector and innovation have become a priority issue. Innovation means activities that create value through knowledge and produce growth. Innovation is driven by entrepreneurs who take risks, accept challenges and change things. In this respect, it is essential to promote policies that support innovation and technological transfer to the SME sector. Furthermore, these policies should support entrepreneurial competitiveness at regional level; in industrial branches it is important to impplement measures to attract investors having a significant role in the regional sustainable development.

The paper presents a short review of the literature on the relevance and the role of innovation in growth. It focuses on the innovation capacities and performances of the transition economies emphasizing the innovative force of enterprises. This study intends to analyze the barriers and challenges for CEE and South European countries in comparison with developed economies and in compliance with Europe 2020 strategies. Moreover, it identifies weak points and local, particular strengths of innovation in the (post)crises period and it identifies the targets for the next period. All the flagship initiatives: innovation, education, information society, climate, competitiveness, labour market present challenges for the analysed countries and require short and long term strategies. The scientific approach in this respect is a necessity because it can process the data in publicly available databases and assess the progress of these countries, which is at the time being slow; some of them are situated in the last places in EU27 concerning the innovation. The goal is to improve this situation.

Key Words: *innovation, transition economies, enterprises, crisis, SME, entrepreneurship.*

JEL Classification: *L25, M21, I25, L29, H12.*

VÝBĚR POTENCIÁLNÍCH PARTNERŮ ZE SKLÁŘSKÉHO ODVĚTVÍ ČR PRO ZAPOJENÍ DO RÁMCOVÝCH PROGRAMŮ EU

Petra Rydvalová, Radka Pittnerová

Úvod

Lze pomoci rozvoji sklářství (tradičnímu odvětví Čech) přípravou inovačních projektů financovaných z Rámcových programů Evropské unie (dále také EU)? Na tuto otázku hledá odpověď předkládaný článek. Vychází z již realizovaných aktivit týmu Ekonomické fakulty Technické univerzity v Liberci (dále také EF TUL) a VÚTS, a.s., a to v rámci inovačních a výzkumných projektů. Cílem článku je zmapovat stav inovačního potenciálu výrobců vybraných komodit sklářského průmyslu. Vybranými komoditami jsou, ty které byly analyzovány ve studiích projektu „Technologické a ekonomické kompetence pro Evropský výzkumný prostor" pod akronymem TE-ERA [11] jako problémové vzhledem k nedostatečnému inovačnímu přístupu v průběhu podnikatelského procesu. Záměrem je na základě hodnocení inovačního potenciálu výrobců vybraných komodit sklářského průmyslu navrhnout postup pro jejich případné zapojení do inovačních projektů v rámci aktivit Regionální kontaktní organizace (dále také RKO) Liberec [4].

Aktivity RKO Liberec jsou zaměřeny na region severních Čech, primárně na Liberecký kraj. Z uvedeného důvodu byl průzkum inovačního potenciálu vybraných komodit sklářského průmyslu omezen na firmy tohoto regionu (viz kapitola 2).

Průzkum probíhal cca od ledna 2011 a dokončen byl v dubnu 2012. Metodický postup včetně časového vymezení byl následující:

- analýza sklářského odvětví, specifikace problémových oblastí sklářského průmyslu (data dostupná z výročních zpráv Asociace sklářského a keramického průmyslu; realizováno v červenci 2011) a výběr komodit pro hodnocení inovačního potenciálu [11];
- hodnocení inovačních aktivit u vybraných komodit sklářského odvětví v České republice dle klasifikace CZ-NACE (dotazník o inovacích v roce 2010, pramen[6]);
- příprava vlastního dotazníkového šetření inovačního potenciálu sklářských firem zabývajících se výrobou problémové komodity, a to v obcích Libereckého kraje s vysokou koncentrací této podnikatelské aktivity. Zpracování dotazníků s možností on-line vyplnění na internetu (realizováno v prosinci 2011 se zapojením studentů EF TUL, [9]);
- příprava databáze podniků z vybraných obcí pro rozeslání dotazníků ve vybrané lokalitě a následné rozeslání průvodních dopisů elektronickou poštou (pramen databáze MF ČR [1]; prosinec 2011);
- zpracování dat o obcích, ve kterých mají respondenti sídlo či místo podnikání (data dostupná ze SLDB 2011, [2]) a vyhodnocení dotazníků realizovaného průzkumu (leden 2012);
- realizace dotazníkového průzkumu, hodnocení a syntéza zjištění (leden až únor 2012);
- návrh dalšího postupu možného zapojení firem vybraných komodit sklářského průmyslu do inovačních projektů v rámci RKO Liberec (duben 2012).

1. Analýza sklářského odvětví

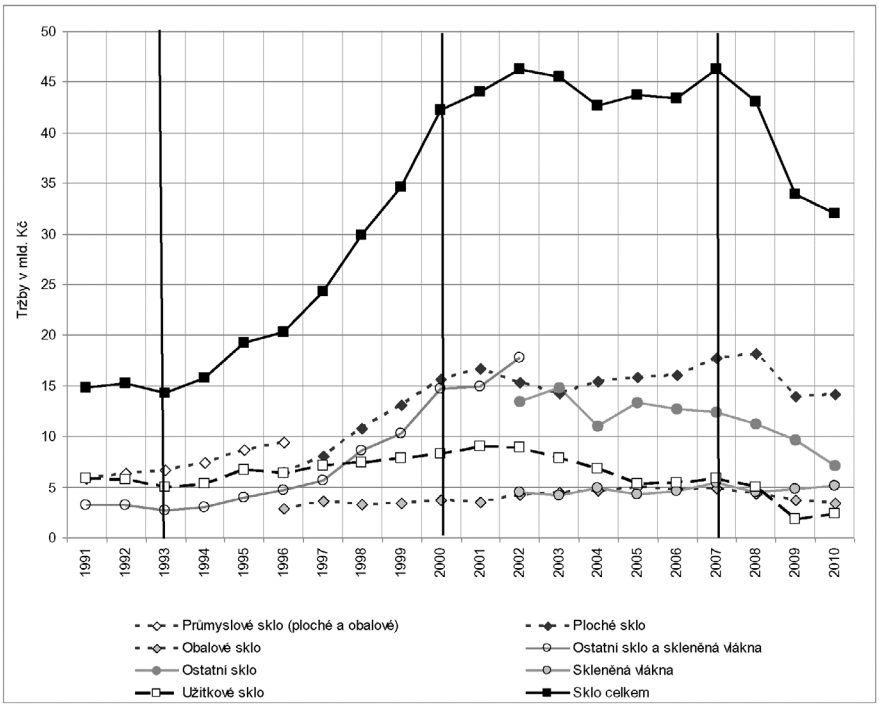
Analýza historického vývoje sklářského odvětví byla zpracována v rámci projektu TE-ERA a některé výsledky již proto byly publikovány, viz Hotař [7], Rydvalová [10], Rydvalová a Hotař [11]. Z důvodu možnosti sledování vývoje sklářského odvětví dle jednotlivých komodit, byla při jeho analýze použita agregace jednotlivých komodit dle Asociace sklářského a keramického průmyslu České republiky (dále také ASKP ČR). Původně agregovaná komodita „průmyslové sklo" je od roku 1995 rozdělena na ploché a obalové sklo. Podobně

byly do roku 2002 sledovány společně ostatní sklo a skleněná vlákna, poslední komoditou je sklo užitkové, ze kterého bylo v roce 2002 odděleno sklo lustrové a svítidla. V důsledku vývoje sledování ukazatelů sklářského odvětví se dnes setkáváme s následujícím členěním sklářských komodit [11]:

- ploché sklo (nezušlechtěné a zušlechtěné);
- obalové sklo (lahve, konzervové sklo, ostatní skleněné obaly);
- ostatní sklo (laboratorní a přístrojové sklo, trubice, skleněné díly pro obrazovky, technické kuličky, skleněné průmyslové aparatury, ochranné svářečské sklo, optické sklo, skleněné tvárnice, bižuterní sklo aj., od roku 2003 lustry, svítidla a jejich skleněné díly);
- skleněná vlákna (výztužná, izolační);
- užitkové sklo (sklo nápojové, domácenské, ozdobné, umělecké apod.).

Provedená analýza sklářského odvětví poukázala v oblasti ekonomické výkonnosti např. na skutečnost, že významný pokles ukazatele tržeb za období od roku 1991 do roku 2010 lze zaznamenat především u komodit užitkové a ostatní sklo. Jak je patrné i z obr. 1, lze vysledovat zhruba čtyři vývojové úseky. Zaměříme-li se na poslední období od roku 2008, lze konstatovat pokles tržeb celého odvětví výroby skla, a to obzvláště ve srovnání let 2007 a 2009. V případě užitkového skla se za stejné období jednalo až o 70% snížení tržeb. V komoditě ostatní sklo došlo k významným změnám především ve výrobě bižuterie.

Obr. 1: Vývoj tržeb za prodej vlastních výrobků a služeb od roku 1991 do roku 2010



Zdroj: Rydvalová, Hotař [11, s. 28]

Jak ukázala studie historického vývoje sklářského odvětví od 17. do 21. století, jsou cestou z krize inovace. Sklářské odvětví je na krizové stavy „zvyklé“. Lze říci, že jej naopak posouvaly k inovačním změnám [11].

Pro další průzkum v oblasti inovačního potenciálu bylo vybráno sklo užitkové, které lze zařadit pod ekonomickou činnost s kódem CZ-NACE 231, kam je však z hlediska statistického sběru dat zařazeno rovněž sklo ploché

(výroba, tvarování a zpracování), duté sklo, skleněná vlákna a další. Z komodity ostatního skla se text dále zaměří na bižuterní, které dle klasifikace CZ-NACE kód 321 tvoří samostatnou skupinu.

1.1 Inovační aktivity vybraných ekonomických činností

Nejprve byla provedena analýza inovačních aktivit, a to firem s převažující ekonomickou činností dle CZ-NACE 231: Výroba skla a skleněných výrobků a 321: Výroba klenotů, bižuterie a příbuzných výrobků. K analýze byla použita data ČSÚ z celorepublikového šetření realizovaného v roce 2011, mapujícího inovace za období 2008–2010, referenční rok 2010 [5]. Výběrové šetření ČSÚ zohledňovalo i regionální rozměr a pod názvem „Dotazník o inovacích TI2010" oslovilo 6 229 podniků (tzv. zpravodajských jednotek) s alespoň 10 zaměstnanci. Klasifikace inovací byla provedena v pojetí revidované verze „Oslo manuálu 2005", kde jsou rozlišovány inovace produktové, procesní, organizační a marketingové [5].

Z uvedené ekonomické činnosti CZ-NACE **(231)** „Výroba skla a skleněných výrobků" vyplňovalo dotazník o inovacích 45 firem z celé České republiky. Z toho 26 uvedlo, že realizovalo v roce 2010 alespoň jednu inovaci a lze je označit jako inovační firmy. (Dle definice Eurostatu z roku 2010 tak lze označit podniky, které zavedly ve sledovaném období alespoň jednu z uvedených inovací).

- U zkoumaných firem při porovnání počtu zaměstnanců v roce 2008 a 2010 došlo celkově ke snížení počtu zaměstnanců cca o 9,5 %, a to přesto, že u některých firem došlo k navýšení počtu zaměstnanců. Lze konstatovat, že firmy, kde došlo ke snížení počtu zaměstnanců oproti roku 2008, snižovaly stav cca o 16,2 %, celkem o 421 zaměstnanců.
- Celkové tržby zkoumaných firem činily v roce 2008 cca 23,7 miliard Kč, v roce 2010 cca 23,4 miliardy Kč. V roce 2010 došlo oproti roku 2008 ke snížení tržeb v průměru o cca 1,2 %.
- Z hlediska právní formy se jednalo o 7 fyzických osob podnikajících dle živnostenského zákona (15 %), 27 s.r.o. (60 %) a 11 a.s. (24 %).
- Více jak 42 % respondentů tj. 19 firem ze 45, uvedlo, že v letech 2008 až 2010 neuskutečnily žádné inovace! Nejvýznamnější vliv na omezování inovačních aktivit či jejich nerealizaci měl nedostatek finančních prostředků. Na otázku inovačních bariér odpovídalo všech 45 respondentů. Vybírali z 11 možností, kterým přiřazovali váhu významnosti v rozmezí bez vlivu, s nízkým, středním či vysokým vlivem na realizaci inovací.
- Nejčastěji byly realizovány inovace marketingové, následně technické (zahrnující produktové a procesní) a organizační.
- Technické inovace byly realizovány nejčastěji ve vlastní režii nebo společně s jinými podniky (včetně vlastních, např. dceřiných společností).
- Respondenti (20), kteří realizovali technické inovace (produktové a procesní), uvedli, že v roce 2010 s nimi měli spojené náklady ve výši 417,4 milionů Kč, v průměru na jednoho respondenta 20,87 milionů Kč. Nejmenší částka byla 8 tisíc Kč, největší 198 milionů Kč.
- Z hlediska možnosti využití financování inovací z veřejných zdrojů byly dotace na inovace čerpány pouze 4 firmami. Z toho v jednom případě byla jako poskytující organizace označena ústřední vláda a ve třech případech podpora ze strukturálních fondů. **Ani jedna firma nečerpala finance z 6. či 7. RP EU.**
- Cíle inovačních aktivit byly hodnoceny dle významu a důvodu, proč realizovat danou inovaci. V oblasti technických inovací odpovídalo 20 firem, k cílům marketingové inovace se vyjádřilo rovněž 20 firem a organizační inovace hodnotilo 14 firem. Lze konstatovat vysoký význam následujících cílů realizovaných inovačních aktivit (v závorce je uvedena charakteristika inovace dle respondentů):
  - rozšíření sortimentu výrobků nebo služeb (technická inovace);
  - zlepšení kvality výrobků nebo služeb (technická inovace);
  - snížení nákladů na jednotku výstupu produkce (organizační inovace);
  - zlepšení kvality zboží a služeb (organizační inovace);
  - uvedení výrobků pro nové skupiny zákazníků (marketingová inovace);
  - zvýšení nebo udržení tržního podílu (marketingová inovace).

Respondenty s převažující ekonomickou činností CZ-NACE **(321)** lze dle dotazníku o inovacích za rok 2010 charakterizovat následovně: do průzkumu se zapojilo 12 firem, z toho inovace realizovalo 7 firem. Tyto lze označit jako inovační. Analyzovaný vzorek firem je sám o sobě statisticky nevýznamný, poskytuje však základní pohled na firmy dané ekonomické činnosti.

- Stav počtu zaměstnanců v roce 2010 klesl u 4 firem respondentů, a to v průměru o 17,6 % oproti roku 2008.
- Celkové tržby zkoumaných firem klesly za období 2008–2010 v průměru o 7 %.
- Z hlediska právní formy byla zastoupena fyzická osoba dle živnostenského zákona 4 respondenty (33 %), s.r.o rovněž 4 (33 %), akciové společnosti byly 2 (17 %) a 2 družstva (17 %).
- Firmy byly převážně z Jablonce nad Nisou, v jednom případě ze Semil a ve třech se sídlem v Praze.
- Více jak 41,6 % respondentů uvedlo, že se inovacemi v období let 2008 a 2010 ve firmě nezabývali. Nejčastějším a s největším významem vlivu na omezování inovačních aktivit či jejich nerealizaci byl nedostatek finančních prostředků (odpovídalo všech 12 respondentů).
- Nejčastěji byly realizovány inovace marketingové (všechny inovující firmy, 7), následně technické inovace (zahrnující produktové a procesní) uvedlo 5 firem a organizační inovace 3 firmy.
- Technické inovace byly nejčastěji realizovány ve vlastní režii.
- Respondenti (5), kteří realizovali technické inovace (produktové a procesní) uvedli, že v roce 2010 s nimi měli spojené náklady ve výši 5,92 milionů Kč, v průměru na jednoho respondenta cca 1,2 milionu Kč. Nejmenší částka byla 20 tisíc Kč největší 5 milionů Kč.
- Čerpání dotací na financování inovací byly zjištěny u jedné firmy. **Ta uvedla podporu z fondů EU a i ze 6. nebo 7. RP EU.**
- Cíle inovačních aktivit byly hodnoceny dle významu, důvodu, proč realizovat danou inovaci. V oblasti technických inovací odpovídalo 5 firem, k cílům marketingové inovace se vyjádřilo 7 firem a organizační inovace hodnotily 3 firmy. Lze konstatovat vysoký význam následujících cílů realizovaných inovačních aktivit (v závorce je uvedena charakteristika inovace dle respondentů):
  - zlepšení schopnosti rozvíjet zboží nebo služby (organizační inovace);
  - rozšíření sortimentu výrobků nebo služeb (technická inovace);
  - vstup na nové trhy nebo zvýšení tržního podílu (technická inovace);
  - zvýšení nebo udržení tržního podílu (marketingová inovace);
  - nahrazení zastaralých produktů nebo procesů (technická inovace).

Z celorepublikového šetření ČSÚ je patrné, že jak u respondentů s převažující činností CZ-NACE 231 (dále také výroba skla), tak i v případě CZ-NACE 321 (dále také bižuterie) uvedlo realizaci inovačních aktivit v období let 2008–2010 cca 58 % firem. Nejčastěji byly realizovány marketingové inovace, následně technické, zahrnující produktové a procesní, a naposled organizační inovace. **Financování inovací z veřejných zdrojů využily zkoumané firmy v celkovém počtu 57 respondentů jen v pěti případech, z toho jen jednou byl realizován projekt rámcového programu EU.** [6, vlastní zpracování]

Jaký je inovační potenciál vybraných firem těchto dvou ekonomických činností v regionu s dlouhou tradicí v oblasti sklářského průmyslu? Na to se zaměří druhá kapitola.

2. Dotazníkový průzkum

V kapitole je nejprve představen soubor firem oslovených v rámci vlastního dotazníkového průzkumu projektu RKO Liberec. Následně je představen rozesílaný dotazník s postupem hodnocení odpovědí, je provedena charakteristika respondentů a vlastní hodnocení dotazníkového průzkumu.

2.1 Charakteristika respondentů dotazníkového průzkumu

Byl vytvořen seznam firem zabývajících se výrobou užitkového skla a bižuterie v obcích vybraného regionu s vysokým podílem sklářské výroby, a to v subregionech SO ORP Jablonec nad Nisou, Semily, Turnov a Železný Brod (SO ORP – správní obvod obce s rozšířenou působností). Podíl sklářských firem dle klasifikace převažujících ekonomických činností (CZ-NACE, čtyřmístný kód) na všech ekonomických subjektech v dané obci je znázorněn na obr. 2. Zde je důležité zdůraznit, že pouhý výčet počtu ekonomických subjektů může podávat zkreslenou informaci o významnosti odvětví pro hospodář-

ský rozvoj obce. Podrobnější rozbor by umožnila analýza počtu zaměstnanců v daném odvětví a vybrané obci. V tab. 1 je na základě zjištěných dat z DB ARES [1] dle členění ekonomických činností na čtyřmístný kód uvedeno zaměření pěti nejvýznamnějších zaměstnavatelů ve vybraných obcích. V tab. 2 je uvedena stručná charakteristika obcí – sídel respondentů. Data pro charakteristiku obcí, ve kterých mají respondenti sídlo či místo své podnikatelské činnosti, byla čerpána z údajů ČSÚ, a to ze sčítání lidu, domů a bytů v letech 1991, 2001, 2011. Vzhledem k tomu, že programy podpory zaměřené na inovace nezohledňují, zda se sídlo firmy nachází v zaostalém či rozvinutém regionu, nebyla dále tato skutečnost zkoumána [3].

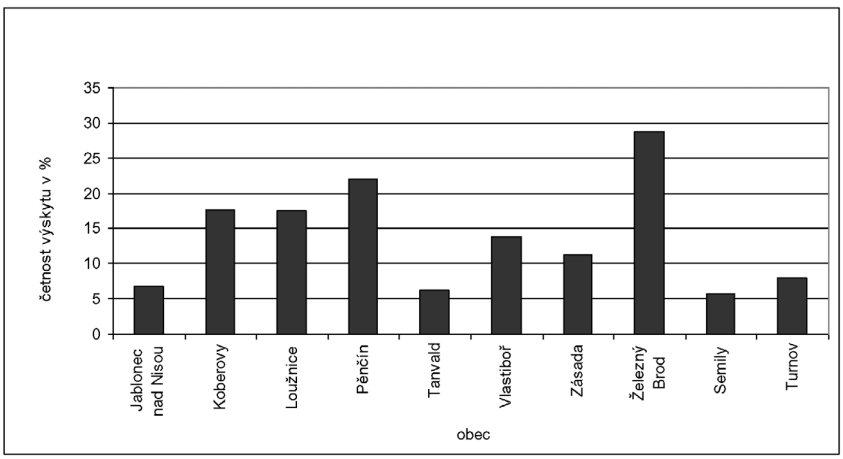
Ze seznamu pak byla vybrána v obci vždy alespoň jedna firma a následně každá třicátá. Vybrané firmy byly nejprve prověřeny na serveru www.justice.cz, zda nejsou v insolvenčním řízení. Rozesláno bylo 84 dopisů se žádostí o vyplnění dotazníku, který byl zpřístupněn respondentům online na www.oursurvey.biz. Bezchybné a úplné vyplnění on-line dotazníků lze konstatovat u 30 respondentů, jedná se o téměř 34% návratnost [9].

Tab. 1: Převažující odvětví ekonomických subjektů v obci (pět nejvýznamnějších zaměstnavatelů v obci dle počtu zaměstnanců)

kód obce	název obce	převažující odvětví významných ekonomických subjektů v obci
563510	Jablonec n. Nisou	sklářský a automobilový průmysl
563641	Koberovy	drobné ekonomické subjekty zaměřené na školství; v případě FO převažuje sklářství
563684	Loužnice	drobné ekonomické subjekty zaměřené na silniční dopravu; v případě FO převažuje sklářství
564303	Pěnčín	sklářský průmysl
576964	Semily	zdravotnictví, státní správa, výroba pečiva a výroba hraček (firma v likvidaci); FO zaměřené na sklářství
563820	Tanvald	zdravotnictví, státní správa, stavebnictví, textilní průmysl; FO zaměřené na sklářství
577626	Turnov	automobilový průmysl, zdravotnictví, výroba šperků, výroba spojovacích materiálů např. pro osvětlení;
563846	Vlastiboř	strojírentství, vzdělávání, státní správa
563854	Zásada	sklářský průmysl a školství
563871	Železný Brod	státní správa, sklářský průmysl, školství pro sklářský průmysl

Zdroj: vlastní zpracování, data DB ARES

Obr. 2: Podíl firem s převažující činností ve sklářství (užitkové sklo a bižuterie) v obci



Pozn.: V obcích Jablonec nad Nisou a Zásada lze konstatovat existenci sklářských firem s velkým počtem zaměstnanců v rozsahu 500–999.

Zdroj: vlastní zpracování

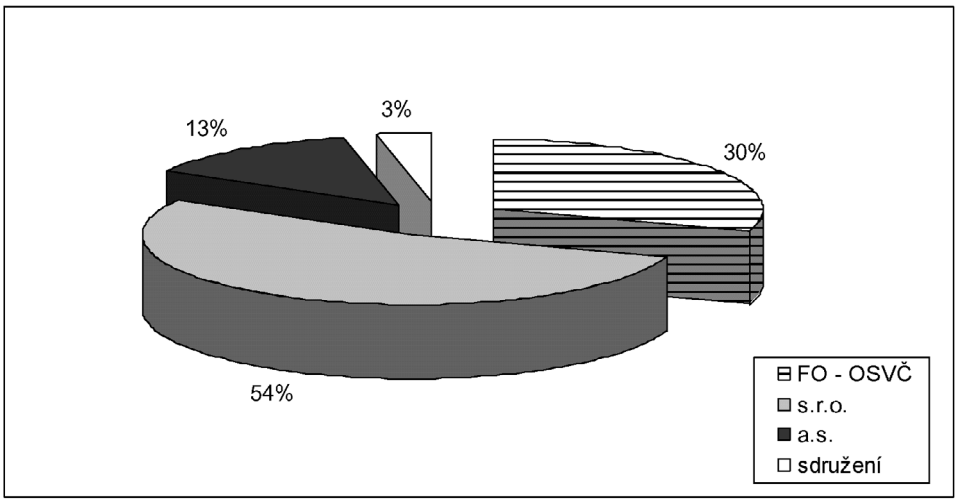
Tab. 2: Charakteristika obcí – sídla či místa podnikání respondentů

		počet obyvatel			ekonomicky aktivní			obyvtelstvo – zaměstnaní			obyvatelstvo – nezaměstnaní			
kód obce	název obce	2011	2001	1991	2011	2001	1991	2011	2001	1991	2011	2001	1991	četnost respondentů
563510	Jablonec nad N.	45255	45266	45937	21809	23721	25657	19604	22258	25028	2205	1463	629	15
563641	Koberovy	1008	952	919	497	470	519	453	458	513	44	12	6	2
563684	Loužnice	215	199	193	101	118	116	91	112	114	10	6	2	1
563749	Pěnčín	1923	1679	1616	901	910	899	811	890	889	90	20	10	5
576964	Semily	8738	9262	9399	4202	4860	5185	3771	4506	5104	431	354	81	1
563820	Tanvald	6740	7001	7055	3011	3562	4003	2599	3309	3927	412	253	76	1
577626	Turnov	14395	14513	14398	6982	7587	7998	6358	7233	7867	624	354	131	1
563846	Vlastiboř	132	125	134	58	58	61	53	54	61	5	4	0	1
563854	Zásada	888	841	904	424	439	496	393	424	492	31	15	4	1
563871	Železný Brod	6448	6544	6826	2984	3471	3834	2601	3326	3781	383	145	53	2

Zdroj: vlastní zpracování, data ČSÚ (SLDB 2011, 2001, 1991)

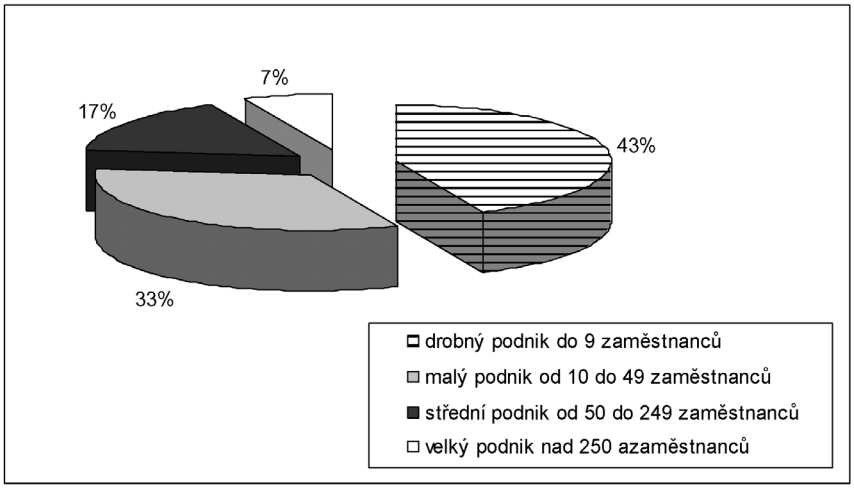
Soubor respondentů dotazníkového průzkumu lze charakterizovat následovně: Všichni respondenti byli z managementu firem, které mají sídlo v obcích s dlouhodobou tradicí ve sklářství. Firmy se v rámci svého předmětu podnikání zaměřují na výrobu v komoditě užitkové a ostatní sklo. Dle právní formy převažovala s.r.o., další významnou formou byly podnikající fyzické osoby, tzv. OSVČ (viz obr. 3). Velikost podniku byla hodnocena dle kritéria počtu zaměstnanců, viz obr. 4.

Obr. 3: Charakteristika respondentů z hlediska právní formy podnikání



Zdroj: vlastní zpracování

Obr. 4: **Charakteristika respondentů z hlediska velikosti podniků, dle počtu zaměstnanců**



Zdroj: vlastní zpracování

2.2 Vyhodnocení inovačního potenciálu vybraných komodit sklářského odvětví

Pro vyhodnocení inovačního potenciálu byla vybrána metodika průzkumu s dotazníkem „Mapa předpokladů k zavádění inovací ve firmě" autorského týmu pod vedením Jiřího Vacka ze Západočeské univerzity v Plzni. Uvedený dotazník byl vypracován v rámci projektu Leonardo da Vinci a je dostupný na internetu [12]. Jeho využitelnost byla ověřena např. v rámci projektu GA ČR [8], zde byl představen i způsob hodnocení inovačního potenciálu nejen po jednotlivých firmách, ale i celého hodnoceného souboru firem. Dotazník je svými otázkami zaměřen na zjišťování slabých a silných stránek ve specifikovaných oblastech podnikatelského procesu.

2.2.1 Popis dotazníku a metodika jeho vyhodnocení

Dotazník zahrnuje šest zkoumaných okruhů, které je dle autorů potřebné sledovat pro zmapování připravenosti podniku k inovačním změnám [12]. Jedná se o oblasti:

1) Strategie a plánování;
2) Marketing;
3) Technologický proces;
4) Kvalita, životní prostředí;
5) Logistika;
6) Organizace a lidské zdroje.

Každý z daných okruhů je dále charakterizován šesti otázkami s nabídkou čtyř možností odpovědí. Zvolení odpovědi „a" odhaluje oblasti ve firmě, ve kterých nejsou nastaveny činnosti a postupy pro zavádění inovací. Jestliže tedy firma chce inovace realizovat, je nutné zavést razantní změny v procesech firmy. Odpověď „b" charakterizuje firemní prostředí, které sice ještě nemá nastaveny procedury pro zavádění inovací, ale již zahájilo změny směrem k inovačním strategiím. Odpověď „c" volí respondenti firem, které již umějí pracovat se svým inovačním potenciálem, a lze jej dále rozvíjet. Firmy, které zvolí odpověď „d", s největší pravděpodobností znají svůj inovační potenciál, trendy vývoje svého podnikání a hledají možnosti, jak svůj inovační potenciál dále rozvíjet. Inovační aktivita v závislosti na vybrané variantě odpovědi byla hodnocena následovně:

1 bod … nulová inovační aktivita (odpověď „a")
2 body … nízká inovační aktivita (odpověď „b")
3 body … střední inovační aktivita (odpověď „c")
4 body … velmi vysoká inovační aktivita (odpověď „d")

Celkové vyhodnocení odpovědí je následně provedeno zařazením firem do tzv. tříd inovačního potenciálu, a to dle nejčastěji se vyskytující odpovědi v rámci jednotlivých zkoumaných okruhů. Stanovené bodové ohodnocení těchto

tříd A, B, AB, C bylo zvoleno za předpokladu, že firma při vyplnění celého dotazníku vždy získá alespoň 6 bodů v každé otázce dané sekce [8].

Výběr odpovědí prováděli respondenti zaškrtnutím varianty, která dle jejich mínění nejlépe vystihovala aktuální stav v podniku s možností upřesnění v poznámce. Inovační aktivita firmy v daném okruhu je hodnocena v rozsahu minimálně 6 až maximálně 24 bodů. Kritéria pro zařazení firmy v rámci daného okruhu do tříd, charakterizujících inovační potenciál firmy v dané oblasti, jsou uvedená v tab. 3.

Tab. 3: Kritéria pro zařazení firmy dle tříd inovačního potenciálu v hodnoceném okruhu

Třída	Rozmezí bodů	Hodnocení inovačního potenciálu	Charakteristika fy v dané třídě
A	21 a více	vysoký	Respondenti volili pro odpovědi na otázky daného okruhu nejčastěji variantu „d“.
B	16 až 20	střední	Firmy volily převážně odpovědi „c“.
AB	11 až 15	nízký	V odpovědích převažuje varianta odpovědí „b“.
C	6 až 10	velmi nízký	Převaha odpovědí „a“.

Zdroj: Jáč, Rydvalová, Žižka [8, s. 102–106] (upraveno)

2.2.2 Vyhodnocení inovačního potenciálu realizovaného průzkumu

Respondenti realizovaného průzkumu inovačního potenciálu vybraných sklářských firem odpovídali ve všech tématech na předložené otázky nejčastěji zaškrtnutím varianty „b“ a „c“. Na základě individuálního hodnocení firem, lze konstatovat nejčastější zařazení respondentů do třídy „AB“ (více jak 50 % firem), druhou nejčastěji se vyskytující třídou je „B“. Přes 80 % dotázaných odpovědělo, že nejsou příjemcem finanční dotace na inovační či výzkumné projekty. Pouze 10 respondentů uvedlo procento obratu, které v roce 2011 investovali do inovací, a to v rozmezí od 3 do 25 %.

Při vyhodnocení inovačního potenciálu celé skupiny respondentů lze konstatovat nízký inovační potenciál, viz tab. 4. Z realizovaného průzkumu je možné vyvodit následující zjištění:

- Management 60 % firem uvedl, že cíle, které byly ve firmě vytyčeny, jsou rámcové a nejsou dále rozpracovávány.
- Z celkového počtu třiceti firem jich šestnáct vůbec neuvažuje o inovacích. Pokud vybrané změny v průběhu podnikatelského procesu realizují, neumějí docenit jejich význam. Lze konstatovat, že prioritou těchto firem je zvládnout současné problémy a úvahy o budoucím rozvoji firmy jsou u jejich představitelů odkládány.
- Zhruba 40 % respondentů uvedlo, že se příliš nevěnují přínosu marketingových informací a know-how firmy je postaveno především na vybraných zaměstnancích.

Tab. 4: Vyhodnocení inovačního potenciálu

hodnocená oblast ve firmách sklářského odvětví	průměrné bodové hodnocení	třída	charakteristika inovačního potenciálu
STRATEGIE A PLÁNOVÁNÍ	11,83	AB	nízký
MARKETING	14,20	AB	nízký
TECHNOLOGICKÝ PROCES	13,20	AB	nízký
KVALITA, ŽIVOTNÍ PROSTŘEDÍ	11,47	AB	nízký
LOGISTIKA (NÁKUP, DISTRIBUCE, OUTSOURCING)	13,67	AB	nízký
ORGANIZACE A LIDSKÉ ZDROJE	14,20	AB	nízký

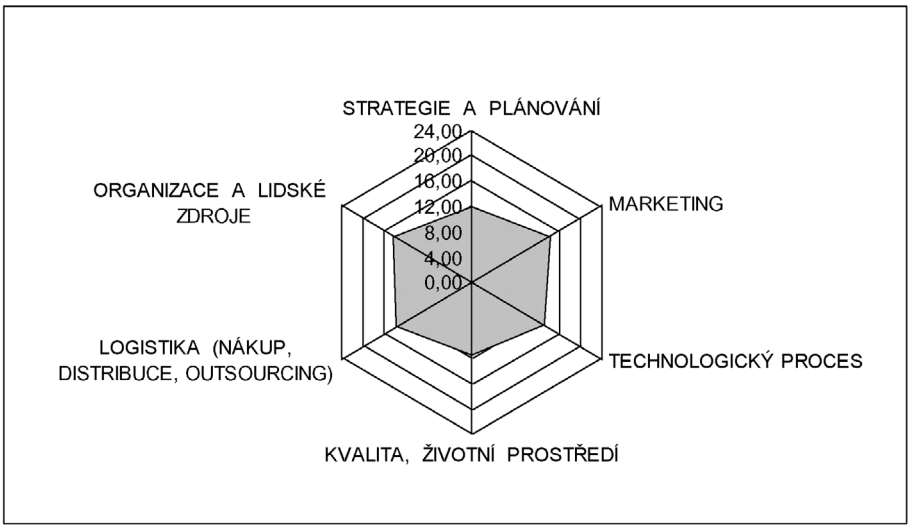
Zdroj: vlastní zpracování

- V oblasti sbírání podnětů k provádění změn technologických procesů uvedlo téměř 50 % respondentů, že vývojové trendy v této oblasti nesledují.
- Více jak 50 % firem si nestanovuje finanční ukazatele plánu, nezabývá se budoucími prognózami vývoje firmy.

U firem, kde management zvolil výše uvedené přístupy, nelze uvažovat o možném zapojení do projektů rámcových programů EU.

Graficky je průměrný potenciál vybraného souboru podniků užitkového skla a bižuterie Libereckého kraje znázorněn na obr. 5.

Obr. 5: Průměrný inovační potenciál zkoumaného souboru



Zdroj: vlastní zpracování

Závěr

V rámci předloženého výzkumu bylo realizováno dotazníkové šetření, dle kterého byl vypracován postup zkoumající možnost zapojení firem vybraných činností sklářského odvětví do rámcových programů EU. Výzkum se zaměřil na komodity sklářského odvětví užitkové a ostatní sklo, které vykazují problémové hodnoty ekonomických ukazatelů v rámci své podnikatelské činnosti.

Nejprve byly z hlediska inovačních aktivit analyzovány vybrané firmy sklářského odvětví v České republice s převažující ekonomickou činností dle CZ-NACE 231 a 321, a to pomocí dotazníkového šetření ČSÚ (rozhodný rok 2010). Na základě jeho vyhodnocení je možné konstatovat nesoulad v kategorizaci členění sklářských komodit (dle ASKP ČR) a klasifikaci ekonomických činnosti CZ-NACE. To následně komplikuje možnosti srovnání výstupů analýzy daného odvětví. Bylo ale zjištěno, že šetřené firmy využívají k financování inovačních aktivit jen v minimálním rozsahu veřejné zdroje.

Záměrem článku bylo zajistit podklady pro rozhodnutí, jaký zvolit postup pro zapojení výrobců uvedených komodit v Libereckém kraji do projektů rámcových programů EU. Předpokladem pro zapojení firem do těchto programů je existence inovačního potenciálu firem. Proto byl realizován dotazníkový průzkum dle metodiky „Mapa připravenosti podniků k inovacím“. Z odpovědí jednotlivých respondentů byly vypracovány „karty“ s vyhodnocením inovačního potenciálu zkoumaných firem s doplněním základních údajů dostupných z obchodního a živnostenského rejstříku, případně obchodního věstníku. Na základě výsledků průzkumu bylo rozhodnuto neoslovovat hromadně s nabídkou pomoci přípravy projektových návrhů pro RP EU všechny firmy uvedených komodit v regionu Libereckého kraje. Tento způsob

byl vyhodnocen jako neefektivní. Projektový tým se dále v Libereckém kraji zaměří s nabídkou možnosti spolupráce na výzkumných projektových návrzích v rámci RP EU jen na management šesti vybraných sklářských firem odvětví užitkové sklo a bižuterie, které vykázaly v průzkumu dostatečný inovační potenciál.

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Abstract

SELECTION OF POTENTIAL PARTNERS FROM THE CZECH GLASS INDUSTRY FOR PARTICIPATION IN EU FRAMEWORK PROGRAMMES

Petra Rydvalová, Radka Pittnerová

The aim of the article was to map the innovation potential of selected commodities produced by the glass industry. Those selected are domestic glass (beverage glasses, kitchenware, decorative glass, artistic glass, etc.) and jewelry. These are commodities that were identified in the available studies as causes for concern. The identified characteristic of these commodities was an insufficiently innovative approach throughout the business process of the companies. The intention of the authors, based on their own assessment of the innovation potential of the mentioned commodities, is to propose a procedure for the companies' possible involvement in innovative projects within the activities of the RCO (Regional Contact Organisation) Liberec.

The present study was conducted from January 2001 to April 2012. First, an analysis of selected economic indicators was carried out for individual commodities produced by the glass industry of the Czech Republic. According to the results, commodities were selected for the evaluation of their innovation potential. The survey was preceded by a summary of the CSO survey for the period 2008–2010, focused on the innovative activity of firms (by sector) of the Czech Republic. To evaluate the innovative activities for selected glass commodities in the Czech Republic, according to industrial classification, the following sectors were selected: the manufacture of glass CZ-NACE 231 and jewelry CZ-NACE 321 (source of input data – Czech Statistical Office). Valuable information was obtained about the type of innovation and how it was funded.

The authors' survey of the innovation potential of glass companies engaged in manufacturing domestic glass and jewelry was focused on companies in the Liberec Region municipalities with a high concentration of these businesses. 84 questionnaires were distributed, and 30 completed questionnaires were evaluated. Based on the survey results, it was found that respondents mostly showed low innovation potential. In this case it would not be effective to provide assistance in projects involving all companies in the EU framework programs. Therefore, a smaller number of companies were chosen to be offered cooperation with RCO Liberec, namely companies in which at least a moderate potential for innovation had been identified.

Key Words: *EU Framework Programmes, innovation potential, glass industry, domestic glass, jewelery, RCO.*

JEL Classification: *L61, O14, O31.*

OUTSOURCING OF FACILITY MANAGEMENT

Milota Vetráková, Marek Potkány, Miloš Hitka

Introduction

The world financial crisis has influenced the whole entrepreneur society in a negative way. As a result of the crisis many enterprises are forced to undertake many costly actions, which sometimes are not even linked to their company's main focus of activity. Outsourcing represents a new way towards rationalization of enterprise activities, which means to submit internal side activities not generally linked to the main company's focus of activity, to external subjects. Outsourcing of facility management is one of the possibilities which mean the solution of this situation by the organisational changes. **The main aim of this paper is to present a basic project for proposal of facility management outsourcing which depends on many factors (industry, region, experience with implementation of outsourcing and form of outsourcing). The paper also presents partial results of the research concerning on outsourcing utilization in companies of wood processing industry in Slovakia with the focus on the area of outsourcing of facility management using the methodology of correlation analyses.**

1. Facility Management

To explain the areas of the facility management we can use the definition of IFMA (International Facility Management Association bringing together more than 18 000 members from 50 countries). IFMA defines Facility Management as "a method whose task is to match the employees of the organization, work activities and work environment that brings together the principles of business administration, architecture, humanities and sciences." Facility management is, according to the definition, characterized by linking three areas, namely [20]:

- Areas related to employees, i.e. human resources and sociological aspects;
- Areas of work, i.e. the performance and funding;
- Working environment, i.e. architecture and engineering.

The final effect of all reciprocal ties is to strengthen all processes with the help of which employees in their workplaces – in a pleasant and performance supporting environment – give an optimal performance. Ultimately, facility management contributes positively to the economic growth in the body and thus boosts its competitiveness.

As stated by Serina [18] it is clear that the first two areas are identical in all managements. It is always about a set of activities, supplying or assignments for a group of persons. For facility management, the third area marked as working environment, is specific. Essentially, we can say that the facility management aims to ensure the support of the company or building so that the employees have everything they need to operate and that the costs of providing all services were as low as possible (Fig. 1).

German National Association of Facility Managers GEFMA emphasizes the cost (i.e. economic) aspect of the processes that support the core business of the organization. Definition according to GEFMA is: "Facility management is defined as an analysis and optimization of all cost-relevant processes relating to building, construction of another facility or organization performance not belonging to the principal activity of the organization" [20].

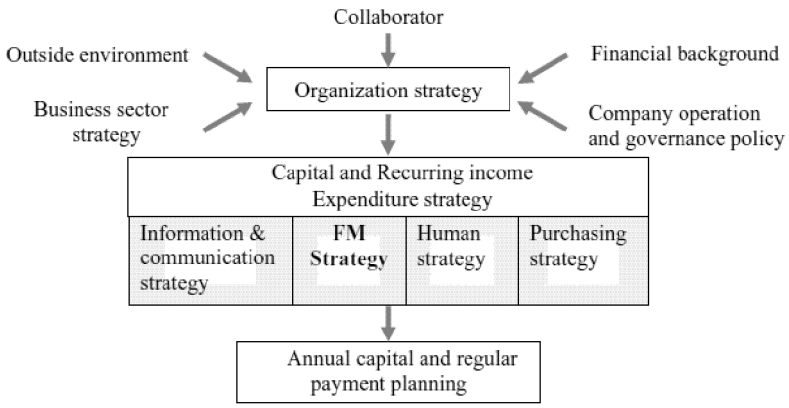
The Technical Committee CEN TC 348 Facility Management established the European standard of facility management in 2007 which is valid also in Slovakia as BS EN 15221 Facility Management. The tentative standard defines facility management as follows: ***"Facility Management represents the integration of activities within the organization for the purpose to ensure and to develop agreed services which support and increase the effectiveness of 'core activities'".***

Fig. 1: Business Areas of Facility Management

Source: [9]

According to Gao and Cao FM has many various definitions. In fact, there are considerable differences in responsibilities among different facility managers, so that many facility managers are confused with their responsibilities in organizations. However, in other traditional disciplines in construction and real estate industry, such as architecture, project management and town planning, the confusion was rarely [6]. The fundamental purpose of FM is support organization strategy and core business to enhance organization's economic benefits and core competence. Therefore, FM should be guided according to organization strategy and FM strategy is part of organization overall strategy. Figure 2 shows the position of FM strategy in organization strategy frame.

Fig. 2: The Position of FM in Organization Strategy



Source [6]

Innovation in facilities management (FM) is a complex process as FM is a diverse discipline [12]. The use of facility management services from a number of their providers can be found in many organizations in the banking sector, multinational retail chains, international corporations, as well as public and the government. The focus in the facility service business has traditionally been on operative level outcomes such as customer satisfaction and technical quality [7].

2. Outsourcing

It is possible to explain the term outsourcing as the acronym consisting of three English words ***"OUTside reSOURCe usING"***. This expression is a term of the American business English and it means ***„utilization of external resources"***. In theory, outsourcing is a quite popular topic with help of which a lot of experts point out the trend and efficiency of external resources utilization in external company management. In general, it is theoretically presented as a modern trend of management which serves to transfer support company activities to an external provider.

The breakthrough in the development of outsourcing from the perspective of economic theory can be ascribed to works of R. H. Coase (published in 1937) and O. E. Williamson (published in 1961). According to R. Coast, there can be only reached to the efficient allocation of resources in economics, if property rights are well determined and then effectively enforceable, with very low cost to bargaining. Generally, these costs have been named as transaction costs. Between the basic principles of transaction cost and incomplete control theories exists dependence [2]. By the particular application of transaction costs can in an otherwise standard competitive model dramatically improves its ability to rationalize observed real exchange rate dynamics [11].

During its development outsourcing became a complex object of doing business and that is why it can be characterized from different points of view. One can find a lot of definitions of different authors. According to the authors I. Hunter, J. Saunders, A. Boroughs, S. Constance ***„outsourcing is a transfer of internal business activities or a group of similar activities and assets to an external producer or provider of services who is able to offer required service on agreed date and price"*** [8]. It is a special form of co-operation concerning internally executed processes where the object of performance is agreed in a contract. This way outsourcing differs from another "partnerships". Nowadays outsourcing is utilized worldwide as one of tools of the strategic company management, namely as a tool of optimizing company resources consumption aimed at basic strategic company goals.

Practical utilization and application of outsourcing is wide and favourite in many industries in all developed countries since it brings many positive effects. In our geographical conditions, in spite of initial distrust to it, its practical application is better now and outsourcing finds its application in many industries as well. The reason is foreign companies' and their management know-how penetration to our market.

In practice it is not possible to outsource all activities. It is ideal to determine a plan based on company business philosophy, it means to focus on a core of company interest and not to outsource this base [22]. This procedure is logical – it is a must to have some area which the company fully deals with and not to let it to the other company. Doing that company's own existence would be threatened. An organization may outsource not only company activities which are classified to the category of „noncore business", which means processes ensuring support activities in the company – it means it is right to select a process where we do not anticipate aversion to changes or aversion is as weak as possible and requirement for changes is strong. So it should be a process which does not work optimally or there are some costs or qualitative reserves.

Outsourcing utilization is often connected with the area of information systems/information technologies (IS/IT), where the extent of contracts is the biggest. In this case we speak about outsourcing of IT infrastructure, applications of technical support, hardware, software, data administration, professional staff, web site hosting, development of applications for business processes, help desk services (customers support), networking (net connection), communication services, data centres operations, IT infrastructure. Areas, where to utilize outsourcing apart from IS/IT is possible, have been recently found in many companies' activities: *Accounting and administration evidence, Facility*

management (cleaning services, supporting services, catering services, property services, security services), Human resources, Ecology and environment, Logistics, Science and research activities.

Today, outsourcing is used primarily as a tool of strategic business management. Priority task of outsourcing is been becoming the providing and increasing of the quality level of performing activities and cost savings to pay the attention to core business [15]. Companies frequently point to the cost savings for labor and training, but also cite the benefits of releasing corporate resources for alternative uses and allowing corporate resources for alternative uses and allowing the business to focus on its core competencies [16].

Praxis has confirmed that ideas about costs saving are often higher than it is actually. The problem seems to be that the level of own costs for realizing of the outsourced processes is quite difficult to identify and to know in the phase of decision-making. Companies can hardly monitor the costs of own processes and then to determine the level of potential costs saving. The methodology of Activity Based Costing calculation is necessary to know to it. This calculation considers as a basic philosophy of costs causes the business processes [1]. One important issue that determines the eventual form and structure of the ABC system is senior managers' demand for data utilizable for decision making. All these requirements need to be defined in relation to the structure of the system. An effectively implemented Activity-Based Costing system then provides accurate product costing and proves a useful aid for managing business operations [13].

3. Partial Results of Research Concerning on Outsourcing Utilization in Wood Processing Companies in Slovakia

Within the solution of the research project VEGA 1/0360/08. *"Functional and Design Parameters for the Evaluation of Economic Effectiveness of Outsourcing in Wood Processing Companies"* by means of a partial solution we have found out possibilities of outsourcing application in companies processing wood in Slovakia. Through the research which was done as a combination of a questionnaire and personal interviews we wanted to get responses to questions which characterize basic areas of outsourcing in selected wood processing companies in Slovakia. Our aim was to map the current situation in areas utilizing outsourcing and to find out potential opportunities, interest and barriers of practical utilization of outsourcing in a company practice of wood processing companies in Slovakia.

The preferred research goal was to carry out quantitative research by using the selected sample of companies of wood processing industry aimed at outsourcing utilization. During solving the research project within the defined research goal by means of the questionnaire executed through e-mail correspondence, telephone or personal conversation. We addressed totally 146 companies/enterprises belonging to the wood processing industry and located in Slovakia. At first we contacted all the companies associated in Association of Slovak Republic Wood Processors and later we have addressed individual contacts in given industry.

Since we made an effort we succeeded to summarise 49 completed questionnaires which present about 34% return. Representation of individual companies which were willing to provide information for the research in a structure of classification due to company regional location and due to the size of companies - based on classification of the European Commission number 2003/361/EC (Tab. 1).

As the primary goal of the task the response to the question *"To which rate and in what areas is outsourcing utilized in companies of wood processing industry in Slovakia and what are preferred reasons of its utilization?"* may be determined. This way defined goal is quite wide and that is why it was necessary to divide the research into several partial questions. Within the frame of content specification of our contribution we will present only **partial results of the research** in the following part together with the presentation of statistical reliance (by the correlation analyses) of selected questions.

For the valuation of statistical reliance of individual questions correlation analysis was used. Correlation means the linear dependence between random variables. Statistical dependence is called the correlation coefficient in the case of linear dependence between the variables degree of tightness. Correlation coefficient of two dependent random variables x and y is the proportion of covariance and the product of

Tab. 1: Structure of Database of Presented Research Enterprises

Size/Region	Micro enterprises	Small enterprises	Medium-size enterprises	Large enterprises	Total
West	2	7	6	1	16
Middle	4	10	5	2	21
East	3	5	3	1	12
Total	9	22	14	4	49

Source: [15, p. 36]

standard deviations. Correlation coefficient takes its values from the interval <-1,1>. The reader is referred to as the covariance which expresses the same time as changing the values of two variables. Pearson's correlation coefficient is calculated by dividing the covariance standard deviations. Pearson correlation coefficient (Pearson's product moment – r) is possible to determine by this formula:

$$r = \frac{\overline{xy} - \bar{x}\bar{y}}{s_x s_y} \quad (1)$$

where:

r – Pearson's product moment(coefficient),
x, y – variables *x (y)*,
s_x, s_y – standard deviations of variables *x (y)*,

Interpretation of the size of the correlation coefficient is a very common problem. According to Cohen and the correlation is trivial under 0.1, from 0.1 to 0.3 correlation is small, from 0.3 to 0.5 correlation is medium and over 0.5 correlation is large. Correlation from 0.7 to 0.9 is very large and from 0.9 to 1 is almost perfect.

Questions in questionnaire were aimed for identification: the region covered by the company (table 2, marked as a question A), sizes of the company (B), the use of any form of facility management outsourcing (C), reasons of use/non-use of outsourcing (D/E), assessment potential of economic efficiency of outsourcing use (F) and interest in the use of outsourcing services in the future (G). All of questions in questionnaire were compared each other through correlation analysis of pairs and then the correlation dependence was expressed. Tab. 2 presents the correlation matrix of the individual questions with expression of its levels depending.

Tab. 2: Correlation Matrix of the Individual Questions of Questionnaire

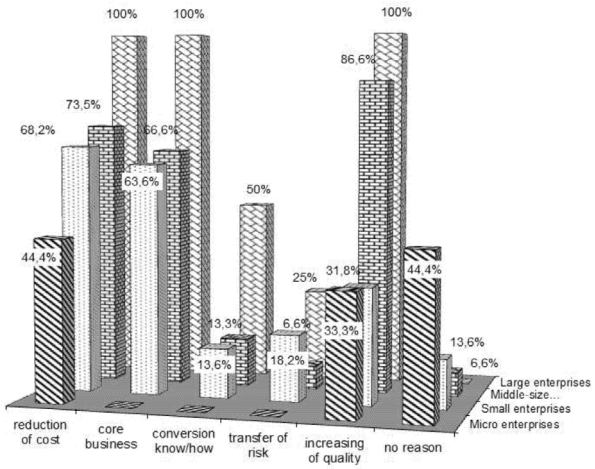
	A	B	C	D	E	F	G
A	-	0.09	0.33	0.21	0.37	0.12	0.16
B	trivial	-	0.28	0.39	0.13	0.16	0.14
C	medium	small	-	**0.77**	**-0.58**	0.04	0.42
D	small	medium	**very large**	-	**-0.60**	0.19	**0.56**
E	medium	small	**large**	**large**	-	0.07	**0.53**
F	small	small	trivial	small	trivial	-	0.08
G	small	small	medium	**large**	**large**	trivial	-

– A Region
– B Size of enterprises
– C Outsourcing use in Facility management
– D Reason for use of outsourcing
– E Reason for rest of outsourcing
– F Evaluation of economy efficiency of outsourcing use
– G Interest in using of outsourcing

Source: [15, p. 35]

The statistical analysis of correlation reported a high linear relationship between the possibility of outsourcing use in facility management and main reasons for outsourcing use, but also with the main reasons for rest of outsourcing in companies.

Fig. 3: Main Reasons for Outsourcing Use in Wood Processing Industry in Slovakia



Source: [15, p. 39]

Wood processing industry in Slovakia is influenced by the economic crisis causing stagnation in the construction industry and decrease in the customer demand for construction, woodwork and furniture products. Many companies are looking for any ways of cost savings and recently more and more companies increasingly have used the possibilities of outsourcing.

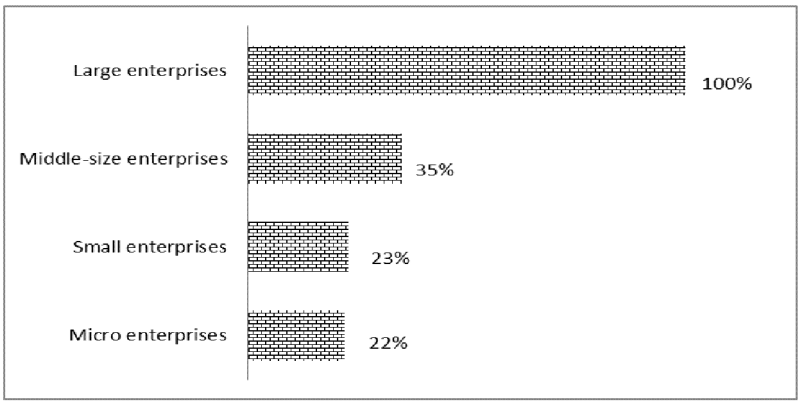
The outsourcing is commonly used in large and medium-sized enterprises when the main reasons are reduction of overhead company costs, orientation into core business and increase of quality for outsourcing processes (Fig. 3). The use of outsourcing services absence mainly in micro and small enterprises. The main reason of inefficient using of outsourcing in the small companies is regarding to the lack of companies offering outsourcing and little time that companies spend on the research in this issue.

As it has been already mentioned, outsourcing of facility management includes not only technical management and administration of buildings, but also maintenance, special inspection, services, educational and catering activities, emergency and energy services. According to the survey result outsourcing of facility management (Fig. 4) in the complex form is most used in large enterprises. In the other types of enterprises (middle-size, small) it is used mainly in areas of administration, educational and catering activities. In micro enterprises is outsourcing use only in administration activities (law and economic consulting, accounting and payroll administration).

Priority task of using facility management outsourcing in company practice is becoming increasing quality level of outsourcing activities performed with the aim of cost saving [4]. However, experience has confirmed ideas on cost savings are often higher than it actually is possible. The problem to determine the level and to know their own costs for the implementation of the outsourced processes is quite difficult. For many companies is extremely difficult able to track costs on their own processes and subsequently to determine the level of potential cost savings from using of outsourcing services.

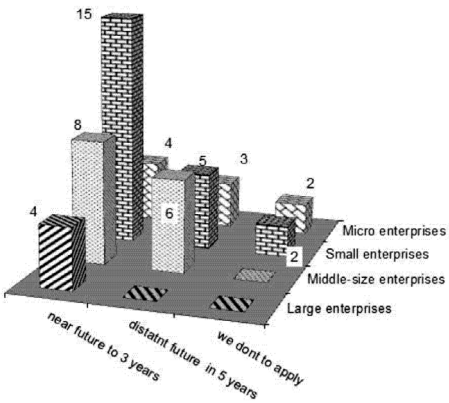
Interest in the use of outsourcing services in wood processing enterprises, as the results of the survey present, is evident (Fig. 5). All large companies and more than half of middle-size and small companies have expressed interest in expanding the use of outsourcing

Fig. 4: Used of Facility Management Outsourcing in Wood Processing Industry in Slovakia



Source: [15]

Fig. 5: The Possibilities of Outsourcing Application in the Wood Processing Industry in Slovakia



Source: [15, p. 42]

services in the close future till three years. Assuming the fulfillment of the benefits that the implementation of the outsourcing can bring for companies, a significant number of middle-size, small and also micro enterprises consider the use of outsourcing services in the longer term of 5 years. The survey also detected a lack of interest in the outsourcing use in some businesses, the main cause is solving of important issues how to keep the market in a competitive environment, but also a lack of time and space to deal with this problematic.

4. Project of Facility Management Outsourcing

The basic prerequisite for facility management outsourcing is optimization of business costs for their administering and improving the quality of services delivered. To implement the outsourcing of facility management in the organization it is necessary to prepare a high-quality project of its ensuring. The general model (design) of applications of outsourcing is very difficult to present because it is influenced by many factors, such as the specific features

of the company (industry, size, region, organizational structure itself, ...), the nature of the outsourced activities, the timetable for the implementation, financial budget and type of outsourcing relationship. In spite of it, there are attempts to define certain phases of outsourcing theoretically.

In the following part is presented a brief summary of the draft form of the implementation process of outsourcing, according to various authors, for example to Corbett [17] and others [3], [10], [15] in accordance with the requirements of international standard ISO 10006. ISO 10006 "Quality management – Quality Directive in the Management of the Project" is an international standard that provides guidance on elements of the quality system and procedures, for which the application in terms of project management is important. This standard complements ISO 9004-1 standard and is applicable for projects of varying scope and complexity. The general application process of outsourcing facility management can be defined in several phases:

- *Analysis of the areas identified for outsourcing facility management,*
- *Definition of requirements for the supplier,*
- *Selecting an outsourcing provider,*
- *Terms and conditions for setting the outsourcing relationship,*
- *Management of the transition phase of outsourcing relationship.*

The overall implementation time of outsourcing greatly depends on many factors while the time horizon of implementation is estimated from a few months to one year.

4.1 Analysis of the Areas Identified for Facility Management Outsourcing

The aim of this stage is to analyze the areas of organizations with potential to be outsourced by facility management with the calculation of potential benefits in the reduction or cost savings. Based on the analysis of the functional areas, a company must answer a few questions:

- What is the available offer of facility management services on the market?
- Which areas related to the administration of building would be appropriate to outsource?
- Outsourcing of which area will be of the highest benefit?
- What will be the potential cost savings resulting from the use of outsourcing services?
- It is appropriate to use the services of one supplier or more service suppliers?
- Analysis of strengths and weaknesses of the current status and opportunities and threats status outsourced?

For the analysis of the area identified for facility management outsourcing is possible to use a suggestion about potentialities for the SWOT analysis's development concerning threats from the authors Simeonov and Lambovska. By presenting empirical results of their implementation, the instruments of measuring and evaluating of threats are substantiated, provided threats evolve from the aggression degree of licensing institutions [19].

The critical question of this phase, which greatly affects the decision-making of the enterprise, is to identify potential cost savings and other benefits arising from the use of outsourcing services. It cannot be presented in this contribution in complex form. From results our proposals is obvious that the economic analysis of the potential of outsourcing in practice it is necessary to work with concepts such as ABC calculation, criterion cost of outsourcing and transaction cost. Primary task is to establish the level of potential cost savings as the primary effect of the use of outsourcing [14]. In the first step is necessary to determine criterion outsourcing costs (CC_O), for the potential analysis of economic calculations of advantages, respectively disadvantages of using outsourcing services as follows formula 2:

$$CC_O = \text{own costs of process (or activity, operation)} - \text{transaction costs} \quad (2)$$

From results follow the need to determine own costs of selected business process and its difference from the level of transaction costs (additional costs required to management the outsourcing relationship determined on the qualified estimation). Transaction costs of outsourcing can be expressed as the total costs of accounting period or on the level of costs related to the specific unit. The specific unit is determined on the base of discussed area of outsourcing (facility management, administration, logistics and other), as well as on the level of

price offer of the external subject for given type of service (employee, document, administration, area and other).

The complex presentation of this methodology is presented in the literary sources *Potkány, M. Outsourcing Companies in the Wood Processing Industry in Slovakia. Zvolen: Technical University in Zvolen, 2011. 79 p. ISBN 978-80-228-2194-0.* Very important information can be found in [21] and [5].

4.2 Definition of Requirements for the Supplier

Based on the results of the previous phase, it is necessary to define basic requirements for the supplier(s) of outsourcing services, whereby it is recommended not to focus on specific results but to identify the type of outsourcing relationship and definition of responsibilities for services rendered. Definition of requirements should include:

- detailed specification of the range and quality of delivered services,
- method of technology and information exchange in connection with outsourcings relationship (acknowledgment and acceptance of services),
- definition of liability (in the form of insurance guarantees determining the extent of insurance coverage),
- qualification requirements and the size of the supplier with proof of ownership of resources to provide services: licenses (certificates, certificates serving as permit the implementation of the activity or as proof of their quality), references (list of organizations using the services provider who predicate of the ability to provide services).

4.3 Selecting an Outsourcing Provider

Selection of the contractor to ensure the assigned area (therefore outsourcing provider), is based on the assessment of criteria set out in the previous stage. However, the bid for outsourced activities designated by the supplier is taken particularly into account – its financial stability, number and expertise of employees, licenses, certificates, licenses, references and guarantees the contractor. Own choice of an outsourcing provider can take different forms and most often takes the form:

- public tender,
- tendering,
- direct addressing of recommended suppliers.

When evaluating potential suppliers it is recommended to compile an Evaluation Commission (with internal staff of organization involved in the future cooperation but also with external evaluators) and use of multicriteria decision-making with more preference points or weighted point method with the assessment of the criteria scoring system based on defined criteria such as scale from 1 to 10.

4.4 Terms and Conditions for Setting the Outsourcing Relationship

In any relationship there must be conditions according to which this relationship is functional, therefore, negotiations about the outsourcing relationship is an inseparable part of the application process of outsourcing. Outsourcing contract is for a certain period and it is possible that, according to its content, the outsourcing relationship may continue for several years. The contract must be drawn up and written to describe the plan how the relationship will be managed.

In practice, there is no outsourcing contract type, because every relationship is different. When creating a contract, it can be inspired by a so-called checklist contract about outsourcing. Outsourcing contract of a specific type should contain at least the following points [17]:

- Definition of the Parties: the definition of customer service and its supplier.
- Subject of the contract: the essence is the determination and specification of services being provided within the outsourcing process with the possibility of defining their level of quality and specific outcomes.
- The clause on transfer of responsibility: the transfer of responsibility for services performed for the contractor with the possibility of defining the fines and compensation for damages.
- Life of the contract: determining the time horizon of the contract (minimum time is recommended for two or for three years).
- How to change the contents of the contract.
- Mode of termination of the contractual relationship: there are several options such as early termination of the contract, withdrawal, cancellation of the agreement

(in each case, defining the reasons and notice period).

4.5 Management of the Transition Phase of Outsourcing Relationship

The project of outsourcing of facility management is not finished with selecting the provider (s) and with the conclusion of an outsourcing relationship contract but it continues in a so-called transition phase. Based on the Takeover documentation, the service provider takes over operation of the facility management services and become the legitimate executor.

The transition phase is actually a process of transformation when a selected area is replaced by an external service which often leads to restructuring of business processes and also to a change in the organizational structure of the enterprise. The incorporation of outsourced services to the restructured business processes should be closely monitored and evaluated. It is recommended to create a working position in the enterprise that would be responsible for relationship management, evaluation, and solving of any emerging problems and the preparation of business administration (the so-called outsourcing manager).

Conclusions

Facility management is an effective form of outreach business management which aims to provide relevant, cost-effective services to support the main business activities (core business) and allow them to optimize. At present, marked by the financial crisis, is the application of facility management most current because it provides savings and optimization of operating costs promotes increased employee performance and thus contributes to increase the profitability of the enterprise. The most common forms of application of facility management in the enterprise is a partial or complete outsourcing, whose main components are technical and administrative management of buildings, interior cleaning of winter and summer maintenance exterior, provision of energy services and water management, including services. For implementation of the outsourcing of facility management in the organization it is necessary to prepare the project's quality assurance which includes an analysis of areas identified for outsourcing facility management, requirements definition and vendor selection, to determine the terms and conditions related to outsourcing and management of organizational change.

Partial results of research concerning on outsourcing utilization in wood processing companies in Slovakia demonstrate that outsourcing is commonly used in large and medium-sized enterprises when the main reasons are reduction of overhead company costs, orientation into core business and increase of quality for outsourcing processes. According to the survey result outsourcing of facility management in the complex form is most used in large enterprises. In the other types of enterprises (middle-size, small) it is used mainly in areas of administration, educational and catering activities. In micro enterprises is outsourcing use only in administration activities (law and economic consulting, accounting and payroll administration). Interest in the use of outsourcing services in wood processing enterprises in the future is evident. All large companies and more than half of middle-size and small companies have expressed interest in expanding the use of outsourcing services in the close future till three years.

The total process of outsourcing implementation in a company depends on many factors. Time horizon of outsourcing implementation is estimated within a few months to one year and it is necessary to consider the risks of outsourcing use (loss of control over the outsourcing activity, the possibility of an external orientation to their own targets, breach of contract from outsourcing provider). Risks can be already eliminated in the process of negotiating its incorporation into the outsourcing contract, which will then manage the outsourcing relationship for several years.

Outsourcing is one of tools which are able to release potential fixed in the areas that do not belong among the core activities. On the other side if the way of outsourcing utilization is chosen correctly as well as the partner – company key abilities and their competitive advantages may be strengthened. But the task of economic and non-economic benefits is still the open one as well as the risks of its utilization. It is the competence of each organization to decide freely about the opportunity of its utilization. Problem of deciding of outsourcing

facility management practices in use or not ?? is a question of its economic efficiency. The problem determines the level of its costs of outsourced processes that are not among the main items of core business activities. Most of the overhead costs must be allocated through a methodology of activity based costing calculation. To determine the allocation base, there is proposed for each group of overhead costs to look for its suitable type, e.g. using the function CORREL of processor Microsoft Office Excel. Data of costs and level of alternatives of allocation bases are recommended to compare minimally quarterly. Then is necessary to determine criterion outsourcing costs (CC_O), for the potential analysis of economic calculations of advantages, respectively disadvantages of using outsourcing services. The application of such calculations in enterprises, however, requires changes to the accounting and corporate governance costs.

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Abstract

OUTSOURCING OF FACILITY MANAGEMENT

Milota Vetráková, Marek Potkány, Miloš Hitka

Facility management is an effective form of organizational changes that support the orientation of the organization on core business activities. At present, at the time of financial crisis, the application of FM is used the most since it provides savings in operating costs of organization. The most common form of FM application is outsourcing. Outsourcing is understood as a modern trend of management and also the changes which serve to transfer support activities of a company on an external provider. Practical utilization and application of outsourcing is frequent and very popular in many industries of all developed countries since it brings a lot of positive effects. Wood processing industry in Slovakia is influenced by the economic crisis causing stagnation in the construction industry and decrease in the customer demand for construction, woodwork and furniture products. Many companies are looking for different forms of cost savings and recently more companies have increasingly used the possibilities of outsourcing. The authors present the results of the questionnaire research aimed at the use of outsourcing within the chosen sample of woodworking industry companies in Slovakia. It focuses on the area of outsourcing FM with the use of correlation analysis lining the dependencies of the chosen questions. Within the article there is also the presentation of the proposal for partial methodology of evaluation for economical effectiveness of the potential outsourcing use which within the ABC calculation methodology suggests implementing conceptual schemes such as criterion outsourcing costs, transaction costs and costs savings. The authors also present the suggestions for general methodology of outsourcing FM implementation project which includes analysis of outsourcing opportunities and threats in this area of business, definition for service supplier requirements, selection of providers, contracting the conditions for the contract relationship and the management of the transonic phases of the outsourcing relationship.

Key Words: *facility management, outsourcing, wood processing industry, changes.*

JEL Classification: *L69, M21, M29.*

ERLANDER PRINCIPLE IN MANAGERIAL DECISION MAKING ON CZECH AND SLOVAK URBAN TRANSPORT ROUTES

Jan Černý, Anna Černá

Introduction

The first urban public transport lines were established separately, on the basis of individual local needs, in the first half of the 19th century. They used horse-drawn omnibuses. An interesting coincidence is that the first public omnibus line was put into operation both in Prague and in London in 1829.

A few decades later, there was promoted the effort to merge the individual lines into coherent systems under common management. For instance, the London General Omnibus Company (LGOC) was founded in 1855. Karlin Omnibus Company (Karlin is a quarter of Prague) arose in 1870. Routes and frequencies of these systems were created intuitively and were modified based on experience. The same become true when the omnibuses were motorized.

The first efforts to create the routes and their frequencies objectively, justified by some engineering experience and knowledge, appeared after the World War I. One can mention the paper [23]. However, "manual" techniques were not able to handle the huge number of all possible lines, less so all their possible configurations. Any mathematically based method, intended to design bus routes and frequencies, could have, generally speaking, the character of a simple, hand-feasible, heuristics. There is, however, one exception. Creation of parallel routes together with their frequencies on small size square grid networks can be done by conventional analytical methods even manually, see [4]. Here should be noted that throughout this article, 'network' means an undirected graph $G = (V, E)$ where V is the set of vertices and E is the set of edges.

The change was brought by the possibility of using computers in the sixties of last century as documented in [19] or [21]. The use of mathematical methods and their implementation on computers, however, began to develop massively in the seventies, as shown in the survey paper [14] where more than 50 such papers are cited.

Computers were mostly used in "man-machine" mode. Predominant variant was the following: The person, i.e. the transport manager, proposes several configurations of routes with their frequencies and the machine configuration. The machine i.e. the computer, evaluate them. One such methodology was described in [22]. Other one, used e.g. in Sweden, is presented by [2].

Other authors, e.g. [29], used the following approach: First, a set R_0 of "candidate" routes is created, manually by a manager or with help of computer. Second, the configuration $R \subset R_0$ (to be operated) is selected. Third, optimal frequencies for the routes from R are determined.

The Swedish-Czechoslovak Symposium on Applied Mathematics was in Prague in March 1975. Sven Erlander, the well known Swedish expert, spoke about an original approach to urban bus routing and frequencing published in [17]. It consists of the following steps, where the originality is in the step S2:

S0: Assemblage of initial data on passenger demand, bus fleet and road network.

S1: Creation of the set R_0 containing reasonable bus routes. This step was usually done manually by a transport manager.

S2: Assignment an integer variable $x_r \geq 0$ to each route $r \in R_0$. The meaning of it is that the value x_r expresses the number of buses assigned to the route r. This variable accomplishes the selection of routes from the initial 'wide' set R_0 into (usually much smaller) set R which is to be put into operation. The value $x_r > 0$ means that the route r will operate x_r vehicles, $x_r = 0$ means that the route r is abandoned.

S3: Choice of all values x_r meeting the constraints on the bus fleet and minimizing the time lost by the passengers. This step is done by computer via non-linear programming.

The step S2 immediately woke overall interest, because the variable x_r did not fulfill only the standard selection role: $x_r = 1 \Rightarrow$ element r is selected, $x_r = 0 \Rightarrow$ element r is rejected. In the Erlander's model, meaning of the relation $x_r = 0$ remains unchanged, while $x_r \neq 0$ not only means acceptance of the route r into the operation, but it expresses the number of operating vehicles. Since that time, the step S2 is known as 'Erlander principle' to Czech and Slovak experts. It enables the simultaneous choice of the set of routes $R \subset R_0$ and their frequencies.

The first author of the current paper followed the lecture of S. Erlander. He realized that it was not possible to take this model unchanged in the Czech and Slovak conditions. The main reason was the non-linearity of it.

It is inevitable that the model is nonlinear, when the variable x_r expresses the number of buses assigned to the route r and the objective function expresses the delays of passengers. The reason is that the average waiting time for the next bus is of the form $const/x_r$, since the greater the number of buses x_r, the less the interval between successive vehicles and, consequently, the waiting time as well.

Moreover, there might happen that $x_r = 0$ in the denominator of the objective function, which is not permitted. Therefore, the model must be protected against it i.e. it should be even more complicated.

Such a variant of non-linear optimization problem is much more demanding on computer memory and calculation time than the linear one. In late seventies, the maximum size of non-linear problem, solved by Erlander model on Czechoslovak computers, was estimated to 15 routes in the set R0. However, the practical demand was to solve problems 10 or more times greater. Therefore the main question was whether there was some linear modification of the model.

1. Linear Modification of Erlander Model (LMEM)

If one wanted to keep the genial idea of the step S2 but to avoid the non-linearity of the problem, it was necessary to replace the indicator of passenger time loss by another one. However, the time loss of passengers is extremely important indicator. Any new objective function should not counteract it.

It is supposed that the passenger demand is represented by an origin-destination matrix (briefly OD-matrix), i.e. the square matrix having n rows (and n columns as well) where n is the number of nodes (usually stops of urban transport). The element f_{ij} in the i^{th} row and j^{th} column of the OD-matrix F expresses the passenger flow, i.e. the number of passengers (an hour) demanding the transport from the node i to the node j. Usually, there are given several OD-matrices, one for the morning peak another for the morning saddle, another for afternoon peak etc.

A new linear objective function not only must not counteract the reduction of time losses, but even it is desirable to support it. Czecho-slovak specialists decided to choose the new indicator, expressing the number of seats over the number of demanding passengers. They found out that there were two possibilities: either to take the new indicator in a constraint and to minimize the necessary number of vehicles, as described in [11] and [12], or to leave the number of vehicles in the constraint and to maximize new indicator, see e.g. [13]. In both cases it is supposed that all passengers, counted in the OD-matrix, are transported without exceeding the bus capacity anywhere in the network. It is obvious that if each passenger is transported and, despite this, the new indicator remains small, then the duration of the trips, as a part of passenger time losses, ought to be small as well. The new and the old indicators are conformable.

1.1 The Linear Model Minimizing the Fleet

It is assumed that, after the traffic assignment, for each edge e of the network G and for both its direction, it is known the total number of passengers per hour who want to ride through this edge in the direction. The number f_e denotes the greatest of these values.

It is also assumed that a set of candidate routes R_0 is prepared and the following data are given for each $r \in R_0$:

E_r – the set of all edges passed by the route r,

t_r – [in minutes] the cycle time of vehicles on the route, i.e. the round trip running time plus layover time at each end,

c – capacity of each bus.

Problem P1: Let the network G and the candidate set R_0 be given. The problem is to find a nonnegative integer x_r for each $r \in R_0$ such that

$$z = \sum_{r \in R_0} x_r \to \min , \qquad (1)$$

$$\sum_{r: e \in E_r} \frac{60c}{t_r} x_r \geq f_e \quad \text{for each } e \in E \qquad (2)$$

Commentary: In the constraint (2), the fraction $60/t_r$ represents the frequency, i.e. the number of buses (per hour) on the route r if exactly one vehicle is assigned to it. Therefore $60c/t_r$ expresses the supply of places for passengers per hour by one vehicle assigned to r and, $(60c/tr)x_r$ is the supply if x_r vehicles are assigned. Finally, the sum on the left side of the constraint (2) represents the total number of places in vehicles of all lines passing through the edge e. Condition (2) then requires that this offer is not less than the demand f_e.

Remark: As said in [11] concerning the problem **P1**, it may happen that the resulting percentage of indirectly traveling passengers (i.e. with at least one transfer) is too high, e.g. they exceed 15 %. Then, in order to reduce it, it is possible to look for such elements f_{ij} of the OD-matrix F, that the set $R_{ij} \cap R = \emptyset$ where $R_{ij} = \{r \in R_0$: r contains both vertices $i, j\}$. If such elements exist then the maximal of them is chosen. Let it be f_{vw}. The following constraint is added to the problem **P1**:

$$\sum_{r \in R_{vw}} x_r \geq 1 \qquad (3)$$

Then, at least one route from the new resulting set R contains both v and w. I.e. a new possibility of direct travel from the vertex v to w arose for f_{vw} passengers per hour. Consequently, the number of indirectly traveling passengers decreases. If it is not yet satisfactory, another constraint of the type (3) can be added etc.

1.2 The Linear Model Maximizing the Comfort of Passengers

The second author of the current article joined the research team in 1984. She noticed that managers of Czech and Slovak transport companies together with the ones of municipal administration did not feel the lack of vehicles as the main problem. Consequently, the minimization of number of needed vehicles is not the objective of the highest importance for them. They have available rolling stock with drivers and they felt no problem with letting them work. Their main problem was overcrowding of vehicles. E.g. it happened in the town of Olomouc in late eighties that some trams transported twice as many passengers then their official capacity was.

Since the overcrowding is unacceptable at any segment of the network, the objective is of the mini-max type. I.e. the maximal overcrowding taken from the set of all edges of the network ought to be minimized. However, such a formulation does not lead to linear function of the variables x_r. Therefore, it was replaced by an equivalent objective – to maximize the minimal relative reserve of places in vehicles as described in [7]. The model and the method were called PRIVOL there. It is a Slovak acronym of "PRIdelenie VOzidiel na Linky" (assignment of vehicles to routes).

A similar type of objective function was chosen by Han and Wilson [18]. They minimized the maximum occupancy level of vehicles for each route.

As mentioned above, $s_r = (60c/t_r)x_r$ expresses the supply of places per hour if x_r vehicles are assigned to the route r. It is valid for each edge the route r is passing through. The relative reserve of places at the edge e equals to the fraction

$$\frac{\sum_{r \in R_e} \frac{60c}{t_r} x_r}{f_e} \qquad (4)$$

where R_e denotes all routes $r \in R_0$ passing through the edge e. On this basis one can formulate the following problem:

Problem P2: Let the network G and the candidate set R_0 be given. Let n be the number of available vehicles. The problem is to find a positive real number y and a nonnegative integer x_r for each $r \in R_0$ such that

$$y \to \max \qquad (5)$$

$$\sum_{r \in R_0} x_r = n \qquad (6)$$

$$\sum_{r: e \in E_r} \frac{60c}{t_r} x_r \geq f_e y \quad \text{for each } e \in E \qquad (7)$$

Remark: The constraint (3) can be added similarly as at the problem **P1** in order to decrease the unacceptably high percentage of indirectly traveling passengers.

1.3 Modifications of the Problem P2

As seen in [13], the problem **P2** can be modified. One can note that similar modification is able for **P1** as well.

The modification is focused on the case of **multiple system urban transport**. It happens e.g. when three modes, i.e. tram, trolleybus and bus, are operating on surface level in a town. Then the set R_0 of candidate routes is divided into three disjoint subsets R_{01} (candidates for tram routes), R_{02} (candidates for trolleybus routes) and R_{03} (candidates for bus routes). The problem **P2** which is defined by (5), (6) and (7), is modified to **P2a** by replacing the constraint (6) by the constraint

$$\sum_{r \in R_{0k}} x_r = n_k \quad \text{for } k = 1,2,3 \tag{8}$$

where n_1, n_2, n_3 means the available number of tram units, trolleybuses and buses respectively.

Other modification consists of changing the meaning of the variable x_r. Instead of number of vehicles assigned to the route r, the modified meaning of x_r is dynamic capacity, i.e. the number of places for passengers per hour. It is easy to show that this modification represents only a linear transformation of variables.

2. LMEM in Czech and Slovak Republic in the Last 20 Years

The urban transport routing and frequencing problem was studied quite intensively around the world in that period. One can mention e.g. the survey papers [16], [20] and [28], citing 20, 60 and 70 papers on routing and frequencing from the last twenty years respectively. Among them, one can find many interesting articles, e.g. [1] focused on the use of genetic algorithm, [5] presenting a three-phases heuristic procedure, which was successfully applied in Rome, [6] combines mathematical programming approaches with decision-making and, last but not least, [3] presents a very successful column generation approach to routing and frequencing.

2.1 Theoretical Results of Czech and Slovak Authors

None of the cited papers is of Czech or Slovak origins. Nevertheless, new research results and their practical applications arose in this pair of countries as well.

The preparatory phase of the routing process, i.e. the choice of the basic network G, is studied in [8], the paper having two Czech and two Slovak authors. The main optimization problem there is to find the cheapest subnetwork G of a given wider "candidate" network G_0 such that the distance $dG(v, w)$ of any important pair of vertices v, w on G is not greater than $qdG_0(v, w)$ where $dG_0(v, w)$ is the distance of v and w on G_0 and $q \geq 1$ is a given number.

From Czech origin, one can mention e.g. the paper [15] where four different models, representing four modifications of the problem **P1**, are examined. Moreover, a number of numerical experiments concerning the network corresponding to a medium-sized town were performed using the four constructed models. These numerical experiments demonstrated the functionality of the designed models.

The book [9] is from Czech origin as well. There the subchapter 12.3 is focused on routing and frequencing. There the problem **P2** and its solution is presented for several modifications. It is said, what happens if

- the number x_r of assigned vehicles is allowed to be non-integer,
- the symbol x_r does not mean the number of vehicles, but the total places for passengers per hour.

Moreover, in [9] one can find the square-root rule concerning the relation between results of optimization, if the objective of maximal comfort of travelling is replaced by minimization of passenger time loss while waiting for the bus. It is shown that if t_r denotes the vehicle cycle time on the route r and p_r is the number of passengers per hour transported by the route r, then the numbers of vehicles allocated to individual lines are in proportion

- $p_1t_1 : p_2t_2$: ... if the objective is the relative reserve of places for passengers,
- $\sqrt{p_1t_1} : \sqrt{p_2t_2}$: ... if the objective is the time loss while waiting for the bus.

Among Czech made papers one can mention also [10] presenting original results concerning optimal routing in small demand areas. The problem the paper deals with is the following:

Let $G = (V, E, q, d)$ be a (non-oriented) graph representing the network suitable for walking. Let q be a demand function $q: V \to \langle 0; \infty)$ and let d be a length $d: E \to (0; \infty)$. Let $d(u, v)$ be the distance of $u, v \in V$ and $d(u, S) = \min\{d(u, v): v \in S\}$ be the distance of the vertex $u \in V$ from the set $S \subset V$. Let $W \subset V$ and $GW = (W, F, \delta)$ be a graph suitable for bus transit with edge length δ (not necessarily equal to d on $E \cap F$). Let $\delta(S)$ be the length of the shortest path containing the vertices of S in GW for every $S \subset W$ (the set S represent "candidates" for bus stops, the path represents a possible bus route connecting S). Let $\lambda \in (0; \infty)$ represents the accessibility limit (e.g. $\lambda = 0.3$ *km*) and $q = \sum_{v \in V} q(v)$. The problem is to find $S \subset W$ such that for the average walking distance to the closest bus stop $\mu(S)$

$$\mu(S) = \frac{1}{q} \sum_{v \in V} q(v) d(v, S) \leq \lambda, \qquad (9)$$

$$\delta(S) \to \min \qquad (10)$$

The paper [27] presents the author's experience with computer programs for heuristic and exact solution of the problem (9), (10).

The most important Slovak author dealing with routing and frequencing is Peško. In the paper [24] Peško seeks a circular route passing through all demand points, while in [10] a reduction of this set is admitted. In the [25], Peško allows refusing a part of demand but [10] does not.

From the viewpoint of routing and frequencing [26] brings several original results concerning the problem **P2**. First, Peško changed both objective function and the definition of the variable *y*. He replaced the meaning of the minimum relative reserve *y* by the absolute reserve. Second, he studied the relaxation of the problem omitting the constraint that the number of buses assignet to a route must be integer. Third another relaxation is obtained by omitting the constraint that each passenger must be transported.

2.2 Practical Applications in Czech and Slovak Towns

The authors of the current paper noticed about 10 applications of PRIVOL in Czech and Slovak Towns. Somewhere the set of routes was changed almost completely, e. g. in Žilina (Slovakia – in that time about 90 thousands inhabitants). Formerly there were 33 routes with quite small frequencies. The new system resulting from PRIVOL had only 14 routes whereas only 3 routes remained unchanged. Since the rolling stock remained unchanged the frequencies increased considerably. Similarly, the substantial changes were implemented in Piešťany (Slovakia – population about 40 thousands). Other towns changed only small part of their routes, e.g. Pardubice (Czech Republic – about 90 thousands). Only 3 from 16 routes were changed.

3. Expected Future Development

The authors of the current paper expect that modifications of the models and methods, derived from the Erlander principle and from the PRIVOL will appear in future as well. One can presuppose that the Czech and Slovak authors mentioned in the preceding paragraph will continue their research work at least. In the theory still remain open such problems like

- incorporation of number of transfers into the objective function,
- incorporation of demand elasticity with respect to the transport supply into the constraints.

Conclusion

The paper outlines development of the routing and frequencing problem history as a part of the history of public transport, as a consequence of the fact, that public transport became a mass need of people. It is shown how complex problem it is and, consequently, that an objectively acceptable solution can be obtained only by computer. It is documented by the fact that large number of citations appeared simultaneously with the mass deployment of personal computers.

The core of the article is a description of how the Erlander approach to routing and frequencing was applied in the former Czechoslovakia and after the division into two independent states. The paper describes the models and methods that are very successfully applied in practice and cited the papers presenting them. Finally, the expectations of future development are outlined.

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Abstract

ERLANDER PRINCIPLE IN MANAGERIAL DECISION MAKING ON CZECH AND SLOVAK URBAN TRANSPORT ROUTES

Jan Černý, Anna Černá

In the beginning of the paper, the position of routing problems in the historical development of public transport is outlined. It is explained why the boom of research papers on this issue came in the seventies of the last century. It is described, how the contacts of Czechoslovak and Swedish researchers, at the same time, motivated the first ones to use the Erlander principle, i.e. starting with a set of "candidate" routes and afterwards choosing some of them by variables which are equal to the number of assigned buses.

Afterwards it is shown that the original Erlander approach used the total passenger time losses as objective function. It led to a non-linear model since the unknown variable expressing the number of vehicles enters into the denominator of the objective function. Another complication of the model was in the necessity to avoid zeroes in the denominators. Czechoslovak researchers did not possess any computer enabling to solve non-linear optimization problems of the dimensions met in practice, Therefore, they decided to replace the indicator of total passenger time losses by another one which would not contain the decision variable in the denominator, but in the numerator. They took the numerical ratio of number of places in vehicles to the number of passengers.

Further, the paper embodies the results achieved in the Czech and Slovak Republic into the context of world literature. The optimization methodology PRIVOL is then described in details, together with a brief outline of its application.

Finally, the further development of research is predicted. E.g. the incorporation of demand elasticity with respect to the transport supply into the constraints in the model.

Key Words: *manager; decision, transport, route, frequency, method.*

JEL Classification: *R42, O18, C61.*

VYUŽITÍ Z" SCORE PŘI HODNOCENÍ FINANČNÍHO ZDRAVÍ ODVĚTVÍ STAVEBNICTVÍ

Michal Kuběnka, Veronika Králová

Vývoj odvětví stavebnictví

Stavebnictví je klíčovým odvětvím národního hospodářství ČR, což dokazuje i podíl odvětví stavebnictví na HDP 6,3 % v roce 2009 a 6,4 % v roce 2010 [21]. Na jeho vývoji se odráží celá řada faktorů, které jsou odrazem celkového stavu ekonomiky v zemi. Pochopitelně se stejný faktor odráží odlišně u výstavby budov, inženýrského stavitelství a specializovaných stavebních činností.

Obecně lze říci, že stavebnictví je zrcadlem celkové kondice hospodářství země. Mezi hlavní faktory ovlivňující toto odvětví patří nárůst či pokles objemu veřejných zakázek (dispoziční prostředky ve státním a municipálních rozpočtech), rozvoj podnikání a v důsledku toho i výstavba výrobních objektů či nevýrobních objektů pro administrativu a obchod. Pro bytovou výstavbu má zásadní vliv nezaměstnanost, příjmy obyvatelstva a také cena a dostupnost úvěrů (úroková sazba).

Analýza vývoje ekonomiky ČR a odvětví v působnosti MPO [14] shrnula vývoj stavebnictví za rok 2010 negativně – uvádí propad produkce o 7,8 % v pozemním i inženýrském stavitelství. Zároveň došlo k úbytku (propuštění) zaměstnanců oproti roku 2009 o 3 %. Stav stavebních zakázek meziročně poklesl o 18 %, ale hodnota nových stavebních zakázek se zvýšila o 5,4 %. K extrémnímu propadu došlo v oblasti bytové výstavby, kde bylo zahájeno o 24,6 % bytů méně než v předchozím roce a počet dokončených bytů se snížil oproti roku 2009 o 5,3 %. Za další ukazatel vývoje odvětví lze považovat i množství vydaných stavebních povolení. Bohužel i v této oblasti došlo k poklesu o 6,2 % ruku v ruce s poklesem hodnoty povolených staveb oproti předchozímu roku o 2,2 %.

Nejnovější globální přehledy situace ve stavebnictví v ČR uvádějí [21], že počet vydaných povolení v roce 2011 vzrostl oproti roku 2010 na 107 231 (o 1,41 %), ovšem hodnota staveb poklesla z 398,8 mld. Kč na 339,9 mld. Kč (tj. o 17,33 %).

Bohužel i při srovnání se slabým rokem 2010 nedochází k růstu – situace je spíše opačná, což lze vidět i na následujícím obrázku vývoje indexu stavební produkce (Obr. 1). Pro toto odvětví je typická sezónnost, proto je nutné veškeré rozbory provádět s daty, která zahrnují celoroční výsledky, anebo v případě sledování kratších období je nutné tyto data porovnávat meziročně mezi sebou (viz Obr. 1).

To, že se odvětví stavebnictví dostane zpět na předkrizovou úroveň (úroveň do roku 2007) nejdříve během roku 2012, bylo prognózováno už v roce 2010 [5, s. 10] a dále uvedený obrázek (Obr. 1) to potvrzuje.

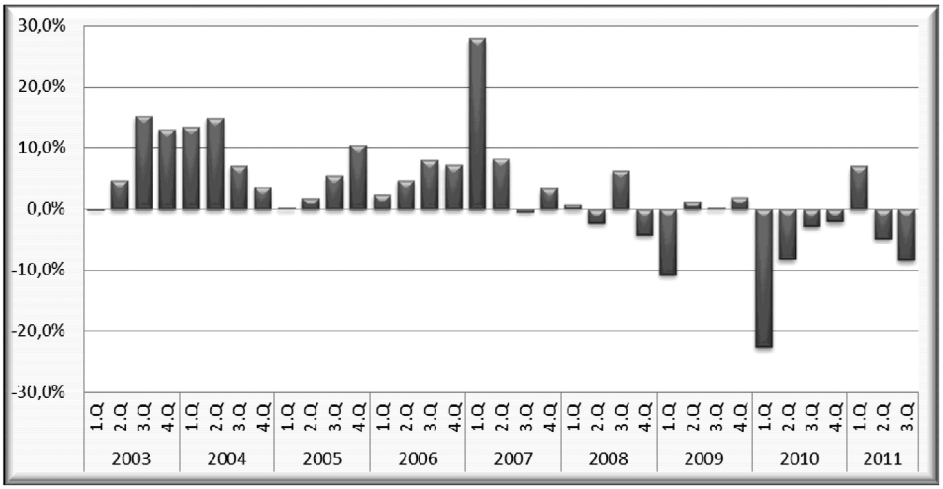
Z vývoje indexu stavební produkce vyplývá, že se odvětví stavebnictví v roce 2008 dostalo do hlubokého propadu a doposud se z této krize nedostalo. Otázkou je, zda je finanční zdraví podniků v tomto odvětví opravdu tak špatné, jak vyplývá ze statistik a nakolik vývoj tohoto odvětví koreluje s vývojem národního hospodářství.

1. Cíle a hypotézy

Cílem tohoto článku je analyzovat nejednoznačnou situaci v odvětví stavebnictví pomocí vybraného predikčního modelu za předpokladu, že dosavadní recese v tomto odvětví doposud nemusela způsobit finanční tíseň, respektive ohrozit finanční zdraví podniků.

Definice pojmu „finanční zdraví" jsou poměrně odlišné. Například Kalouda přibližuje tento pojem poměrně stručně za pomoci konkrétních poměrových ukazatelů finanční analýzy, jako *„jedno ze syntetických kritérií zvláštního významu, a to jako průnik podnikem dosažené rentability a likvidity."* [9, s. 22]

Obr. 1: Vývoj indexu stavební produkce (meziroční změna, stálé ceny)



Zdroj: ČSÚ, prosinec 2011, graf MPO [14]

Existuje však i řada obecnějších formulací tohoto pojmu, jak uvádí například Valach: *„za finančně zdravý podnik je možné považovat takový podnik, který je v danou chvíli perspektivně schopen naplňovat smysl své existence."* [25, s. 75]

V anglosaské literatuře bývá jako finančně zdravý označován ten podnik, který je schopen svou činností zhodnocovat svůj majetek do takové míry, která odpovídá riziku, které podnik v daném oboru podstupuje a to při současném zajištění platební schopnosti.

Nehledě na formulaci tohoto pojmu se finanční zdraví podniku zjišťuje vždy za pomoci nástrojů finanční analýzy. Pro účely ověření následujících hypotéz zaměřených na finanční zdraví podniků působících v odvětví stavebnictví budou využity vybrané poměrové ukazatele a vybraný predikční model.

Situace v odvětví stavebnictví bude analyzována potvrzením nebo vyvrácením těchto hypotéz:

Hypotéza 1 (H1): *Odvětví stavebnictví se dostává z krize.*

Hypotéza 2 (H2): *Minimálně 20 % podniků z odvětví stavebnictví spěje k bankrotu.*

Hypotéza 3 (H3): *Predikce bankrotu v odvětví stavebnictví není vyšší, než průměr v národním hospodářství.*

2. Predikční modely, výběr metodiky a zdrojová data

Český statistický úřad, Ministerstvo průmyslu a obchodu a další instituce sledují stav národního hospodářství souhrnně a rovněž i v členění na jednotlivá odvětví. Souhrnné výsledky hospodaření a dílčí poměrové ukazatele finanční analýzy ovšem nestanoví bonitu, resp. finanční tíseň v odvětví. Skupiny poměrových ukazatelů (likvidita, rentabilita, aktivita, zadluženost) hodnotí vždy jen danou oblast a je zcela běžné, že výsledné hodnoty těchto ukazatelů indikující finanční zdraví podniku často ukazují protichůdné výsledky (dobrá likvidita a zároveň špatná rentabilita, apod.).

Problém protichůdných indicií poměrových ukazatelů řeší syntetické ukazatele, které jsou obecně nazývány predikčními modely. Lze je rozdělit na kategorie bonitních a bankrotních (či kombinovaných). Mezi ty nejznámější a zároveň nejužívanější bankrotní modely patří celá řada modelů profesora Altmana [2]:

- **Z Score** (1968) pro podniky obchodovatelné na burze,
- **ZETA** (1977) pro neobchodovatelné podniky,
- **Z" Score** (1999) pro neobchodovatelné podniky vytvořený na vzorku nevýrobních podniků, sám autor ale uvádí, že lze model využít pro „výrobní podniky, nevýrobní podniky i pro rozvíjející se trhy." [3, s. 25]

Manželé Neumaierovi vytvořili pomocí diskriminační analýzy bonitní, bankrotní i bonitně-bankrotní modely, které jsou označovány jako „Indexy důvěryhodnosti českého podniku – IN". Ty mají oproti mnoha jiným modelům velkou přednost v tom, že byly vytvořeny přímo pro české podniky a na velkých vzorcích sledovaných podniků:

- **IN 95** – věřitelský pohled (bankrotní) – index je výjimečný tím, že využívá různé váhy pro různá odvětví. Úspěšnost predikce finanční tísně je více než 70 % [10].
- **IN 99** – vlastnický pohled (bonitní) – index vychází z úpravy ukazatelů a vah IN 95, přičemž u zkoumaného vzorku podniků byl primárně sledován dopad jednotlivých ukazatelů indexu na tvorbu ekonomické přidané hodnoty EVA [16, s. 97]. Index dokáže predikovat tvorbu EVA s úspěšností 86,4 % a s úspěšností 98,9 % je schopen předpovědět, zda bude podnik tvořit kladnou či zápornou EVA [20, s. 131].
- **IN 01** – bonitně bankrotní model kombinující předchozí dva indexy a tudíž sledující jak tvorbu EVA, tak možnou finanční tíseň. Index dokáže u podniků, které překročí mezní hranice hodnotících intervalů predikovat s pravděpodobností 67 %, že budou tvořit hodnotu a s pravděpodobností 86 %, že zbankrotují [16, s. 99].
- **IN 05** – aktualizovaný IN 01 bonitně-bankrotní model [17, s. 145].

Mezi čistě bonitní modely patří například Tamari [23], Kralickův jednorozměrný známkovací test – tzv. Quick test [12], Grünwaldův index bonity [6], Index bonity [26] a další.

Modely se liší v přesnosti a možné aplikaci na různá odvětví, což se odvíjí od toho, v jakém odvětví byl model vytvořen. Mimo to, je zde hypotetický předpoklad, že model vytvořený na podnicích v zahraničí, jejichž specifika jsou odlišná (podnikatelské prostředí, účetní metody), nebude pro tuzemské podniky vhodný. Aplikací tuzemských a zahraničních bankrotních a bankrotně-bonitních modelů na různá odvětví v ČR se podrobněji zabývali Maňasová [13] a opakovaně Sušický [22].

Maňasová [13] se zaměřila na odvětví a) Zemědělství, b) Výroba potravinářských výrobků a nápojů, tabákových výrobků, c) Výroba textilií, textilních a oděvních výrobků, d) Stavebnictví.

Potvrdila hypotézy, že zahraniční modely nejsou méně úspěšné než tuzemské a že přesnost předpovědi zkoumaných bankrotních modelů je odvislá na odvětví, ve kterém působí zkoumaný podnik. Jako nejpřesnější bankrotní model pro všechna analyzovaná odvětví dohromady a současně i pro odvětví stavebnictví stanovila model Z´´. Pro souhrnné hodnocení modelů za všechna sledovaná odvětví uvádí toto pořadí přesnosti [13, s. 143]:

1. Z" Score,
2. Z-Score,
3. IN 05,
4. IN 01,
5. ZETA,
6. IN99,
7. Taffler a Tisshaw.

Sušický [22] sice potvrdil obě hypotézy, ale v rámci výzkumu přesnosti jednotlivých bankrotních modelů došel k jiným závěrům. Při své analýze zkoumal odvětví a) Zemědělství, b) Výroba potravinářských výrobků a nápojů, tabákových výrobků, c) Výroba kovových konstrukcí a kovodělných výrobků, d) Výroba motorových vozidel, e) Výroba a rozvod elektřiny, plynu a tepelné energie. Jeho celkové vyhodnocení přesnosti modelů za všechna sledovaná odvětví je [22, s. 179]:

1. Z-Score,
2. ZETA,
3. IN 05,
4. IN 99,
5. Z" Score,
6. IN01,
7. Taffler a Tisshaw.

Oba autoři pravděpodobně došli k odlišným výsledkům na základě odlišného bodování toho, nakolik byly jednotlivé modely přesné v odhadu počtu podniků, které zbankrotují, počtu finančně zdravých podniků a počtu mylně zařazených bankrotujících podniků mezi finančně zdravé. Dle Maňasové [13] lze za celkově nejpřesnější bankrotní model a zároveň nejpřesnější bankrotní model pro podniky ze stavebního odvětví považovat model Z" Score vytvořený profesorem Altmanem. Pro analýzu odvětví stavebnictví bude tedy využito právě tohoto modelu. Z" Score má následující podobu [2, s. 248]:

$$Z''Score = 6{,}56\ X_1 + 3{,}26\ X_2 + 6{,}72\ X_3 + 1{,}05\ X_4 \quad (1)$$

kde

$$X_1 = \frac{\text{čistý pracovní kapitál}}{\text{celková aktiva}} \quad (2)$$

$$X_2 = \frac{\text{nerozdělený zisk minulých let}}{\text{celková aktiva}} \quad (3)$$

$$X_3 = \frac{\text{zisk před zdaněním a úroky}}{\text{celková aktiva}} \quad (4)$$

$$X_4 = \frac{\text{vlastní kapitál}}{\text{celkový kapitál}} \quad (5)$$

Z" Score má nastaveny tyto hranice:
Z" > 2,6 *finančně silná firma,*
1,1 < Z" < 2,6 *šedá zóna,*
Z" < 1,1 *pásmo bankrotu.*

Pro ověření H1 bude proveden rozbor dat ze statistik Ministerstva průmyslu a obchodu [14] [15], kde jsou uvedeny kumulované hodnoty položek rozvahy a výkazu zisku a ztráty ve stavebnictví v letech 2009–2011. H1 bude potvrzena v případě rostoucího trendu výsledných hodnot ukazatele Z" Score.

Pro ověření H2 bude využito vlastní databáze rozvah a výkazů zisku a ztráty za rok 2010 od 473 podniků, která vznikla na základě dat získaných z obchodního rejstříku [8]. Zkoumaný vzorek zahrnuje podniky působící ve stavebnictví s více jak 100 zaměstnanci a zároveň obratem nad 50 mil. Kč. Na tento vzorek bude aplikován bankrotní model Z" Score a výsledné procento podniků pod kritickou hranicí 1,1 (směřuje k bankrotu) bude porovnáno s hypotetickou hodnotou 20 % (volně daná mez Paretova pravidla). V případě statistického potvrzení (Z – test o jednom výběrovém poměru) toho, že 20 % podniků směřuje k bankrotu, dojdeme k názoru, že krize v odvětví je alarmující.

Pro ověření či vyvrácení H3 bude opět využito globálních statistik ČR [14] [15], ze kterých budou vybrána data pro výpočet hodnot Z" Score za celé národní hospodářství (popř. vybraná odvětví) za roky 2009–2011. Výsledný trend bude porovnán s hodnotami Z" Score pro odvětví stavebnictví v letech 2009 až 2011.

Je třeba dodat, že je finanční zdraví podniků často hodnoceno také ratingovými nástroji komerčních ratingových společností. Mezi nejznámější patří Standard & Poors, Moody's model, více viz [24].

3. Dostává se odvětví stavebnictví z krize?

Pro zodpovězení této otázky byla vyhodnocena globální data odvětví stavebnictví z let 2009, 2010, 2011. Nejdříve byly propočteny poměrové ukazatele z oblasti likvidity, rentability a zadluženosti, které jsou běžně využívány pro hodnocení finančního zdraví. Výsledky jsou shrnuty v tabulce 1.

Tab. 1: Propočet ukazatelů za celé odvětví stavebnictví

	RTMZ				Rentabilita		Struktura zdrojů		
Rok	**PK/A**	**L1**	**L2**	**L3**	**ROA**	**ROE**	**NZ/A**	**CK/A**	**VK/K**
2009	30,68 %	0,36	1,39	1,59	8,82 %	18,39 %	11,91 %	63,14 %	35,20 %
2010	30,64 %	0,39	1,47	1,67	5,93 %	12,46 %	17,15 %	60,66 %	37,30 %
2011	32,29 %	0,44	1,57	1,77	4,55 %	9,20 %	18,43 %	59,65 %	38,56 %

Zdroj: převzato z MPO 2010, 2011 + vlastní propočty

Legenda:

RTMZ	= rovnováha trvání složek majetku a zdrojů
PK/A	= čistý pracovní kapitál/aktiva
L1, L2, L3	= likvidita 1. stupně, likvidita 2. stupně, likvidita 3. stupně
ROA	= rentabilita aktiv
ROE	= rentabilita vlastního kapitálu
NZ	= nerozdělený zisk (včetně fondů)
CK	= cizí kapitál
K	= celkový kapitál

Byly vybrány jak ukazatele, které jsou využívány při propočtu Z" Score, tak i další nejčastěji využívané poměrové ukazatele z jednotlivých skupin. Na těchto několika poměrových ukazatelích se můžeme lehce přesvědčit o tom, že hodnocení jednotlivých poměrových ukazatelů může vést k nejednoznačným závěrům o finančním zdraví podniku (predikci finanční tísně). V tabulce 2 je hodnocení propočtených ukazatelů a komentář k rozporuplným indiciím o celkovém finančním zdraví podniků v odvětví stavebnictví.

Tab. 2: Indikátory finančního zdraví

RTMZ	
pozitivní indicie +	Podíl čistého pracovního kapitálu na celkových aktivech roste (mezi lety 2009 a 2011 o 5,25 %), což koresponduje i s trendem posilováním u všech stupňů likvidity (2009 až 2011 L1 o 22,22 %, L2 o 12,95 %, L3 o 11,32 %). Navíc hodnoty všech stupňů likvidity ve všech letech se pohybují v obecně doporučovaných intervalech. Výjimkou je pouze L2 2011, která nepatrně přesahuje doporučený interval 1–1,5, což může poukazovat na jistou nehospodárnost.
RENTABILITA	
negativní indicie –	Ve všech letech dochází k radikálnímu poklesu. U ROA téměř o 48,5 % mezi léty 2009 až 2011. U hodnoty ROA_{2011} 4,55 % hrozí, že některé podniky při tak nízké rentabilitě nepokryjí náklady na využívané zdroje. Hodnota ROA by měla dosahovat minimálně hodnoty vážených průměrných nákladů na kapitál ($WACC_{2011}$ 11,08 %), které nedosahuje ani z poloviny. Hodnota ROE poklesla mezi léty 2009 a 2011 celkově o téměř 50 %, což je špatný signál. A bohužel hodnota ROE_{2011} 9,2 % pokrývá hodnotu alternativních nákladů na VK (re_{2011} 12,44%) pouze ze 74 procent.
STRUKTURA ZDROJŮ	
pozitivní indicie +	V oblasti struktury zdrojů (resp. zadluženosti) dochází ke zlepšení u všech vybraných ukazatelů. Růst NZ/A ukazuje na to, že podniky navyšují hodnotu zadrženého zisku pro další rozvoj/investice. Mezi lety 2009 a 2011 dokonce téměř o 55 %. Rovněž pozitivní je růst koeficientu samofinancování (VK/K), což představuje pokles zadluženosti podniků v letech 2009–2011 v relativním vyjádření o 9,55 %, v absolutním vyjádření pak o 3,36 % (koef. samofinancování vzrostl z 35,20 na 38,56 %). Ukazatel věřitelského rizika (CK/A) je doplňkovým ukazatelem koeficientu samofinancování, tudíž je jeho vývoj rovněž pozitivní.

Zdroj: autoři

Z jednotlivých poměrových ukazatelů nám vyplývá nejednoznačný výsledek a je zřejmé, že je třeba využít některý ze souhrnných indexů hodnocení. Proto pro potvrzení nebo vyvrácení H1 byly vybrány hodnoty tabulky 1 a propočteny hodnoty bankrotního modelu Z" Score.

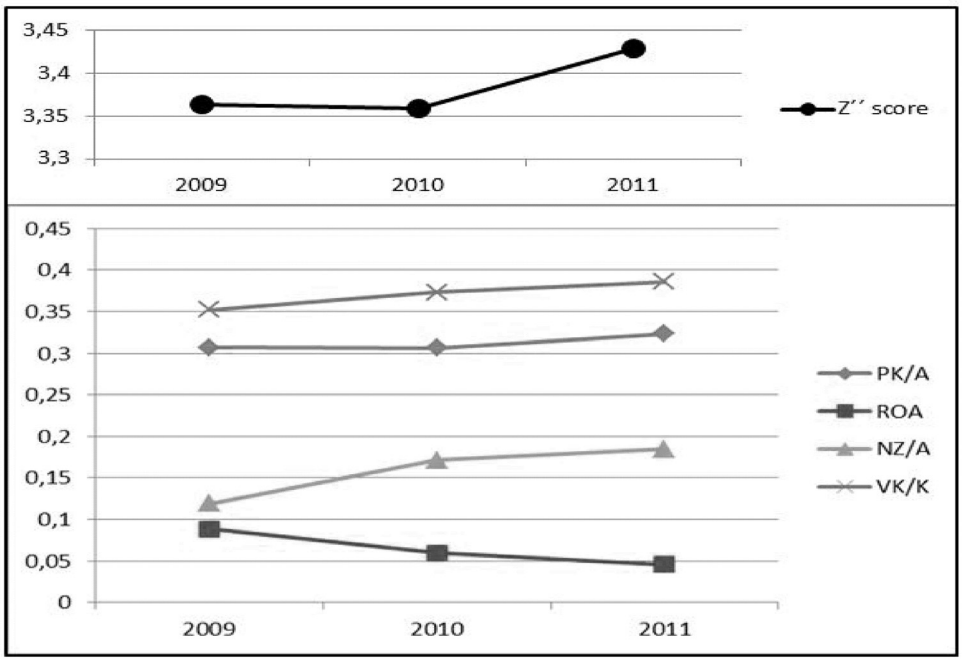
Tab. 3: Vstupní a výsledné hodnoty Z" Score

Rok	PK/A (X1)	NZ/A (X2)	ROA (X3)	VK/K (X4)	Z" Score
2009	0,3068	0,1191	0,0882	0,352	**3,363178**
2010	0,3064	0,1715	0,0593	0,373	**3,35922**
2011	0,3229	0,1843	0,0455	0,3856	**3,429682**

Zdroj: MPO 2010, 2011 + vlastní propočty

Z údajů uvedených v tabulce 3 a zobrazených v následujícím grafu (Obr. 2) vyplývá rozdílný trend dílčích ukazatelů finančního zdraví. Ukazatele struktury majetku a zdrojů financování (PK/A, NZ/A, VK/K) sice ukazují pozitivní trend, ovšem ukazatel výnosnosti ROA má trend negativní. Nakolik se vývoj těchto dílčích komponent modelu Z" Score projevil na výsledné hodnotě Z" Score ukazuje následující graf. Hodnota z roku 2009 (3,36) ukazuje v globálu na to, že odvětví je finančně silné (Z">2,6 finančně silná firma), v roce 2010 došlo ke stagnaci, resp. mírnému zhoršení a v roce 2011 naopak k silnému zlepšení tohoto ukazatele téměř až na hodnotu 3,43. Na základě převážně rostoucího trendu ukazatele Z" Score můžeme prohlásit, že v globálu se situace v odvětví stavebnictví zlepšuje a pravděpodobnost finanční tísně se snižuje, tudíž je hypotéza 1 potvrzena.

Obr. 2: Vývoj ukazatele Z" Score v návaznosti na vývoj jeho komponent



Zdroj: autoři

4. Jaká je četnost podniků ve stavebnictví spějících k bankrotu?

Hypotéza 2 si dala za úkol otestovat, zda minimálně 20ti procentům podniků z odvětví stavebnictví hrozí bankrot. Hranice 20 % byla stanovena jako klíčová s odkazem na Paretovo pravidlo [18]. Byla při tom využita data 473 podniků, jejichž účetní závěrky za rok 2010 byly k dispozici ve Sbírce listin [8].

Propočet modelu ukázal kritický stav finanční tísně v tomto odvětví. Pro lepší představu byla zóna bankrotu rozdělena do dvou intervalů: (-∞; 0) a <0; 1,1). Pásmo „finančně silná firma" bylo rovněž rozděleno do dvou úseků – jeden v rozmezí (2,6; 3,7), druhý v rozmezí <0; +∞). – tabulka 4.

Při propočtu Z" Score ze sumarizovaných hodnot celého odvětví (data MPO [14], [15]) může být extrémně špatné finanční zdraví některých podniků kompenzováno extrémně dobrým finančním zdravím jiných podniků a četnost podniků v krizi zůstává zahalena. Ovšem na sledovaném vzorku jednotlivých

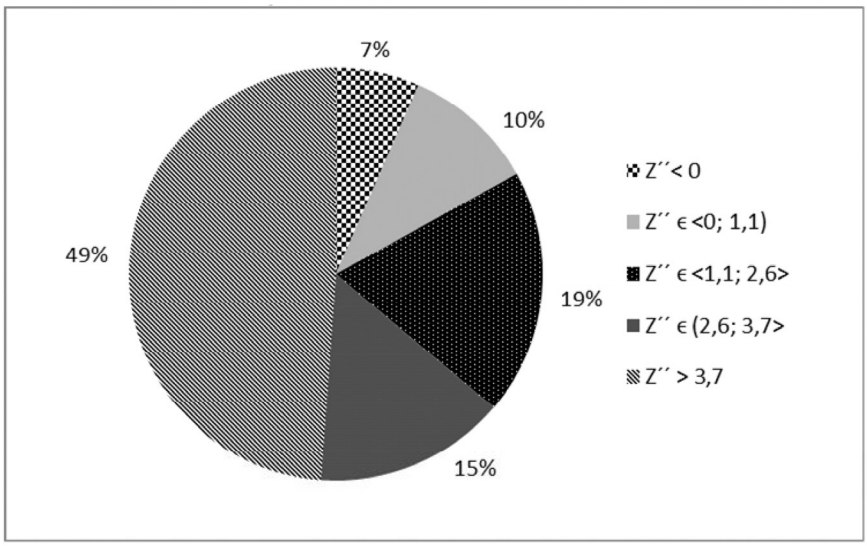
Tab. 4: Absolutní a relativní rozdělení četností podniků dle Z" Score

bankrot: Z" < 1,1				šedá zóna		zdravý podnik: Z" > 2,6			
absol.		relat.		absol.	relat.	absol.		relat.	
80		16,91 %		91	19,24 %	302		63,85 %	
Z" < 0		Z" ∈ <0; 1,1)		Z" ∈ <1,1; 2,6>		Z" ∈ (2,6; 3,7>		Z" > 3,7	
absol.	relat.	absol.	relat.	absol.	relat.	absol.	relat.	absol.	relat.
31	6,55 %	49	10,36 %	91	19,24 %	71	15,01 %	231	48,84 %

Zdroj: autoři

podniků je možné četnosti podniků v jednotlivých zónách Z" stanovit. V tomto případě se v kritické zóně (< 1,1) nachází téměř 17 % podniků a 6,5 % dokonce až pod hranicí 0, což poukazuje na jejich velice špatnou situaci. Pozitivní je, že jako finančně zdravých se jeví téměř 64 % podniků, přičemž u 49 % z nich je finanční zdraví velice silné (Z" > 3,7). V nejednoznačné situaci (tzv. šedá zóna) je pouze 19 % podniků sledovaného vzorku. Procentuální vyjádření četností podniků spadajících do jednotlivých zón Altmanova Z" Score je graficky vyjádřeno na obrázku 3.

Obr. 3: Finanční zdraví podniků v odvětví stavebnictví



Zdroj: autoři

H2 si kladla za úkol ověřit, zda minimálně 20 % podniků spěje k bankrotu. Výsledná četnost podniků v zóně bankrotu ve výši 17 % není ze statistického hlediska dostatečným důkazem pro potvrzení této hypotézy. Proto pro ověření H2 byl použit Z – test o jednom výběrovém poměru.

Testujeme, zda výběrový poměr π (0,17 = = 17 % podniků) rovná poměru Paretova pravidla π (0,2 = 20 %), tedy:

$H0 : \pi = \pi_0$
$H1 : \pi \neq \pi_0$

Testovací statistika má v tomto případě tvar [1]:

$$Z_{obs} \frac{\pi - \pi_0 \pm 0{,}5/n}{\sqrt{\frac{\pi_0(1-\pi_0)}{n}}} \sim N(0,1)$$

kde:
n značí počet pozorování, v tomto případě 473 podniků zahrnutých do šetření.

Na základě výše uvedeného byla vypočtena hodnota *p* value 0,0952. Porovnáme-li tuto *p* hodnotu s námi zvolenou hladinou významnosti α = 0,05, dojdeme k závěru, že nulovou hypotézu testu nezamítáme. Tedy můžeme na základě našeho výzkumu potvrdit H2 a to, že 20 % podniků vykazuje symptomy bankrotu.

Ale opravdu 20 % podniků zbankrotuje? Nemusí tomu tak být, protože jednotlivé modely nejsou v predikci bankrotu podniku úspěšné stoprocentně, respektive přesnost predikce se pohybuje mezi 50 a 90 % a chybovost při zařazení finančně zdravých podniků mezi bankrotující taktéž. Na nepřesnost bankrotních modelů a opatrnost při jejich interpretaci poukazuje řada autorů, např. Vochozka [27] a další [13], [22], [19]. Maňasová ve svém průzkumu stanovila přesnost předpovědi bankrotu modelu Z" Score na 72,5 % a úspěšnost při identifikaci prosperujících podniků 89,2 % [13, s. 168].

5. Jaká je situace ve stavebnictví oproti situaci v národním hospodářství?

Bankrotní modely, včetně Z" Score, pracují s ukazateli rozvahy a VZZ. H3 bude ověřena na základě propočtu Z" Score ze vstupních hodnot, které budou získány kumulací hodnot vybraných odvětví. Za reprezentaci národního hospodářství, i vzhledem k dostupnosti vstupních dat, byla vybrána následující odvětví – tabulka 5. Není zde zahrnuto zemědělství, lesnictví a rybářství, veřejná správa, vzdělávání, zdravotní péče a kultura.

Tab. 5: Zahrnovaná CZ-NACE (klasifikace ekonomických činností)

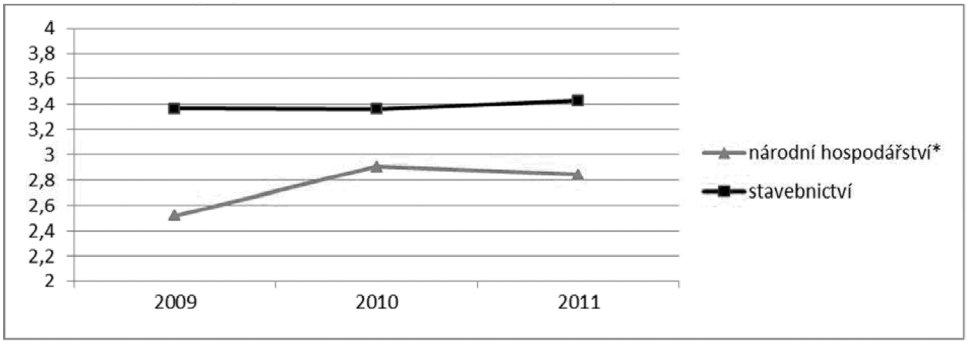
B	Těžba a dobývání
C	Zpracovatelský průmysl
D	Výroba a rozvod elektřiny, plynu, tepla a klimatizovaného vzduchu
E	Zásobování vodou; činnosti související s odpadními vodami, odpady a sanacemi
F	Stavebnictví
G	Velkoobchod a maloobchod; opravy a údržba motorových vozidel
H	Doprava a skladování
I	Ubytování, stravování a pohostinství
J	Informační a komunikační činnosti
L	Činnosti v oblasti nemovitostí
M	Profesní, vědecké a technické činnosti
N	Administrativní a podpůrné činnosti

Zdroj: [4]

Z obrázku 4 je i na poměrně krátké časové řadě vidět poměrně stabilní vývoj odvětví stavebnictví při srovnání s kolísavým vývojem v národním hospodářství. Navíc ve všech sledovaných letech jsou ve stavebnictví hodnoty Z" Score 3,35 a vyšší, oproti národnímu hospodářství, kde byla dosažena nejvyšší hodnota 2,91 v roce 2010 (2009 hodnota 2,52, rok 2011 hodnota 2,84).

Díky tomu, že se výsledné hodnoty Z" Score ve stavebnictví pohybují ve všech letech vysoko nad hodnotami národního hospodářství, můžeme potvrdit H3, která říká, že predikce bankrotu v odvětví stavebnictví není vyšší, než je průměr v národním hospodářství. Mimo výsledných hodnot ukazatelů Z" Score je vhodné analyzovat i to, jak se vyvíjely hodnoty dílčích komponent tohoto bankrotního modelu

Obr. 4: Porovnání vývoje ukazatele Z" Score v národním hospodářství a stavebnictví



Zdroj: autoři

*národní hospodářství bylo zastoupeno odvětvími z CZ-NACE uvedenými v tabulce 5

Tab. 6: Komparace hodnot dílčích komponent národního hospodářství a stavebnictví (v %)

	PK/A^{nh}	PK/A^{s}	rozdíl (s-nh)	ROA^{nh}	ROA^{s}	rozdíl (s-nh)	NZ/A^{nh}	NZ/A^{s}	rozdíl (s-nh)	VK/K^{nh}	VK/K^{s}	rozdíl (s-nh)
2009	13,79	30,68	16,89	5,98	8,82	2,84	20,68	11,91	-8,77	51,30	35,20	-16,10
2010	19,44	30,64	11,20	5,93	5,93	0,00	21,67	17,15	-4,52	50,26	37,30	-12,96
2011	18,82	32,29	13,47	5,87	4,55	-1,32	21,42	18,43	-3,00	49,07	38,56	-10,51

Zdroj: autoři

pozn.: nh – národní hospodářství (kumulace vybraných odvětví), s – stavebnictví

ve stavebnictví a národního hospodářství a porovnat vzájemné rozdíly. Ty uvádí v tabulkovém vyjádření tabulka 6, v grafickém vyjádření pak obrázek 5.

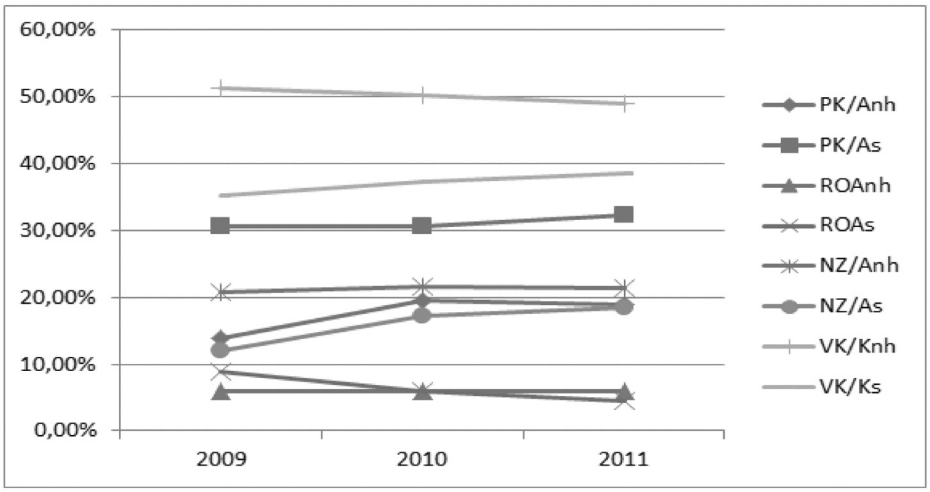
Ve všech sledovaných letech má odvětví stavebnictví enormně vyšší podíl čistého pracovního kapitálu na aktivech (PK/A = komponenta X_1) a v roce 2009 dokonce téměř o 17 %. Na základě toho, že této komponentě přiřadil Altman ve svém modelu vysokou váhu 6,56 (dále: 3,26 X_2; 6,72 X_3; 1,05 X_4), napomohl právě vysoký poměr PK/A k výsledným vyšším hodnotám Z" Score ve stavebnictví. Vliv rentability aktiv na výsledné rozdíly ukazatelů Z" Score mezi stavebnictvím a národním hospodářstvím byl minimální především z důvodu malých rozdílů ROA a také z důvodu přibližně poloviční váhy přiřazené komponentě X_2 (oproti X_1). Rozdíly hodnot Z" Score by byly ve všech sledovaných letech ještě vyšší, kdyby vliv komponenty X_3 (NZ/A) v kombinaci s nejvyšší vahou v tomto modelu (6,72), neznevýhodňoval stavebnictví z důvodu nižšího poměru NZ/A.

Poslední komponenta X_4 je koeficientem samofinancování a vyjadřuje kolik je z celkových zdrojů kryto vlastním kapitálem. Trend X_4 je ve stavebnictví rostoucí, tudíž zadluženost postupně klesá. Ovšem řada autorů doporučuje zadluženost nižší, obvykle 30–60 % [11, s. 84], což potvrzuje i Jáčová, která doporučuje zadluženost max. 50–60 % [7, s. 96]. Při srovnání s průměrem v národním hospodářství je v odvětví stavebnictví ve všech letech zadluženost vyšší o 10,51 až 16,10 %.

Závěr

Světová finanční krize v roce 2008 se dotkla nejen odvětví stavebnictví, ale zároveň se projevila i v celém národním hospodářství. Cílem článku bylo posoudit finanční zdraví podniků v odvětví stavebnictví, zjistit jeho trend a také porovnat situaci ve stavebnictví s celkovou situací hospodářství ČR na základě aplikace bankrotního modelu Z" Score profesora Altmana. Tento bankrotní model byl pro odvětví stavebnictví

Obr. 5: Hodnoty dílčích komponent



Zdroj: autoři

pozn.: nh – národní hospodářství (kumulace vybraných odvětví), s – stavebnictví

vybrán jako nevhodnější na základě výsledků výzkumu Maňasové [13]. Bohužel autorům není známé žádné jiné šetření, které by se opíralo ze statistického pohledu o dostatečně velký vzorek zkoumaných podniků působících v ČR.

Na základě potvrzení H1 jsme došli k závěru, že odvětví stavebnictví se dostává z krize. Toto tvrzení je podložené rostoucím trendem výsledného ukazatele aplikovaného bankrotního modelu.

Potvrdila se také H2, což znamená, že minimálně 20 % podniků v odvětví vykazuje dle modelu Z" Score symptomy bankrotu. Potvrzení této hypotézy bylo založeno na analýze účetních výkazů 473 podniků, z nichž se téměř 17 % nalézalo, dle propočtených hodnot Z" Score, v zóně bankrotu. Zda by tato hodnota mohla být ze statistického pohledu i 20 %, bylo potvrzeno pomocí Z – testu o jednom výběrovém poměru. Je ale třeba mít na paměti, že nepřesnost modelu při predikci finanční tísně je dle [13, s. 168] 27,5 % a úspěšnost zařazení finančně zdravého podniku mezi prosperující 89,2 %.

Na základě zpracování sumarizovaných ekonomických dat ČR poskytnutých Ministerstvem průmyslu a obchodu byla potvrzena i H3, která tvrdila, že predikce bankrotu v odvětví stavebnictví není vyšší, než je průměr v národním hospodářství (zahrnutá odvětví viz Tab. 5). Tato hypotéza byla potvrzena na základě propočtených hodnot Z" Score v odvětví stavebnictví, které ve všech sledovaných letech (2009–2011) převyšovaly hodnoty vypočtené za celé národní hospodářství.

Článek vznikl za podpory SGFES03/2012 - Vědecko-výzkumné aktivity v oblasti "Ekonomika a management."

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Abstract

Z" SCORE IN ASSESSING THE FINANCIAL HEALTH IN THE CONSTRUCTION SECTOR

Michal Kuběnka, Veronika Králová

The construction industry is a key sector of the national economy. In many areas of construction industry does not reach pre-crisis levels before 2008. Its development reflects a range of factors, estimates of future are different. To analyze the current situation and for prediction of the future was used bankruptcy model Z" Score. The analysis was based on the confirmation or rejection of the three hypotheses.

To verify the hypothesis 1 was analyzed data from the statistics of the Ministry of Industry and Trade, which lists the cumulative values of the balance sheet and profit and loss account in the construction industry in the years 2009–2011. Hypothesis 1 was confirmed on the basis of the growing Z" Scores trend. It means that the situation in the sector is improving.

To verify the hypothesis 2 was used a sample of balance sheets and profit and loss accounts (year 2010) with 473 companies. This data were obtained from the Commercial Register. Based on the calculation of Z" Score was found the number of enterprises in the area of bankruptcy. Subsequently was applied Z - test on one sample proportion. It statistically confirmed that 20 % of businesses have symptoms of bankruptcy.

To test the hypothesis 3 was used global statistics CR. There have been extracted data for the calculation of Z" Score for the total economy (or selected industries in total) in the years 2009–2011. The resulting trend was compared with the values of Z" Score for the construction sector in the years 2009 to 2011. The results showed that the construction sector achieves higher levels of indicators Z" Score in all years. Thus, we can say that the situation in the construction industry better than the national economy as a whole.

Key Words: *construction industry, financial health, return on assets, liquidity, debt ratio, bankruptcy models, Z" Score.*

JEL Classification: *L74, G33.*

PROCESS MODEL AND ITS REAL APPLICATION IN THE SELECTED MANAGEMENT AREAS

Zuzana Závadská, Ján Závadský, Mária Sirotiaková

Introduction

Since their creation, the ISO 9000 international standards have been reviewed several times and the reviews have advanced these standards for quality management systems from originally reviewing especially technical and quantitative aspects of enterprises to performing managerial and qualitative assessments [15]. The requirements to quantify some economic aspects remained even after the latest review of the ISO 9001 standard in 2008. The essential and fundamental change was the integration of a process approach into existing enterprise management systems. However, the requirement to apply a process approach has been carried out only declaratively by many enterprises. The particular requirements, included in clauses 4.1., present the demand to identify enterprise processes, to determine their interaction and sequence, to determine criteria and methods needed to ensure that both the operation and control of these processes are effective, to assure sources and information in processes, and to monitor and improve them.

The goal of the research is to find out how companies which have already introduced business process model apply it to management. Companies with introduced quality system following the standard ISO 9001:2008, which must apply process approach and develop business process model were chosen as a sampling set. The goal of the research is not to examine quality management system but the application of business process model in management. After process approach implementation the system of management is understood as business process model, since primarily managed subsystem are not organizational units as in functional orientation, but company processes. Business process model of management presents a process model which contains the description of all company processes and objects and its outputs may be utilized in company managerial practice.

Business process model is the model of an enterprise management system which contains, at the minimum, a list and description of enterprise processes and their activities ordered in a logical sequence, inputs and outputs of activities and processes, the allocation of resources to activities in the identified processes, and indicators for measuring and assessing enterprise processes [17]. Under the business process model we understand a model of management system which contains company processes, sequences of activities, processes inputs and outputs, human resources allocated to activities, equipment necessary for execution of activities, organizational units, external documents not worked out directly by the company and indicators of processes efficiency. Business process orientation of management system may be created when a new company is established or by transformation of functional orientation to the process one. The change from functional orientation to the process one is carried out through the implementation of process approach based also on requirements of ISO 9001:2008. Theoretically also companies without certified quality management system could be selected as a sample set. Implementation of process approach may be independent on implementation quality system following the standard ISO 9001. If the independence is discussed in this paper, it is understood as independence on

implementation of quality management system. Companies might decide whether they implement process approach as an individual project or as a sub-project of information system development. Process approach is an integral part of many others quality management systems. Often implemented are EFQM model, ISO 9001, Malcolm Baldrige model and Six Sigma and many authors describe these concepts [15], [6], [14], [16], [18]. All of the above mentioned concepts contain the requirement for process approach whose output is also business process model. Its utilization in management, however, depends on the fact whether process model as the whole or its part become obligatory for management practice. Process model offers a lot of possibilities for its application in management. If it is not obligatory then it is not used in management as well. If it is obligatory then it is necessary to find out how its outputs are applied in management. The main problem enterprises with a quality management system certified to the ISO 9001 may face is the antagonism between the declarative and real application of a process approach in their management systems. Managers should avoid the declarative application of a process approach. Declarative application of a process approach is on the one hand presented through the fulfilment of ISO 9001 standard requirements, but on the other hand, its practical application in enterprise management is minimal. Process approach and its real application can prevent those problems, especially in case the business process model is obligatory for managers. We did not explore tools for business process modelling in our study. They are irrelevant for research results and given research questions. We focused on four selected management areas where enterprises could apply developed business process model: (1) to control the processes, (2) to control all activities and their sequences, (3) to create and to control organizational standards and (4) to measure and to evaluate the process performance.

Declarative or real application of any management systems depends on managers. The real application of a process approach enables organizations especially to [17], [1]: (1) focus on goals and process outputs regardless of different organizational units, (2) define the intra-organizational market of internal suppliers and customers (in many organizations based on a service-oriented architecture), whose basis are intra-business service-level agreements between the process owners (managers responsible for individual business processes), (3) identify critical places of value creation for customers faster, as in the case of hierarchical functional structures, (4) optimize cost structures concerning products and services.

The aim of the research is to point out the dominance of the declarative over the real application of the process approach as one of the essential requirements of the ISO 9001, and to check the linear dependence between the scope of the business process model and its application in enterprise management. In the sample set of surveyed enterprises, we did not concentrate on particular requirements of ISO 9001, but we checked the global application of the process approach. Declarative application of process approach may be proved through non-obligation of business process model and its outputs utilized in managerial practice. On the contrary the real utilization of business process model in management is proved through its obligatory utilization by managers and employees. A process approach represents a business process model and the obligation of this model for enterprise management may confirm or exclude the mere declarative application of the process approach.

Linear dependence of the business process model scope and its application in management was studied by means of a correlation analysis between a set of business process items and a set of possibilities for its real application to meet the needs of managers. This paper presents the results of whole sample enterprises and it is a baseline for future survey to explore dependencies by correlation scatter graphs in selected enterprise categories. In the first set, ten minimal model elements were determined, and in the second set twenty-one minimal possibilities for the application of a business process model in the real utilization of the process approach were defined. The process approach presents an enterprise process-based management system. There are three basic orientations of management systems: (1) functional, where the dominance of organizational units as the base for enterprise management prevails, (2) process, where the basis for management is a cyclical

process with repeating outputs and (3) the project one, where it is a non-cyclical project with usually non-repeating output for a customer.

Business process management is the discipline whose subject of research is enterprise processes. The main supporters of this discipline were M. Hammer and R. Champy [9] with their publication *Reengineering* and T. Davenport [5]. Since that period a lot of papers which deal with this topic have been published, e.g. Hammer [10], Burlton [2], Kubiš [12], Řepa [17], Závadský [19], and Broomfield [1]. In 2000 the requirement concerning the process approach was included in ISO 9001 and the management system process orientation became obligatory for enterprises certified to the ISO 9001. However, if these requirements are reviewed only by an internal or external quality audit, it is possible to apply a process audit or specific business process maturity models and several authors have focused their attention on these aspects, e.g. [10], [4]. These models are known as business process management maturity models and they verify the real application of a process approach in enterprise management. The application of maturity models is sometimes identified with the term "process audit" [10]. Maturity models contain individual criteria focused on defining processes, then on measuring and assessing performance, and improving processes, the organizational layout of the business, mutual communication and information system. Important is measuring and assessing performance based on Balanced Scorecard, writes Gavurová [8], Gavurová [7], Lesáková [13]. From our point of view, M. Hammer's PEMM model (Process and Enterprise Maturity Model) is considered as the key one.

The research, which was carried out, is based on the assumption that a business process model exists in companies which are certified according to the requirements of the ISO 9001 standard. This model may have: (1) a different scope (number of defined items in a model) and (2) applications by managers (number of items and outputs of the business process model applied in management). A business process model is a simplified representation of a process oriented management system, which is consistent with the real system in essential characteristics. According to Řepa [17], the basic items of each business process model are: processes, activities, incentives, and relations – consequences. Process modelling/simulation are not considered to be among the main content of process management. Košturiak [11] provides critical views on process modelling as a dominant activity, and according to him a lot of companies have invested a large amount of money and time into process descriptions and into the implementation of various programmes. The expected results were not often achieved. Why? Because no process diagram has managed to improve company's internal organization yet. Based on literature, we managed to find research starting points which are formulated in the following: (1) requirements (criteria) for a process approach are defined in the ISO 9001 standard, (2) specific requirements for a process approach are defined in business process management maturity models, (3) an audit of the requirements concerning the process approach may be carried out to the ISO 9001 and maturity models independently, (4) the process approach is represented by the enterprise business process model, (5) the application of the business process model management system may be declarative and real, and (6) there is a linear dependence between the scope of the business process model and its application in practice.

1. Research Methods

Due to the character of the separate parts of the research, with the aim of achieving its goal and verifying the two research hypotheses, the following methods were utilized: (1) a content and comparative analysis of literature sources applied in the research of theoretical approaches towards process management, the determination of business process models and maturity models, (2) primary research based on enquires in the form of questionnaires to analyze the application of the process approach in a selected set of businesses, (3) a systems analysis and synthesis to form a set of items in a business process model which determines its scope, and to form a set of possible application, which determine the usage of the business process model in the managerial practice and (4) a correlation analysis to search for linear dependence.

To search for the linear dependence of two variables (the scope of the business process

model and extent of its application in managerial practice), we have applied Spearman's rank correlation coefficient. Spearman's rank correlation coefficient is a non-parametric measure of statistical dependence between two variables. It assesses how well the relationship between two variables can be described using a monotonous function. Spearman correlation of +1 or -1 occurs, where each of the variables is a perfect monotonous function of the other. The sign of the Spearman correlation indicates the direction of association between *X* (the independent variable) and *Y* (the dependent variable). If *Y* tends to increase when *X* increases, the Spearman correlation coefficient is positive. If *Y* tends to decrease when *X* increases, the Spearman correlation coefficient is negative. A Spearman correlation of zero indicates that there is no tendency for *Y* to either increase or decrease when *X* increases. To show linear dependence, we used the following formula [15]:

$$r = \frac{\frac{1}{n} \times \sum_{i=1}^{n} (X_i - \bar{X}) \times (Y_i - \bar{Y})}{s_X \times s_Y}; \qquad (1)$$

where X_i and Y_i are *X* and *Y* parameter values, $\bar{X}$, $\bar{Y}$ are arithmetic averages of the parameters of *X* and *Y*; s_x and s_y are the standard deviations of the values of *X* and *Y*; *n* is the scope of the selected set.

2. Research Hypothesis

In the primary research two hypothesis were defined: (1) it is supposed that in enterprises with a certified quality management system, according to the requirements of ISO 9001, a process approach declarative application prevails over its real application and (2) it is supposed that there is a linear dependence between the scope of the business process model and its real application in managers' control work. To verify the first hypothesis, the absolute and relative number of responses to the question of whether a business process model is obligatory, informative or partially obligatory for company management was used. To verify the second hypothesis, a correlation analysis, where the two variables are the scope of the business process model and its application in management, was used.

3. Survey Results and Discussion

3.1 Identification of the Selected Set of Enterprises

The selected set to be researched is represented to the ISO 9001 certified enterprises, which have a certified quality management system. The research was carried out based on enquires in the form of questionnaires from 30th June, 2011 to 30th January, 2012. During this period, we received responses from 193 enterprises. By means of statistical testing, the representativeness of the sample set was confirmed by application of Pearson's chi-squared test (χ^2 – test).

Basic set is generated from certified organizations due to the requirements of the international standard ISO 9001:2008. In the process of representativeness verification company size was considered. Calculation was done with the selected level of importance $\alpha = 0.05$. Expected values were achieved from the certification bodies. We distributed questionnaire by three selected Slovak certification bodies. Expected and actual frequencies *n* of individual enterprises categories are defined according the size in table 1. The number of variance degrees *(k – 1)* is equal to three, since four categories of enterprises were defined.

Tab. 1: χ^2 **– test Due to Enterprises' Size**

Company category	np_i	n_i	$(n_i - np_i)^2$	χ^2
Micro companies	10	13.5	12.25	1.2250
Small companies	50	49.7	0.09	0.0018
Medium companies	30	27.5	6.25	0.2083
Large companies	10	9.3	0.49	0.0490
Total				1.4841

Source: authors

Null hypothesis of good compliance test claims statistically non-important difference between the basic (all certified companies to the ISO 9001 standard) and selected sets (responded companies). The value we achieved χ^2 is lower than the value χ^2 at the level of importance $\alpha = 0.05$ for 3 levels of variance (4 – 1), what particularly presents 7.815. Since 1.4841 < 7.815, we accept null hypothesis and we state that the selected set well represents the basic one.

In the first part of the research, we focused on identifying the researched enterprises. Identification meant to determine the enterprise size and its management system (or several management systems simultaneously). The criterion used to structure the enterprises according to their size was the enterprise's number of employees. The biggest share in the structure of Slovak enterprises belongs to micro enterprises, but in our research they account only for 13.5 %. The reason for this is the fact that a quality management system according to the requirements of ISO 9001 has not been introduced in micro enterprises at the same extent as in other enterprises. Mostly small enterprises participated in the research; they represent 49.7 % of the enterprises researched, the percentage of medium enterprises is 27.5 % and the percentage of large enterprises is 9.3 %. These data are summarized in table 2.

Tab. 2: Distribution of Enterprises by Size

	Micro (≤ 9 employees)	Small (10–49)	Medium (50–249)	Large (≥250 employees)
No.	26.0	96.0	53.0	18.0
%	13.5	49.7	27.5	9.3

Source: authors

The selected enterprises of questionnaire surveys all had certified management system. All of them responded that they apply a quality management system due to the requirements of the ISO 9001. An environmental management system according to the requirements of ISO 14001 was introduced in 27.5 % of the examined enterprises, especially in the group of large enterprises, where all the enterprises claimed its existence. In the group of medium enterprises, the existence of an environmental management system was claimed in 30.2 %. The system according to OHSAS 18001 was implemented in 16.1 % of the enterprises surveyed, and again the greatest number of enterprises is in the group of the large ones. Data concerning management systems are stated in table 3.

Tab. 3: Distribution of Enterprises by Certified Management Systems

		ISO 9001	ISO 14001	OHSAS 18001	ISO 22000	ISO 27001	AQAP	ISO TS 16 949
Micro	No.	26.0	3.0	0.0	0.0	0.0	0.0	0.0
	%	100.0	11.5	0.0	0.0	0.0	0.0	0.0
Small	No.	96.0	16.0	8.0	0.0	0.0	2.0	3.0
	%	100.0	16.7	8.3	0.0	0.0	2.1	3.1
Medium	No.	53.0	16.0	7.0	0.0	0.0	5.0	0.0
	%	100.0	30.2	13.2	0.0	0.0	9.4	0.0
Large	No.	18.0	18.0	16.0	0.0	1.0	0.0	0.0
	%	100.0	100.0	88.9	0.0	5.6	0.0	0.0
	Total	193.0	53.0	31.0	0.0	1.0	7.0	3.0
	%	100.0	27.5	16.1	0.0	0.5	3.6	1.6

Source: authors

3.2 Commitment of the Business Process Model for Management

The goal of the first part of the research was to verify the hypothesis that in companies with ISO 9001 certified quality management systems, a declarative application of the process approach prevails over its real application.

Tab. 4: Reasons for the Application of a Process Approach

		As an independent BPM project	For implementing ISO 9001	For implementing an information system
Micro	No.	0.0	23.0	3.0
	%	0.0	88.5	11.5
Small	No.	15.0	81.0	0.0
	%	15.6	84.4	0.0
Medium	No.	11.0	34.0	8.0
	%	20.8	64.2	15.1
Large	No.	11.0	5.0	2.0
	%	61.1	27.8	11.1
	Total	37.0	143.0	13.0
	%	19.2	74.1	6.7

Source: authors

The research indicates that as much as 74.1 % of enterprises applied a process approach to the quality management system introduction project. The introduction of a process approach is a part of the quality management system requirements of ISO 9001. In addition, due to the fact that the enterprises examined have implemented a quality management system, the result of this response achieved such a high value/score. The individual application of a process approach is the assumption that the enterprise will also apply it in management practice. This application of a process approach was executed by 19.2 % of enterprises. The larger the size the enterprise is, the higher the share of the separate application process approach. In the group of large enterprises, it is 61.1 %. The lowest number of responses is in the application of a process approach in the implementation of the enterprise information system (6.7 %). As it is stated in table 4, three micro enterprises also provided the response that they applied a process approach in connection with implementing their information system.

Tab. 5: Obligation of Business Process Model for Management

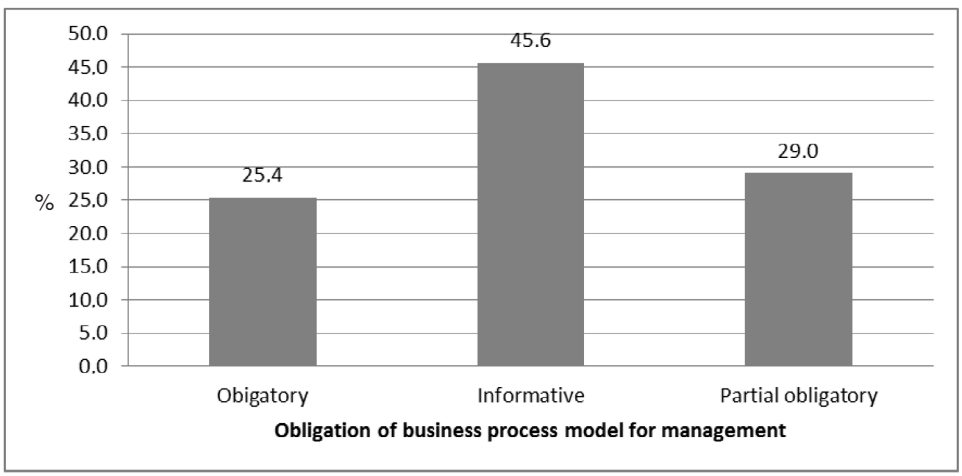
		Obligatory	Informative	Partial obligatory
Micro	No.	0.0	22.0	4.0
	%	0.0	84.6	15.4
Small	No.	15.0	54.0	27.0
	%	15.6	56.3	28.1
Medium	No.	22.0	12.0	19.0
	%	41.5	22.6	35.8
Large	No.	12.0	0.0	6.0
	%	66.7	0.0	33.3
	Total	49.0	88.0	56.0
	%	25.4	45.6	29.0

Source: authors

The reason for applying a process approach in existing management systems is that it has a great impact on the real future application in enterprise management practices. The application of a process approach requires its execution as a separate project, especially if the size of enterprises grows. The research confirmed this assumption because the biggest share of responses concerning the independent application was achieved in the case of large enterprises. If the reason for introducing a process approach was the implementation of an information system, a paradoxical result is that the business process application is not as high as in the case when it was developed due to the implementation of a quality management system. The reason may be that the business process model is used only for the implementation of an information system and it is not applied in managing the enterprise. One of the main goals of this paper is, however, to confirm the prevalence of the declarative application of the process approach over its real application in the management of the enterprises surveyed. This statement can be verified by means of a survey to find out if the process approach is applied or is not applied in the management practices of the enterprise. The application of a business process model in management practice was tested by three questions in the questionnaire. The enterprises could either respond that a business process model as a whole is obligatory for management, partially obligatory or only informative. In this way, the statement could be uniquely confirmed or rejected. If it is obligatory as a whole, then it is applied in managing the enterprise. On the contrary, if it is informative, the enterprise does not apply it to managing itself or its processes. In case it is partially obligatory, enterprises have developed a business process model, but its parts (some processes) are only informative and some parts of the model are obligatory for management and form the basis for creating organizational regulations (especially organization guidelines and working procedures.)

To interpret the statement concerning the dominance of the declarative approach, the application of the business process model in practice is defined as its obligation to it. The research indicated that the application of a business process model is obligatory in the management practices for 25.4 % and partially obligatory for 29.0 % of the enterprises surveyed. An informative character of the business process model was found in 45.6 % of the enterprises. In table 5 we can see that the larger the size the enterprise is, the higher the total obligation of the business process model is in the management practice of the enterprise.

Fig. 1: Percentage of Enterprises with an Obligatory Business Process Model (see also Table 5)



Source: authors

On the contrary, if the size of the enterprise is smaller, the business process model becomes often only informative for management. The statement that in enterprises with an ISO 9001 certified quality management system, the declarative application of the process approach prevails over the real one was confirmed. This assertion is also supported by figure 1.

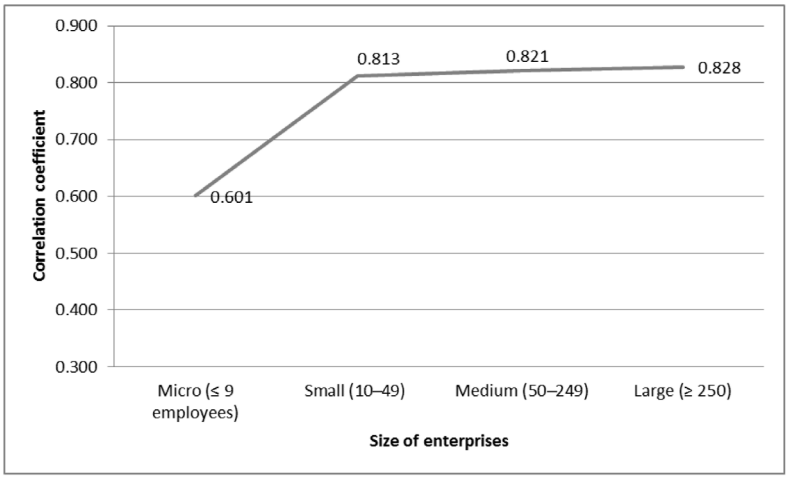
3.3 Linear Dependence between the Scope of the Business Process Model and its Real Application for Management

Verification of the hypothesis claiming that there is a linear dependence between the scope of the business process model and its real application for management is the aim of the second part of the research.

To describe the business process model, 10 items were specified. It is possible to define them in the business process model (in theory there are more items in a business process model and process attributes), but from our point of view, to meet our research goals, only the most important ones were used. To review the application of a business process model in management practice, enterprises could choose from 21 alternatives which were classified in four areas. This enabled them to assess the application of the business process model in enterprise processes management, in the management of activities of particular processes, in the creation of company documents which resulted from the model, and the measurement and assessment of the performance of the enterprise processes.

The result of the research shows that the dependence between the scope of the business process model and its application in practice is linear. Figure 2 shows that linear dependence increases with the growing size of the enterprise. The research found out that the closest linear dependence between the scope of the business process model and its application in management practice is in the group of large enterprises, where the correlation coefficient achieves the value of 0.870. The value of this coefficient corresponds with the verification of the results of the first hypothesis, where in table 5 we may observe that in the group of large enterprises, the business process model in management practice is totally or partially obligatory. No enterprises from the group of large companies marked the possibility that the business process model has only an informative character in management practice. In the group of medium enterprises, the value of the correlation coefficient is 0.821; in the group of small enterprises it is 0.813, and in case of micro enterprises this value is equal to 0.601.

Fig. 2: Correlation Coefficient Distributed by Size of Enterprises



Source: authors

Just to remember – our hypothesis is not based on the assumption of dependence of business process model scope and enterprise size. Our assumption was that there is dependence between the scope of business process model and its application in companies' management. It means that the scope of business process model is determined by the number of items included in the model. Possible items are provided in the table 7. Application in management is determined by the number of competencies which a company applies in management and which are presented in the figures 3–6. Theoretically two extremes may exist. The first is that a company will include all 10 examined items into the model but will not apply it in its management. The second is that a company will include all 10 items to the model and will apply all of them in management, what in our research presents 21 abilities. So the scope of business process model and its application in practice is not related to the enterprise size.

Coefficient of correlation was calculated based on a set of data pairs. The first value was obtained by counting the number of items included to the business process model and the second value was determined by counting the number of abilities of the model application in management. Maximum theoretical pair of data presents the combination (10, 21). In this way a pair for each enterprise of the selected set was identified and we got 193 of the following pairs: (4, 4; 4, 7; 4, 3; 5, 7; 1, 1; 4, 4; 3, 2; 2, 3; 1, 6; 4, 3; 5, 6; 1, 1; 4, 4; 3, 2; 2, 2; 1, 3; 4, 6; 4, 2; 4, 4; 4, 4; 5, 10; 1, 1; 4, 4; 3, 2; 2, 2; 1, 2; 2, 3; 5, 5; 6, 7; 9, 16; 7, 15; 2, 1; 4, 3; 7, 14; 3, 4; 4, 4; 6, 7; 4, 6; 2, 1; 3, 4; 4, 4; 3, 4; 7, 7; 3, 3; 2, 2; 5, 13; 2, 1; 5, 5; 2, 2; 8, 9; 3, 3; 5, 5; 8, 11; 2, 2; 7, 8; 6, 6; 7, 5; 4, 3; 3, 2; 6, 10; 2, 1; 8, 11; 5, 3; 8, 7; 4, 3; 6, 4; 4, 3; 6, 10; 2, 1; 8, 11; 5, 3; 8, 7; 7, 15; 2, 1; 4, 3; 7, 14; 3, 4; 4, 4; 6, 7; 4, 6; 5, 5; 6, 7; 9, 16; 7, 15; 2, 1; 4, 3; 7, 14; 3, 4; 4, 4; 6, 7; 4, 6; 2, 1; 8, 13; 5, 4; 3, 4; 7, 7; 3, 3; 2, 2; 5, 13; 2, 1; 5, 5; 2, 2; 8, 9; 3, 3; 5, 5; 8, 11; 2, 2; 7, 8; 6, 6; 7, 5; 4, 3; 3, 2; 6, 10; 2, 1; 8, 11; 5, 3; 8, 7; 4, 3; 6, 4; 4, 3; 2, 1; 7, 12; 9, 14; 6, 8; 10, 18; 8, 5; 6, 7; 6, 7; 8, 8; 10, 15; 4, 4; 10, 18; 8, 7; 5, 6; 10, 17; 7, 8; 6, 4; 5, 6; 6, 5; 9, 17; 6, 8; 5, 8; 8, 14; 6, 8; 9, 12; 6, 8; 10, 18; 8, 5; 6, 7; 6, 7; 8, 8; 10, 15; 6, 8; 6, 8; 10, 18; 8, 5; 6, 7; 6, 7; 8, 8; 10, 15; 4, 4; 10, 18; 8, 7; 5, 6; 10, 17; 7, 8; 6, 4; 5, 6; 6, 5; 9, 17; 6, 8; 5, 8; 8, 14; 6, 8; 9, 12; 8, 14; 8, 12; 9, 18; 6, 9; 10, 18; 10, 19; 9, 12; 7, 11; 9, 14; 7, 11; 8, 12; 9, 18; 6, 9; 10, 18; 10, 19; 9, 12; 7, 11; 9, 14). Based on these data, the definite result is that there is always a linear dependence between business process model scope and its application in management practice.

Tab. 6: Coefficient of Correlation for the Whole Enterprise Selected Set

	Items in process model	Abilities of model application in management	
Arithmetic average	$\bar{X} = 5.601$	$\bar{Y} = 7.332$	$\frac{\sum_{i=1}^{n} (X_i - \bar{X}) \cdot (Y_i - \bar{Y})}{n} = 10.691$
Standard deviation	$S_x = 2.481$	$S_y = 4.952$	$S_x \cdot S_y = 12.289$
			$r = 10.691/12.289 = 0.870$

Source: authors

The calculation of the correlation coefficient was automated by means of MS Excel, which calculated arithmetic averages, standard deviations and correlation coefficient for the whole selected set provided in table 6. The value of the correlation coefficient for the whole set of enterprises is 0.870.

It may be observed in table 7 that in the group of large enterprises, the scope of the business process model is the largest. Up to 100 % of large enterprises define processes, sequences of activities, process inputs and outputs, activity inputs and outputs in the business process model, and they also describe organizational units as boundaries of enterprise processes. The results from this research indicate that these items are the most frequently described items in a business

process model. The next result is that 100 % of the enterprises researched marked "defining processes" in the business process model, what is determined by the selected set of enterprises with certified system of management according to ISO 9001:2008.

Tab. 7: Elements of the Business Process Model

		Processes	Sequences	Process outputs and inputs	Activity outputs and inputs	Human resources	Technical and material resources	Organizational items	Organizational documentation	External documentation	Performance indicators
Micro	No.	26.0	17.0	20.0	11.0	3.0	0.0	0.0	0.0	0.0	3.0
	%	100.0	65.4	76.9	42.3	11.5	0.0	0.0	0.0	0.0	11.5
Small	No.	96.0	78.0	92.0	61.0	30.0	23.0	29.0	22.0	0.0	34.0
	%	100.0	81.3	95.8	63.5	31.3	24.0	30.2	22.9	0.0	35.4
Medium	No.	53.0	51.0	53.0	47.0	43.0	26.0	49.0	30.0	10.0	22.0
	%	100.0	96.2	100.0	88.7	81.1	49.1	92.5	56.6	18.9	41.5
Large	No.	18.0	18.0	18.0	18.0	16.0	12.0	18.0	13.0	4.0	16.0
	%	100.0	100.0	100.0	100.0	88.9	66.7	100.0	72.2	22.2	88.9
	Total	193.0	164.0	183.0	137.0	92.0	61.0	96.0	65.0	14.0	75.0
	%	100.0	85.0	94.8	71.0	47.7	31.6	49.7	33.7	7.3	38.9

Source: authors

Defining processes is an essential part in the existence of a business process model. The next step in defining processes in a business process model is defining process inputs and outputs. Another important item is defining the sequence of activities, which is applied in the model by 85 % of the enterprises researched. After defining the sequence of activities, up to 71 % of the enterprises researched also define activity inputs and outputs.

49.7 % of business process models contain organizational items; human resources are defined in almost half of the researched business process models. According to the research results, the least defined model element is the one of external documents, only 7.3 % of enterprises. The micro enterprises researched do not define technical equipments or organizational items, they do not generate organizational standards from the business process model and they do not have the external documents directly inserted in the process model. Additionally, in this case based on the research, it can be concluded that with the growing size of the enterprise, the scope of business process model items goes up.

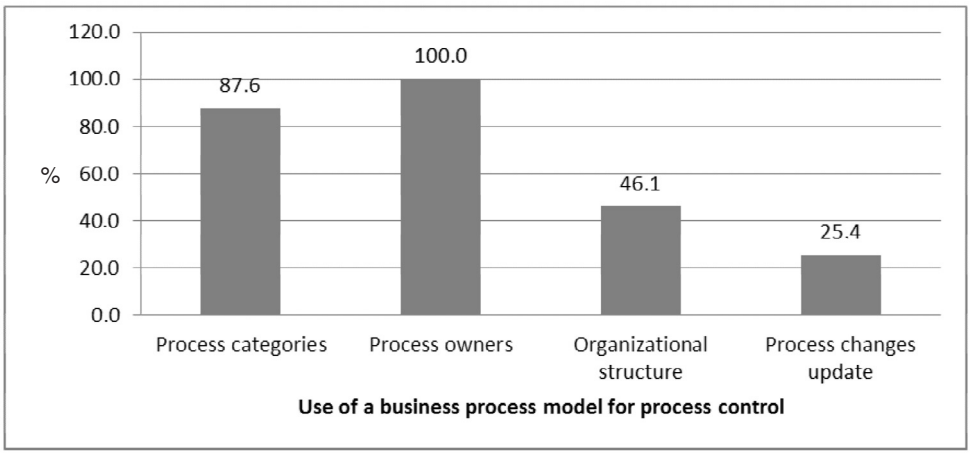
As figures 3 to 6 show, process management and a business process model as a real base for management are mostly applied for these selected management areas (the results are presented for the whole set of enterprises):

- 100 % of enterprises define process owners. If an enterprise defines the process, it is supposed to define its owner (the one responsible for running the process and for the results), what is requested to the ISO 9001. (The model element "process" is contained in the model by 100 % of the enterprises),
- 87.6 % of enterprises classify company processes,
- 83.4 % of the enterprises define in the sequence of activities a decision condition in the form of an "if – then" rule (85 % of the enterprises define a sequence of activities in the model),

- 52.8 % ex-post measurement,
- 51.8 % of enterprises describe in detail activities mentioned in particular enterprise processes,
- 30.1 % of enterprises generate organizational guidelines based on the business process model, (33.7 % of enterprises state that the model enables the generation of organizational documents),
- 23.8 % of enterprises generate job descriptions based on the business process model, (47.7 % of enterprises define a human resources in the model),
- 52.8 % of enterprises measure and assess enterprise process performance after the process completion by means of a set of indicators contained directly in the business process model (38.9 % of enterprises also state that indicators as integral part of business process model are defined in the model).

As shown in figure 2, there is always a linear dependence between the number of items in a business process model (scope of the process model) and their application in enterprise process management.

Fig. 3: Percentage of Enterprises Applying a Business Process Model for Process Control



Source: authors

Abilities of business process model applications in processes management shown in Figure 3 present categorization of processes (for example to main and supportive), defining of processes owners, determination of organizational units as processes limits and the way of processes changes management.

Application of the model in activities management in Figure 4 presents allocation of employees directly to the activities, allocation of technical equipment directly to the activities, defining of activities duration, defining of detailed activities description, defining of passing rules if – then.

Application of the model in creation of organizational documents in Figure 5 includes the following abilities: creation of jobs descriptions, creation of organization rules, creation of working procedures, creation of consumption norms and creation of other managerial documents.

As it is shown in Figure 6 application of business process model in performance management includes six abilities. The first one is ability to define strategic relation. Strategic relation presents the relation between the indicator of strategic performance and the process. Next ability is utilization of processes performance measurement after it end, even if it is considered as minimal from the point of view of business process model application. The better is the ability to apply business process model to measure process performance in a real time when a manager gets information

Fig. 4: Percentage of Enterprises Applying a Business Process Model for Controlling Activities

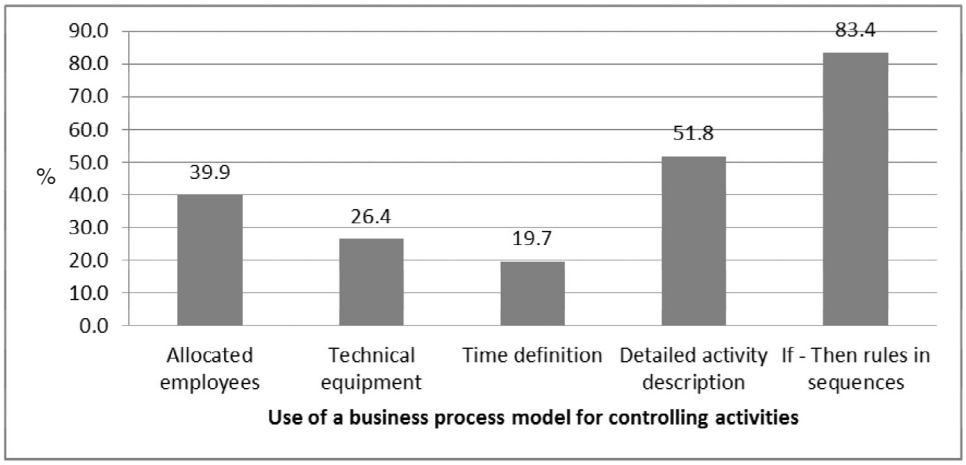


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Fig. 5: Percentage of Enterprises Applying a Business Process Model for Creating Organizational Regulations

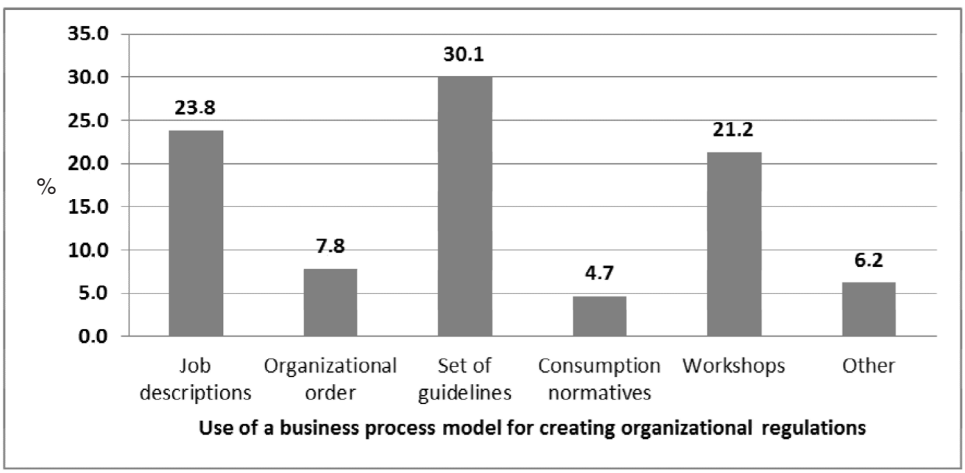

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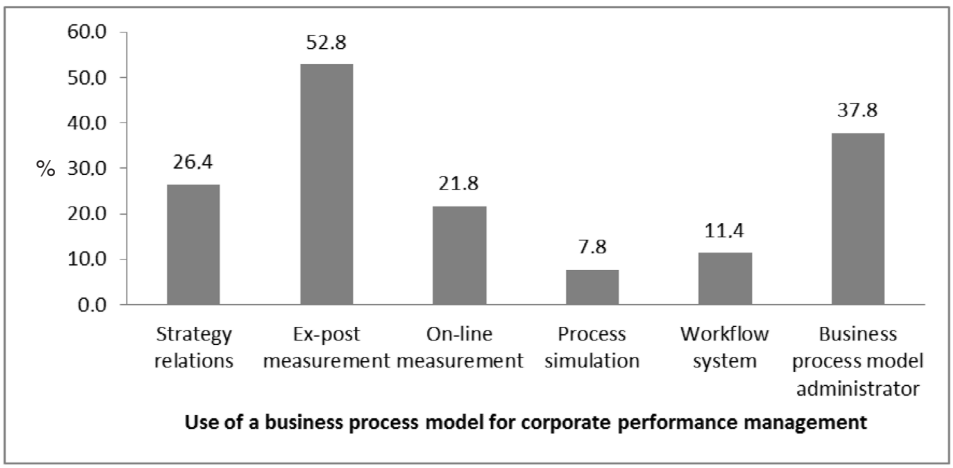
Fig. 6: Percentage of Enterprises Applying a Business Process Model for Corporate Performance Management



Source: authors

concerning the performance/efficiency continually according to the process measurements selected places. Next abilities are processes simulation, utilization of workflow system mapping the actual state of degree of completion of a particular demand of a customer due to the defined activities sequence.

Conclusions

The following conclusions of presented primary research are considered as the important ones: (1) the biggest set of enterprises generating a business process model obligatory for management belongs to the group of large enterprises, (2) enterprises which generated a business process model for the purpose of implementing an enterprise information system project mostly do not apply it in management practice, (3) the most frequently certified management system in the selected set of enterprises was the quality management system under the requirements of ISO 9001, (4) a business process model is applied in enterprise management practice mostly if it was generated independently from the implementation of other management systems, (5) in case the reason for process approach application is an individual project, all enterprises stated that a business process model is obligatory for management, (6) the scope of a business process model and its application in management practice are linearly dependent.

The primary research was carried out in a selected set of enterprises with a quality management system based the requirements of the ISO 9001. This work focuses especially on specific requirements, which presents a relevant change in the way an enterprise and its processes management are looked upon. Recommendations for enterprise management practice result from the survey are based on the organizational assumptions for the real application of a process approach. It requires the initiation of an individual project aimed at creating a business process model which, after its completion, would become obligatory for the management practice of a particular enterprise. If we want to verify the process approach in an enterprise management system, regardless of the requirements of the ISO 9001 standard, specific criteria for the process audit should be applied. Complete sets of such procedures do exist. The maturity model defined by Michael Hammer [10] is considered the best known. This study is basis for the future correlation analysis in sample enterprises divided by size as well as for exploring the causes of different business process model utilization in the management practice.

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Abstract

PROCESS MODEL AND ITS REAL APPLICATION IN THE SELECTED MANAGEMENT AREAS

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The process approach became an integral part of quality management systems due to the requirements of the ISO 9001 standard as early as in 2000. However, the application of the process approach has been implemented in two different ways: (1) a declarative application and (2) a real application in enterprise management systems. The fulfilment of the ISO 9001 standard concerning the application of a process approach into practice is represented by a business process model. As the standard requests, it usually contains identified processes and activities, their interactions, the determination of responsibilities for processes, and the determination of sources and proper indicators for monitoring and improving company processes. The existence of a business process model does not guarantee its real application in enterprise management and may only satisfy a declarative fulfilment of the ISO 9001 standard requirements, which is often sufficient for external auditors.

Based on the above mentioned different approaches to application, two research questions have been defined: (1) does the declarative application of the process approach prevail over its real application in enterprises with the ISO 9001 quality management certificate and (2) what is the selected management areas where enterprises certified to the ISO 9001 standard could apply their developed business process models? The research was carried out for a sample set of Slovak enterprises. This paper was supported by the Slovak Research and Development Agency under the contract No. LPP-0384-09: "Concept HCS model 3E vs. Concept Corporate Social Responsibility (CSR). This study is basis for the future correlation analysis in sample enterprises divided by size as well as for exploring the causes of different business process model utilization in the management practice.

Key Words: *process approach, ISO 9001, management.*

JEL Classification: *M10, M20.*

AN INTUITIONISTIC FUZZY DATA ENVELOPMENT ANALYSIS FOR EFFICIENCY EVALUATION UNDER UNCERTAINTY: CASE OF A FINANCE AND CREDIT INSTITUTION

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Introduction

Performance evaluation is a necessary step on the path to organizational success that provides the possibility of measuring movement of organization in the direction of their goals and missions. Performance evaluation helps managers guide their organization toward achieving excellence and leadership and impressive results. Simons [1] defines performance evaluation and control systems as formal procedures based on the information which managers use to maintain or improve their organizational pattern. Based on this definition, performance evaluation systems will have the following four features:

1. The goal of each system is to control and evaluate the data performance;
2. Performance evaluation and control systems are based on formal procedures;
3. Performance evaluation and control systems are designed in specific forms to be used by managers;
4. Managers use performance evaluation and control systems to maintain or change their organizational activity pattern.

Data envelopment analysis is a non-parametric method to appraise the relative efficiency of a set of congruent units. Charnes, Cooper, and Rhodes first proposed this method in 1978 which the name of the basic model is known as CCR due to their names [2]. Data envelopment analysis has all the four features of these systems as a performance evaluation method. This method transmits the information in an effective way, its structure has been defined and its applications are effective in improving organizational units.

Over more than 30 years of development of this method, its idea has grown steadily and has been strengthened in several ways. Emrouznejad et al. [3], Cook and Seiford [4] and Liu et al. [5] have reported over a thousand different projects and applications using this technique. Data envelopment analysis is used to appraise the relative efficiency of a set of *n* congruent Decision Making Unit (DMU) that use *m* congruent input to produce *s* congruent output.

Like any other framework, data envelopment analysis has also been the subject of evolution. One of the important developments in this field related to circumstances that inputs and outputs are defined and measured under conditions of uncertainty. In fact, one of the assumptions of classic data envelopment models is their crispness of data. However, in situations where uncertainty is an inevitable feature of a real environment, the assumption of crispness of data and observations seems questionable. Also, most management decisions are not made based on known calculations and there is a lot of uncertainty and ambiguity in decision-making problems [6]. Zadeh [7] believes “As the complexity of system increases, our ability to express specific propositions about the behavior decreases”. In response to the need to present a formal framework to deal with uncertainty, various ideas in probability and statistics, fuzzy logic and the Grey systems theory is presented [8]. In data envelopment analysis issues, outputs like customer satisfaction,

social responsibility, customer satisfaction and etc. are examples of variables which are subjective in nature and it is difficult to measure them accurately. In this regard, development of many models based on data envelopment analysis under uncertainty is being studied by researchers. Zhu and Cook [9] studied the wide variety of uncertainty in DEA models.

Fuzzy logic is presented by Zadeh [10] as a generalization of classical set theory. A fuzzy set is a set of pairs like (x, $\mu_{\tilde{A}}(x)$) in universe X which assign to each element $x \in X$ a membership function (degree) equal to $\mu_{\tilde{A}}(x)$. Sengupta [11], Kao and Liu [12], Guo and Tanaka [13], Lertworasirikul [14], Saati-Mohtadi et al. [15], Lertworasirikul et al. [16], Zerafat-Angiz et al. [17], Tavana et al. [18], Mirhedayatian [19], Ghapanchi et al. [20], Sadeghi et al. [21] and Houshyar et al. [22] are examples of works done on DEA models with use of fuzzy data.

Grattan-Guinness [23] and Gau and Buehrer [24] believe representing a verbal statement in the form of fuzzy sets is not enough. In fact, decision makers do not have sufficient information to assign a determined membership value to each element. On this basis, Atanassov [25] presented Intuitionistic Fuzzy Sets (IFS) which assign a membership and non-membership function to each element. Intuitionistic Fuzzy Sets are widely used on decision making issues. Li et al. [26], [27], Boran et al. [28], Wei et al. [29] and Zhang, Liu [30] are examples of applications.

In this paper, data envelopment analysis model is developed in a way that input and output data presented in the form of intuitionistic fuzzy sets. This model tries to solve the model based on the aggregation operator. In the second and third section of the paper the intuitionistic fuzzy sets and data envelopment analysis are briefly reviewed. The proposed intuitionistic fuzzy data envelopment analysis model is presented in forth section. In the fifth section an example of the application of this model in a problem of performance evaluation is studied and finally discussion and conclusion are provided in sixth section.

1. Intuitionistic Fuzzy Sets

Atanassov [25] introduced a generalize type of fuzzy sets as intuitionistic fuzzy sets.

Definition1. Assume that X is a universe. Intuitionistic fuzzy set A in X is a subset of elements like $x \in X$ in which:

$$A = \left\{ \left\langle x, \mu_A(x), v_A(x) \right\rangle \middle| x \in X \right\} \quad (1)$$

In Eq. (1), $\mu_A : X \to [0,1]$ and $v_A : X \to [0,1]$ shows membership and non-membership functions of the element $x \in X$ in A and for each $x \in X$,

$$0 \le \mu_A(x) + v_A(x) \le 1 \quad (2)$$

Xu [31] introduced $\alpha = \langle \mu_\alpha, v_\alpha \rangle$ as an intuitionistic fuzzy number for simplicity of presentation and computation.

Definition2. If $\alpha = \langle \mu_\alpha, v_\alpha \rangle$, $\alpha_1 = \langle \mu_{\alpha_1}, v_{\alpha_1} \rangle$ and $\alpha_2 = \langle \mu_{\alpha_2}, v_{\alpha_2} \rangle$ be some intuitionistic fuzzy numbers, then the following operational rules will be hold [31], [32].

$$\alpha_1 \oplus \alpha_2 = \left\langle \mu_{\alpha_1} + \mu_{\alpha_2} - \mu_{\alpha_1}\mu_{\alpha_2}, v_{\alpha_1} v_{\alpha_2} \right\rangle \quad (3)$$

$$\alpha_1 \otimes \alpha_2 = \left\langle \mu_{\alpha_1}\mu_{\alpha_2}, v_{\alpha_1} + v_{\alpha_2} - v_{\alpha_1} v_{\alpha_2} \right\rangle \quad (4)$$

$$\lambda\alpha = \left\langle 1 - (1 - \mu_\alpha)^\lambda, v_\alpha^\lambda \right\rangle, \lambda \succ 0; \quad (5)$$

$$\alpha^\lambda = \left\langle \mu_\alpha^\lambda, 1 - (1 - v_\alpha)^\lambda \right\rangle, \lambda \succ 0; \quad (6)$$

Definition3. If $\alpha = \langle \mu_\alpha, v_\alpha \rangle$ and $\beta = \langle \mu_\beta, v_\beta \rangle$ be two intuitionistic fuzzy numbers, then $S(\alpha) = \mu_\alpha - v_\alpha$ and $S(\beta) = \mu_\beta - v_\beta$ are the score functions [33] and $h(\alpha) = \mu_\alpha + v_\alpha$ and $h(\beta) = \mu_\beta + v_\beta$ are the accuracy functions [26] of intuitionistic fuzzy numbers. Hence, sequential relationship between these two numbers is defined as follows [32].

1. If $S(\alpha) \prec S(\beta)$ then $\alpha \prec \beta$.
2. If $S(\alpha) \prec S(\beta)$ then:
   a. If $h(\alpha) = h(\beta)$ then $\alpha = \beta$.
   b. If $h(\alpha) \prec h(\beta)$ then $\alpha \prec \beta$.

Simply, if $\mu_\alpha \prec \mu_\beta$ and $v_\alpha \succ v_\beta$, then $\alpha \prec \beta$ and if $\mu_\alpha = \mu_\beta$ and $v_\alpha = v_\beta$, then $\alpha = \beta$.

Definition4. Let $\alpha_j = \langle \mu_{\alpha_j}, v_{\alpha_j} \rangle (j = 1,2,\ldots,n)$ is a set of intuitionistic fuzzy numbers and GIFWA: $V^n \to V$ that V is the set of all intuitionistic fuzzy numbers. If

$$GIFWA_w(\alpha_1, \alpha_2, \ldots, \alpha_n) = \left(w_1\alpha_1^\lambda \oplus w_2\alpha_2^\lambda \oplus \ldots \oplus w_n\alpha_n^\lambda\right)^{1/\lambda} \quad (7)$$

Then GIFWA is called the generalized intuitionistic fuzzy weighted average operator which $\lambda \succ 0$ and w = (w_1, w_2, ..., w_n)^t is weighted vector of this operator that for $j = 1,2,\ldots,n$, $\sum_{i=1}^{n} w_j = 1$ and $w_j \ge 0$ [35]. According to the

operational rules (3) – (6) between intuitionistic fuzzy numbers, Zhao et al. [35] showed that:

$$GIFWA_w(\alpha_1,\alpha_2,\ldots,\alpha_n)=\left\langle\left(1-\prod_{j=1}^{n}\left(1-\mu_{\alpha_j}^{\lambda}\right)^{w_j}\right)^{1/\lambda},\right.$$
$$\left.1-\left(1-\prod_{j=1}^{n}\left(1-\left(1-v_{\alpha_j}\right)^{\lambda}\right)^{w_j}\right)^{1/\lambda}\right\rangle \quad (8)$$

If $\lambda = 1$ then GIFWA operator decreased to IFWA operator.

2. Data Envelopment Analysis

Data envelopment analysis used to appraise the relative efficiency of a set of congruent decision making units that use some inputs for producing a set of outputs. This model was first introduced by Charnes, Cooper and Rhodes [2] and after the 1980 recognized as one of the main tools for modeling and analyzing the performance. In fact, this is a multi-factor productivity analysis model for measuring the relative efficiency of a set of congruent units. Performance is defined respect to multiple inputs and outputs as follows [36]:

$$\text{Performance} = \frac{\text{Weighted sum of outputs}}{\text{Weighted sum of inputs}} \quad (9)$$

The multiple form of CCR basic model could be shown as follow:

$$Max\left\{u^t y_0 \middle| v^t x_0 = 1, u^t y_j - v^t x_j \le 0, u^t, v^t \ge 0,\right\} \quad (10)$$

In this model, $j = 1, \ldots n$ shows the number of decision making units which a unit like j, use m dimensional input vector $x_j = [x_{1j}, \ldots, x_{mj}]$ to produce s dimensional output vector $y_j = [y_{1j}, \ldots, y_{sj}]$. The m dimensional vector $u^t = [u_1, \ldots, u_m]$ shows input variables weights and s dimensional vector $v^t = [v_1, \ldots, v_s]$ shows output variables weights and these weights are used to determine the efficiency of the unit under evaluation. The data envelopment analysis model runs for all decision making units and calculate the optimal value of and in a way that units under evaluation gain the maximum possible performance. This model is called input-oriented CCR model with constant returns to scale. The envelopment form of model (10) is shown as follow:

$$Min\left\{\theta \middle| \theta x_0 \ge \lambda X, y_0 \le \lambda Y, \lambda \ge 0\right\} \quad (11)$$

This model is developed under assumptions like variable returns to scale, being input or output oriented, being additive and etc. Various sources have evaluated and disseminated models of data envelopment analysis like Charnes et al. [37], Ray [38] and Cooper et al. [39]. A comprehensive review on the applications of DEA is reviewed in Emrouznejad et al. [40], Cook and Seiford [4] and Liu et al. [5].

3. Data Envelopment Analysis with Intuitionistic Fuzzy Inputs and Outputs

Suppose that there are n decision-making units that each unit, $DMU_j (j = 1,2, \ldots, n)$, use the input vector $X_j = (x_{1j}, x_{2j}, \ldots, x_{mj})$ to produce the output vector $Y_j = (y_{1j}, y_{2j}, \ldots, y_{sj})$. Assume the input matrix X partition to two subset of intuitionistic fuzzy inputs $IFV_x = (x_{1j}, x_{2j}, \ldots, x_{pj})$ and crisp inputs $E_x = (x_{p+1j}, x_{p+2j}, \ldots, x_{mj})$. Similarly output matrix Y partition to $IFV_y = (y_{1j}, y_{2j}, \ldots, y_{lj})$ and $E_y = (y_{l+1j}, y_{l+2j}, \ldots, y_{sj})$. Now the input oriented variable returns to scale model BCC, originally introduced by Banker, Charnes, Cooper [41], is written as follows. It is clear that the model (12) is different from CCR model only at constraint $\sum_{j=1}^{n}\lambda_j = 1$ which is related to variable returns to scale assumption.

$$\begin{aligned}
&Min\theta \quad (12)\\
&S.T.\ \sum_{j=1}^{n}\lambda_j x_{ij} \le \theta x_{i0}\ \ i \in IFV_x\ \ (i)\\
&\sum_{j=1}^{n}\lambda_j x_{ij} \le \theta x_{i0}\ \ i \in E_x\ \ (ii)\\
&\sum_{j=1}^{n}\lambda_j y_{ij} \ge y_{r0}\ \ r \in IFV_y\ \ (iii)\\
&\sum_{j=1}^{n}\lambda_j y_{ij} \ge y_{r0}\ \ r \in E_y\ \ (iv)\\
&\sum_{j=1}^{n}\lambda_j = 1\\
&\lambda_j \ge 0,\ j = 1,2,\ldots,n\\
&\theta: unrestricted
\end{aligned}$$

The constraints sets *(ii)* and *(iv)* are like the usual CCR model and do not need any special modification. Now consider the constraints set *(i)*. For $i \in IFV_x$, the right side of the constraint can be replaced by IFWA operator and the left side with section 3 of the definition 2.

$$\left\langle\left(1-\prod_{j=1}^{n}\left(1-\mu_{x_{ij}}\right)^{\lambda_j}\right),\prod_{j=1}^{n}v_{x_{ij}}^{\lambda_j}\right\rangle \le \left\langle 1-\left(1-\mu_{x_{i0}}\right)^{\theta}, v_{x_{ij}}^{\theta}\right\rangle \quad (13)$$

Similarly, the below relationship is hold for $r \in IFV_y$

$$\left\langle \left(1-\prod_{j=1}^{n}\left(1-\mu_{y_{rj}}\right)^{\lambda_j}\right), \prod_{j=1}^{n} v_{y_{rj}}^{\lambda_j} \right\rangle \geq \left\langle \mu_{y_{r0}}, v_{y_{r0}} \right\rangle \qquad (14)$$

Since IFWA operator is an intuitionistic fuzzy number, Eqs. (13) and (14) are corresponding to relations in constraints *(ii)* and *(iv)*. Based on the expressed sequential relationships between intuitionistic fuzzy numbers in definition 3, Eq. (13) is transformed to following two equations.

$$\begin{aligned} &\prod_{j=1}^{n}\left(1-\mu_{x_{ij}}\right)^{\lambda_j} \geq \left(1-\mu_{x_{i0}}\right)^{\theta} \\ &\prod_{j=1}^{n} v_{x_{ij}}^{\lambda_j} \geq v_{x_{ij}}^{\theta} \end{aligned} \qquad (15)$$

A similar transformation could be done for relation (14)

$$\begin{aligned} &\prod_{j=1}^{n}\left(1-\mu_{y_{rj}}\right)^{\lambda_j} \leq 1-\mu_{y_{r0}} \\ &\prod_{j=1}^{n} v_{y_{rj}}^{\lambda_j} \leq v_{y_{r0}} \end{aligned} \qquad (16)$$

The relations (15) and (16) are nonlinear relations that could be transformed to linear form by natural logarithm. Eqs. (17) and (18) shows this transformation on constraints sets (15) and (16).

$$\begin{aligned} &\sum_{j=1}^{n}\lambda_j \cdot ln\left(1-\mu_{x_{ij}}\right) \geq \theta \cdot ln\left(1-\mu_{x_{i0}}\right) \\ &\sum_{j=1}^{n}\lambda_j \cdot ln\left(v_{x_{ij}}\right) \geq \theta \cdot ln\left(v_{x_{i0}}\right) \end{aligned} \qquad (17)$$

And

$$\begin{aligned} &\sum_{j=1}^{n}\lambda_j \cdot ln\left(1-\mu_{y_{r0}}\right) \leq ln\left(1-\mu_{x_{i0}}\right) \\ &\sum_{j=1}^{n}\lambda_j \cdot ln\left(v_{y_{r0}}\right) \leq ln\left(v_{y_{r0}}\right) \end{aligned} \qquad (18)$$

Finally, the intuitionistic fuzzy BCC model (IF-BCC) is obtained as follow.

$$Min\theta \qquad (19)$$

$$\begin{aligned} S.T.\ &\sum_{j=1}^{n}\lambda_j \cdot \ln\left(1-\mu_{x_{ij}}\right) \geq \theta \cdot \ln\left(1-\mu_{x_{i0}}\right) && i \in IFV_x \\ &\sum_{j=1}^{n}\lambda_j \cdot \ln\left(v_{x_{ij}}\right) \geq \theta \cdot \ln\left(v_{x_{i0}}\right) && i \in IFV_x \\ &\sum_{j=1}^{n}\lambda_j x_{ij} \leq \theta x_{i0} && i \in E_x \\ &\sum_{j=1}^{n}\lambda_j \cdot \ln\left(1-\mu_{y_{r0}}\right) \leq \ln\left(1-\mu_{y_{r0}}\right) && r \in IFV_y \\ &\sum_{j=1}^{n}\lambda_j \cdot \ln\left(v_{y_{r0}}\right) \leq \ln\left(v_{y_{r0}}\right) && r \in IFV_y \\ &\sum_{j=1}^{n}\lambda_j y_{ij} \geq y_{r0} && r \in E_y \\ &\sum_{j=1}^{n}\lambda_j = 1 \\ &\lambda_j \geq 0,\ j = 1,2,\ldots,n \end{aligned}$$

θ: *unrestricted*

Note that the return to scale condition $\sum_{j=1}^{n}\lambda_j = 1$, meet the condition mentioned in IFWA operator that total weights should be equal to 1. Therefore the data envelopment analysis BCC model is a good option for solving performance evaluation problems with intuitionistic fuzzy data. Also, the definition of IF-BCC performance is quite like the definition of BCC performance which is presented in Cooper et al. [39]. This definition can be presented as follows.

Definition 5. A decision making unit is called IF-BCC efficient if and only if $\theta_0 = 1$ and all the slack variables are zero.

This model also has the following features:

1. $\theta_0 = 1$, $\lambda_0 = 1$, $\lambda_j = 0$, j = 1,2, ..., n, $j \neq 0$ is a feasible for the model (19) and so the above model always has a feasible answer and the performance is less than one.
2. According to existence of the feasible region respect to the last characteristic θ is a real number in interval (0, 1].
3. $\lambda = (\lambda_1, \lambda_2, ..., \lambda_n) \neq 0$ in model (19).

4. Application of IF-BCC model

In this section, an example of the use of IF-BCC model will illustrate. The example is devoted to the evaluation of 20 branches of a finance and credit institution. For this purpose, the use of data envelopment analysis model is proposed. Management of the organization considered sets of two inputs include the number of employees and an annual budget and three outputs include net profit, social responsibility and customer satisfaction, through studies and analysis of expert opinions to assess units.

On this basis, the first output variable is an objective measure that is calculated based on the company's financial data. But the second and third output variables are subjective indicators. Customer satisfaction index is evaluated through a series of questionnaires designed. The questionnaires were distributed among a random sample of customers and based on their views customer satisfaction index is calculated for each unit.

On the other hand, evaluation of the social responsibility index is done based on criteria and indicators defined in the EFQM excellence model. Accordingly, a group of assessors review the functional records of each unit and rate them in respective index. However, considering these scores as deterministic and exact values, decrease the semantic of them and ignore the ambiguity and uncertainty in these estimates. Thus, the scores per unit of this index are divided to a range from "very very low" to "very very high". Then each of these verbal expressions converts into an intuitionistic fuzzy number. Table 1 shows the scale used for this conversion.

Tab. 1: Intuitionistic Fuzzy Values for Customer Satisfaction and Social Responsibility Index

Intuitionistic fuzzy number	Verbal Phrase
⟨0.05,0.9⟩	Very Very Low (VVL)
⟨0.1,0.75⟩	Very Low (VL)
⟨0.25,0.6⟩	Low (L)
⟨0.4,0.5⟩	Below Average (BA)
⟨0.5,0.4⟩	Average (A)
⟨0.6,0.3⟩	Above Average (AA)
⟨0.7,0.20⟩	High (H)
⟨0.8,0.1⟩	Very High (VH)
⟨0.85,0.1⟩	Very Very High (VVH)
⟨0.9,0.05⟩	Excellent (E)

Source: own

Tab. 2: DMUs Inputs and Outputs

Units	Inputs		Outputs			IF–BCC Performance
	Budget	Staff	Profit	Customer satisfaction	Social responsibility	
1	13883	206	434.12	A	H	0.43
2	15370	227	250.01	VVH	L	0.67
3	7577	119	67	AA	AA	0.49
4	19000	254	246	L	BA	0.36
5	7116	120	59.6	VVH	H	0.95
6	10400	149	1142.2	E	BA	0.91
7	35929	601	1312.6	VVL	VH	1
8	6800	98	0.5	AA	VL	0.57
9	6216	70	276.3	AA	BA	0.75
10	18390	303	683.47	AA	E	0.55
11	3253	51	26.672	A	VVH	1
12	19200	282	2357.07	A	BA	0.59
13	5326	100	29.72	VH	VVL	0.96
14	5150	92	I.33	VH	VVH	1
15	9821	133	133.17	VL	BA	0.28
16	20756	206	50.8	E	VH	0.85
17	6798	274	185.89	VVL	BA	0.316
18	3370	81	77.46	H	A	1
19	6385	61	251.17	AA	H	1
20	12024	116	539.4	VL	L	0.68

Source: own

Table 2 shows the input and output of the 20 units under assessment. This data is proposed and evaluated based on the IF-BCC model. The model results are shown in the last column of Table 2. Based on the IF-BCC model, five units of 7, 11, 14, 18 and 19 are known as IF-BCC efficient. Another 15 units are known as radial inefficient. IF-BCC model also shows the combinatory efficacy based on the values of slack variables. Table 3 shows the values of slack variables.

According to Table 3, some decision-making units in addition to the radial inefficiency have mix inefficiency. The interpretation of shortcomings associated with intuitionistic non-fuzzy variables is performed such as the fundamentals of classical DEA. But providing accurate and quantitative interpretation about slack values of intuitionistic fuzzy variables is not easy. In this regard, we adopted two different views: First, the values of the degrees of membership can be considered a continuous spectrum and the slacks are interpreted carefully like the slacks in the exact variables. Second, according to dissociation of intuitionistic fuzzy data, deficiencies can be regarded as a signal to increase the output variables or decrease the input intuitionistic fuzzy varialble to a better level. According to this approach, for example, 0.0028 and 0.059 as membership and non-membership deficiencies of the first units means that this unit should increase its activities related to social responsibility and simultaneously consider maintaining the level of customer satisfaction. These analysis and interpretations are the main advantages of data envelopment analysis to evaluate the performance.

Tab. 3: Slack Variables of Decision Making Units Based on Intuitionistic Fuzzy BCC model

Unit	Additional input		Output slacks				
				Social responsibility		Customer satisfaction	
	Budget	Staff	Profit	Membership	Non-membership	Membership	Non-membership
1	0	0	0	0	0.0028	0.059	0
2	2636	0	0	0	0.143	0.922	1.1
3	0	0	0	0	0.048	0.028	0
4	1172.052	0	0	0.094	0	0	0.0045
5	647.9	0	0	0	0.288	0.588	0.62
6	1731.78	0	629.8	0	0.14	1.182	2.19
7	0	0	0	0	0	0	0
8	1061.03	0	0	0	0.076	0.778	0.805
9	1765.5	0	0	0	0.103	0.547	0.593
10	0	0.013	0	0.516	0.06	0.078	0
11	0	0	0	0	0	0	0
12	2217.304	0	0	0	0.017	0.205	0.288
13	0	4.7	310	0	0	1.84	2.19
14	1	0	0	0	0	0	0
15	282.5	0	0	0.11	0	0.04	0
16	7174	0	0	0.062	0	0.114	0
17	0	37	0	0.68	0.87	0.025	0
18	0	0	0	0	0	0	0
19	0	0	0	0	0	0	0
20	4303.5	0	0	0.106	0	0.08	0

Source: own

Conclusion

Unknown data and vagueness in knowledge about systems create the challenge of uncertainty for decision makers. Performance evaluation using data envelopment analysis also faced such a challenge. Researchers have been proposed various frameworks to develop DEA models under uncertainty that stochastic, fuzzy and interval data could be noted. However, DEA is not extended under IFS environments. In this paper a form of data envelopment analysis model was presented that ambiguity and uncertainty of data are shown by intuitionistic fuzzy sets. Considering a membership and non-membership function (degree) for each element in the intuitionistic fuzzy sets help analysts to obtain a better picture of the uncertainty in data. In this regard, this research presented an approach for analyzing DEA model with variable returns to scale, BCC, in the circumstances that data uncertainty are displayed in the form of intuitionistic fuzzy sets. The presented model which is called IF-BCC, measure the efficiency of decision making units with intuitionistic fuzzy data. Efficiency scores of the proposed model have a similar meaning and interpretation with original BCC model. Furthermore, the model provided the possibility of analyzing the slack variables and determination of improvement projection for inefficient units.

This model is appropriate in situations where some inputs or outputs do not have an exact quantitative value. The proposed model is developed based on the weighted aggregation operator of intuitionistic fuzzy data. The condition of the operator is that the sum of the weights should be equal to 1 and therefore BCC model is appropriate. The application of the proposed model is examined in a real world case study of a finance and credit institution. Future researches can be concentrated on the development of other types of DEA models based on the notion of intuitionistic fuzzy (α, β)-cuts. While developing data envelopment analysis models based on interval valued intuitionistic fuzzy data is another area for further studies.

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Abstract

AN INTUITIONISTIC FUZZY DATA ENVELOPMENT ANALYSIS FOR EFFICIENCY EVALUATION UNDER UNCERTAINTY: CASE OF A FINANCE AND CREDIT INSTITUTION

Seyed Hossein Razavi Hajiagha, Hadi Akrami, Edmundas Kazimieras Zavadskas, Shide Sadat Hashemi

Performance evaluation is a challenging issue for managers. Data envelopment analysis is a non parametric and linear programming based approach to appraise the relative efficiency of a set of congruent units. One of the shortcomings of classic data envelopment model is their crispness of data. In this paper, a data envelopment model is extended in which inputs and outputs are ambiguous and are expressed in the form of intuitionistic fuzzy sets. The proposed method is extended based on a weighted aggregation operator which is defined for intuitionistic fuzzy data. This model applied the advantages of intuitionistic fuzzy data in capturing the uncertainty. The main advantages of the proposed method are its simplicity and consistency with classic models. The proposed method is applied in a real instance and its results are examined.

Key Words: *performance evaluation; data envelopment analysis; BCC model; intuitionistic fuzzy sets; aggregation operator.*

JEL Classification: *D61, D80, G21.*

THE ROLE OF MARKETING IN MULTINATIONAL SUBSIDIARIES: STANDARDIZATION VERSUS LOCALIZATION

Miroslav Karlíček, Zuzana Chytková, Nikola Hořejš, Hana Mohelská, Jakub Fischer

Introduction

In the international marketing literature as well as practice, one of the most pressing issues for any multinational corporation's marketing strategy is the choice between standardization (or globalization) and localization (or adaptation) [3].

The first approach, often applied for example by companies producing cosmetics, electronics, soft drinks and most industrial goods, is based on the assumption that customer needs are relatively homogenized [5]. Companies with the standardized global marketing strategy apply a single marketing mix in every country. In doing so, they realize economies of scale (i.e. reduce costs of production and local marketing spending) [8], [3], yet may be less effective in capturing consumers' attention due to the lacking correspondence between the mix and consumers' needs.

On the other hand, locally oriented multinational corporations focus primarily on differences among individual markets. They assume that due to the differing cultural, socio-historical or geographical context consumers live in, most products cannot be successfully marketed in a standardized manner and adapt their marketing strategies and/or tactics to the local market conditions. Localization is thus more costly than standardization, yet can prove to be a more effective approach.

It is clear that for a corporation operating on an international scale, the decision regarding standardization or localization of marketing mix is crucial. Both strategic orientations can be successful depending on factors such as product category, level of competition on the market etc. Because of the importance of the topic, many studies have concentrated on these issues to create recommendations that would guide decisions concerning this matter [7], [10], [3].

These decisions are often taken at the corporation's international marketing headquarters and that is also mostly the level of analysis to be found in literature. These decisions, however, clearly have an effect also on the local marketing practice, a fact mostly ignored within marketing literature. Especially within local markets that are considered relatively small for the corporation's business, this issue becomes quite interesting. Local marketers are those who know the market "from the inside", yet often do not have a say in the brand strategy. Does this global practice have an effect on their perception of their own work? This study tries to fill this knowledge gap.

The study, in fact, is not focused on comparison of the two philosophies of international marketing and does not offer recommendations about the appropriateness of one or the other. Rather, it concentrates on the perception of these global decisions by those who effectively carry them out on the local level. The Czech context is particularly adapt for this study because the Czech market is often seen as only marginally important by multinational corporations.

In particular, this paper analyzes how Czech marketers working in subsidiaries of multinational corporations perceive the role of marketing within their companies. Specifically, it tries to find out if those working for subsidiaries governed primarily by the philosophy of standardization perceive their role as different

from those who are employed by subsidiaries governed primarily by the philosophy of localization.

While in the second case, the local company is relatively independent in its marketing decisions, in the first case the subsidiary's marketing is controlled significantly by the parent corporation. Marketing managers in such multinational subsidiaries not only tend to be forced to accept all strategic marketing decisions from the headquarters, but many of the tactical marketing decisions are controlled by the central marketing body as well. Marketing activity of these subsidiaries thus often shrinks to more or less significant adaptations of marketing communications [9]. This situation is far removed from the complex role marketing function should be playing in corporations [4]. This forced adoption of most concepts from their headquarters and the lack of freedom in decision-making may result in de-motivation of marketing managers in subsidiaries with centralized marketing activities [6, pp. 18], [10]. Consequently, standardization can restrict entrepreneurial spirit, creativity and initiative in the subsidiary [10], [1].

Given these issues, the results of this study are of high importance not only to multinational corporations' global management that should take them into account when considering the effectiveness of standardization, but especially to HR managers of multinational subsidiaries who hire employees for their marketing departments. The findings are important also for business faculties which prepare graduates for their future careers in marketing.

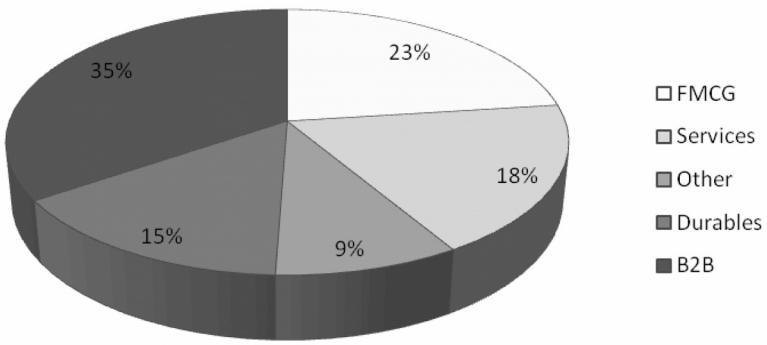
1. Methods and Sample Composition

In order to answer the research question, a mixed-method research has been carried out. A preliminary qualitative study was realized consisting in individual in-depth interviews with seven Czech marketing managers of larger multinational subsidiaries. The respondents were asked about the role their marketing department was playing in the subsidiary. The results of the qualitative study then represented grounds for the quantitative part of the research that was carried out through an online questionnaire.

The survey was realized during March and April 2011 with 87 marketing managers who were in charge of marketing departments in multinational subsidiaries. All of the corporations had their headquarters outside of the Czech Republic. Only relatively large corporations (with more than 100 employees) were addressed.

All respondents were marketing managers. Approximately 36 % of them worked in a small marketing department with 3 employees or less. The rest of the respondents worked in larger marketing departments with 4 employees and more. 23 % of the sample worked in corporations operating in the FMCG sector, 18 % of them worked in corporations operating in services, 35 % in corporations operating in B2B sector, 15 % in corporations which produce durables and 9 % in other corporations (e. g. media) (see fig. 1).

Fig. 1: Sample Composition



Source: authors

To get a more complex understanding of the issue, we carried out the research also among marketing managers of Czech companies with more than 100 employees. Altogether 140 marketing managers of those companies responded.

In order to uncover if marketing departments with higher parental control carry out different marketing operations and what these are, the questionnaire included questions about activities the respondents' departments were involved in most of the time. Respondents were allowed to choose maximum of two of the following possibilities: marketing communication development, media acquisition, brand strategy and positioning, new brand development, consumer research, sales analysis, reporting to the headquarters, price-related decisions, new product development, business plan creation and other. It can be noted how certain answers point to strategic and others to tactical kind of activities.

The respondents were also asked which of the activities listed above they would like to spend more time with. This question was intended to uncover ambitions (and also frustrations) of both groups of marketing managers. Similarly to the first question, respondents were allowed to choose the maximum of two of the possibilities.

Finally, respondents were asked about the most important gaps in knowledge and skills of their junior colleagues. Respondents were allowed to choose maximum of two of the following possibilities: creativity, general overview, brand strategy knowledge, data analysis skills, negotiation skills, management skills, knowledge of economics, knowledge of media, knowledge of advertising, knowledge of sales strategy and other. This question allowed uncovering what are the valued abilities for a marketer in that particular organization, as they bear a close relation to the kind of activities that are mostly carried out.

Clearly, our study has its limitations, as the sample is not very numerous. As a consequence, for some of the differences found in the data statistical significance could not be asserted. Further research is therefore needed to strengthen our findings conclusively. However, this research represents a crucial exploratory voyage into the world of marketing practitioners that seldom is made accessible to researchers.

2. Preliminary Qualitative Study

The results of the qualitative study showed that both strategic orientations described in the introduction of this paper were recognized. They were then reflected in the respondents' perception of the relationship between the subsidiary and the parent organization. Some marketing managers felt they had enough freedom from the headquarters, whereas others believed that they were under inappropriate control from the parent marketing department. These two contradictory opinions are demonstrated by the following statements:

Fig. 2: The Role of Marketing in Subsidiaries According to the Multinational's Strategic Orientation

Source: authors

"We are functioning federatively. The headquarters leave us surprisingly high degree of independence."

"Centralization of marketing and low possibility of adaptation of the central strategy to the local needs is a huge barrier."

Based on results from the qualitative research and literature review, we presumed that marketing departments in multinational subsidiaries tend to adopt one of the following patterns (see fig. 2).

We expected marketing activities of the subsidiary to differ in correspondence with the strategic marketing orientation on the global level.

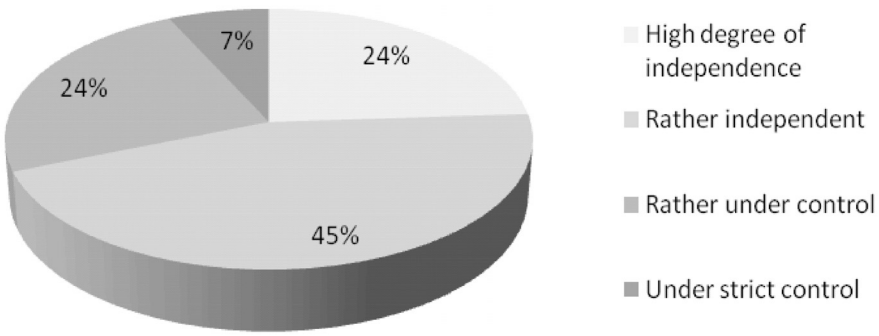
In case of standardized marketing philosophy (i.e. high parent company control of the subsidiary's marketing function) the focus of the marketing department should be relatively narrow and rather tactical in nature. Marketing managers should be primarily responsible for translations and minor adaptations of marketing communications. They should spend a relatively big portion of their time reporting to the headquarters. At the same time, the involvement of the subsidiary's marketing managers with strategic activities should be limited because the global marketers want to prevent the local ones from diluting or confusing the global brand positioning as stated for example by Gatignon and Anderson [2]. For the same reasons creativity of marketing managers should be rather restricted.

The company's philosophy of localization (i.e. low parent company control of the subsidiary's marketing function), on the other hand, will render the subsidiary's marketing activities much more complex and more strategic in nature. Such marketing department should be involved not only in marketing communications but also in strategic marketing activities, such as brand strategy, positioning or new product development. Reporting should be less time-consuming than in case of high parent company control, whereas creativity of marketing managers should be relatively supported.

3. Perceived Control of the Parent Corporation

Based on the survey, surprisingly, only less than one third of the respondents claimed that they were under relatively high control from their headquarters (see fig. 3): 7 % of them stated that almost everything is decided from the headquarters and 24 % of them stated that the parent corporation decides in majority of situations. On the other hand, 24 % of the respondents felt they had a high degree of independence. Most of the respondents (45 %) believed that they were rather independent on the headquarters.

Fig. 3: The Perceived Degree of Control from the Headquarters



Source: authors

Because of the limited sample, answers were summarized into two groups only: “High degree of independence” was associated with “Rather independent” and “Under strict control” associated with “Rather under control”.

3.1 Marketing Activities in Subsidiaries with High/Low Parental Control

In tab. 1 there are marketing activities respondents claimed to be involved in most of their time. Based on this data, the hypotheses presented in fig. 2 seem to be quite relevant, because the marketing activities carried out by subsidiaries with low parental control tend to be more strategic in nature and present a more complex understanding of marketing. Our data suggest that these marketing departments are more typically involved with brand strategy, positioning and new brand development than departments with high parent control (19.3 % vs. 4 %). Similar tendency was found also for new product development. However, in this case the difference was rather small (9.7 % vs. 8 %).

On the other hand, marketing departments with high parent control seem much narrower in their activity scope, as compared to departments with low parent control. Much more of their time is swallowed by reporting to the headquarters (28 % vs. 12.9 %). This difference was statistically significant at 10% level of significance. Similarly, creation of business plans takes more time in marketing departments of subsidiaries with high parent control than in departments of subsidiaries with low parent control (24 % vs. 19.4 %).

Counterintuitively, price-related decisions were more typical for departments with high parent control than for departments with low parent control (8 % vs. 4.8 %). A possible explanation can be that departments with high parent control are more typically involved with price decisions because of the need of global brand positioning protection (as price is usually a crucial element of brand positioning).

Tab. 1: The Most Frequent Activities of the Marketing Managers

	Departments with high parent control	Departments with low parent control	Departments of Czech corporations
Activities related to marketing communications			
Marketing communication development	52 %	54.8 %	42.1 %
Media acquisition	24 %	25.8 %	20.7 %
Activities related to brand strategy			
Brand strategy and positioning	4 %	16.1 %	17.1 %
New brand development	0 %	3.2 %	1.4 %
Data analysis			
Consumer research	16 %	14.5 %	11.4 %
Sales analysis	16 %	17.7 %	22.9 %
Reporting and business planning			
Reporting to the headquarters	28 %	12.9 %	12.9 %
Business plan creation	24 %	19.4 %	12.9 %
Price-related decisions	8 %	4.8 %	10.7 %
New product development	8 %	9.7 %	13.6 %
Other	4 %	4.8 %	7.1 %

Source: authors

It is interesting to compare marketing departments with high/low parental control with departments of Czech corporations. Marketing departments of Czech corporations are less often involved in activities related to marketing communications (62.8 % vs. 76 %, resp. 80.6 %). When comparing activities related to brand strategy, marketing departments of Czech corporations

seem to be similar to departments with low parent control. The same was true also for reporting.

However, as for price-related decisions and new product development, marketing departments of Czech corporations scored higher than departments of multinationals of both types (high and low parental control). Therefore, it seems that marketing departments of Czech corporations may be even more complex in their activities than departments with low parental control, also for the fact that in all multinational corporations new product development would be carried out elsewhere. More data, however, would be necessary to prove this statement and explore this issue further.

3.2 Ambitions of Marketing Managers in Subsidiaries with High/Low Parental Control

The second battery of questions was closely related to the first one and it concentrated on uncovering those activities that the respondents would like to spend more time with. The results are available in tab. 2.

The most common answer of the respondents from both groups was that they would like to spend more time with consumer research. This was especially true for marketing managers of subsidiaries with high parental control. 60 % of them answered this way. In case of marketing managers of subsidiaries with low parental control the number was 30.6 %. This difference was statistically significant at 5% level of significance, Pearson contingency coefficient being 0.263.

This finding suggests that marketing managers of both groups (but especially from subsidiaries with high parent control) feel that they do not have enough knowledge about their customers. Although this may be due to research bias, as our survey may have been answered primarily by marketing managers with positive attitudes towards surveys in general, the result still suggests an interesting insight into the workings of marketing departments. It especially corroborates the hypothesis that multinationals which follow the strategy of standardization assume consumer behavior to be homogeneous across different cultural settings. Thus, they do not deem it necessary to collect local consumer data and as a consequence and the local marketers are not given the budget and freedom to carry out local market research.

The hypothesis that corporations pursuing the strategy of homogenization provide the

Tab. 2: Activities Marketing Managers Would Like to Spend More Time With

	Departments with high parent control	Departments with low parent control	Departments of Czech corporations
Activities related to marketing communications			
Marketing communication development	20.0 %	22.6 %	19.3 %
Media acquisition	12.0 %	8.1 %	12.1 %
Activities related to brand strategy			
Brand strategy and positioning	44 %	27.4 %	25 %
New brand development	8.0 %	8.1 %	12.1 %
Data analysis			
Consumer research	60.0 %	30.6 %	44.3 %
Sales analysis	32.0 %	21.0 %	19.3 %
Reporting and business planning			
Reporting to the headquarters	4.0 %	1.6 %	4.3 %
Business plan creation	20 %	19.4 %	15.0 %
Price-related decisions	4 %	9.7 %	7.1 %
New product development	16.0 %	17.7 %	26.4 %
Other	4.0 %	1.6 %	5.7 %

Source: authors

local subsidiaries with a "ready-made" brand strategy is supported by other results. In fact, the second most common answer of the respondents to the question what activities they do not engage in often enough was brand strategy and positioning. Similarly to the first question, this answer was more typical for managers working in subsidiaries with high parental control than managers working in subsidiaries with low parental control (44 % vs. 27.4 %).

Both of these results are thus consistent with the hypotheses presented in fig. 2. What could follow from this is a possible feeling of frustration of managers in subsidiaries with high parent control, resulting from the inconsistency between their understanding of marketing as a strategic endeavor (including market research and brand strategy) and the reality, in which they engage in tactical activities.

The two groups of marketers differed also in the ambition to spend more time with sales analysis. Marketers from subsidiaries with high parental control mentioned this activity more often than their colleagues from subsidiaries with low parental control (32 % vs. 21 %).

However, opposite tendency was found regarding price-related decisions. Consistent with our findings from table 1, marketers from subsidiaries with low parental control stated more often than their colleagues from subsidiaries with high parental control that they would have liked to spend more time with pricing (9.7 % vs. 4 %).

3.3 Perceived Gaps in Knowledge and Skills of Juniors in Subsidiaries with High/Low Parental Control

When asked about gaps in knowledge and skills of their junior colleagues, the answers of marketing managers working in subsidiaries with high and low parental control differed considerably (see tab. 3).

Tab. 3: Perceived Gaps in Knowledge and Skills of Juniors

	Departments with high parent control	Departments with low parent control	Departments of Czech corporations
Creativity and general overview			
Creativity	12 %	29 %	23.6 %
General overview	24 %	35.5 %	35 %
Brand strategy knowledge	32 %	12.9 %	14.3 %
Data analysis skills	60 %	45.2 %	20.7 %
Negotiation and management skills			
Negotiation skills	40 %	19.4 %	23.6 %
Management skills	32 %	16.1 %	18.6 %
Other knowledge			
Knowledge of economics	16 %	12.9 %	11.4 %
Knowledge of media	12 %	12.9 %	13.6 %
Knowledge of advertising	8 %	12.9 %	12.1 %
Knowledge of sales strategy	36 %	27.4 %	15.7 %

Source: authors

"Creativity" was stated more than twice more often by managers in subsidiaries with low parental control than those in subsidiaries with high parental control (29 % versus 12 %). This difference was statistically significant at 10% level of significance. Such result is in line with the proposed theory, as creativity would clearly be required from workers in less controlled environments.

Similar reasoning can be applied to "general overview" whose lack was noted more often by managers in subsidiaries with low parental control than by those in subsidiaries with high parental control (35.5 % vs. 24 %). Again, if the workload consists mainly in carrying out given tasks, general overview is not among the necessary competences of employees.

On the other hand, managers in subsidiaries with high parental control feel much more often than managers in subsidiaries with low parental control that their juniors miss

"brand strategy knowledge" (32 % vs. 12.9 %). This difference is statistically significant at 5% level of significance. Pearson contingency coefficient of 0.218 implies weak to medium dependence. The knowledge of brand strategy here may refer to mastering the steps of carrying out a brand strategy (which would be required from marketers who are expected to implement a global brand strategy), but also to the company's brands' global strategies.

Quite interesting is also a notable difference in how the two groups of managers perceived analytical skills of their juniors. 60 % of managers in subsidiaries with high parental control perceived data analysis skills of their juniors as insufficient. In case of managers working in subsidiaries with low parental control this was only 45.2 %. What could be deduced from this difference is the greater importance that foreign companies place on data as such, be it internal or external data. What should be noted here is the opposite tendency individuated for creativity. Evidently, what is required by the multinational central headquarters is more action based on precise information and less improvisation based on creativity. Interestingly, then, there is a statistically significant (at 1% level of significance) difference between Czech and foreign companies, where Czech companies find the lack of data analysis skills much less important (only 20 % of them individuated this element as lacking in juniors). This may be due to the persisting misunderstanding of the role of marketing in Czech corporations, where marketing is considered to be creative, rather than based on careful analysis of available information.

However, there are also other differences: marketing managers in subsidiaries with high parental control (vs. those in subsidiaries with low parental control) found their juniors less competent in negotiation skills (40 % vs. 19.4 %), in management skills (32 % vs. 16.1 %), knowledge of sales strategy (36 % vs. 27.4 %) and knowledge of economics (16 % vs. 12.9 %). On the other hand, marketing managers in subsidiaries with low parental control criticized more often gaps in advertising knowledge of their juniors in comparison to their colleagues in subsidiaries with high parental control (12.9 % vs. 8 %). All these differences suggest that subsidiaries under a strict control from their headquarters tend to be much more oriented towards sales, rather than strategic marketing. What is stressed there is the ability to sell given products (that is reflected in the negotiation skills and knowledge of sales strategy) rather than manage the marketing mix. The relatively independent subsidiaries, on the other hand, emphasize rather the knowledge of advertising as a key component of marketing mix. Such result should also be read together with the stress on creativity that these companies show.

Based on our data we can conclude that marketing departments of subsidiaries with low parental control tend to appreciate creativity and general overview more often than departments of subsidiaries with high parental control. Our hypotheses in figure 2 seem to be therefore supported, as these two elements add up to the overall "marketing freedom" of the companies with low parental control, which allows them to approach marketing strategically rather than just sell a prefabricated one.

On the other hand, marketing departments of subsidiaries with high parental control tend to appreciate brand strategy knowledge more often than departments of subsidiaries with low parental control. However, we expect that this knowledge is related primarily to patronage of the global brand positioning, not to brand development or creation. This explanation would be consistent with the reasoning of Gatignon and Anderson [2] which we mentioned in the previous text.

Our data suggest that working in marketing departments of subsidiaries with high parental control is probably more analytical in nature than working in marketing departments of subsidiaries with low parental control and demands more negotiation, sales-related and management skills.

It is also interesting to compare perceived gaps in knowledge and skills of juniors mentioned by marketers from departments of Czech corporations with those mentioned by marketers from subsidiaries with high/low foreign parental control. From this perspective, marketing departments of Czech corporations seem to be relatively close to marketing departments of subsidiaries with low parental control. This may be quite logical because marketing departments of Czech corporations should enjoy even greater degree of independence than marketing departments of subsidiaries with low parent control.

Conclusions

Our findings suggest that there is a significant difference between the role of marketing in subsidiaries of multinational corporations with high parental control (i.e. marketing orientation of standardization) and subsidiaries with low parental control (i.e. marketing orientation of localization).

In particular, subsidiaries of corporations oriented at standardization are less often involved in strategic activities central to marketing considered as a complex process [4], such as brand strategy, positioning and new brand development. Their position of dependence is exemplified by the importance of reporting to the headquarters, which becomes one of the most frequent activities of the marketing departments.

In case of low parent control, marketing managers' involvement with brand strategy, positioning and new brand development tends to be significant. Approximately one fifth of the respondents claimed that those activities belong among the most frequent activities their department was involved with.

Differences exist also in relation to ambitions both groups of managers have. Marketers from subsidiaries with low parent control would like to be focused on consumer research more often than those from subsidiaries with high parent control. This finding suggests that marketers from subsidiaries with low parent control feel like knowing too little about their customers and may be allowed a too small budget for market research. That would resonate with the hypothesis that the corporations these subsidiaries belong to pursue the strategy of standardization, and the subsidiaries thus tend to receive most of the marketing strategy from the headquarters. In such situation, local market research may seem as redundant by the headquarters. The conclusion that these subsidiaries are guided by a standardized marketing strategy is supported also by the fact that its marketing workers lament not spending enough time with brand strategy and positioning. Such finding suggests there may be feelings of frustration caused by the tactical nature of their role, which does not add to the employees' motivation.

The results also resonate with the findings related to the abilities lacked in junior marketers. What we found was that marketing departments of subsidiaries with high parent control do not seek creativity in their employees. In fact, marketing managers in subsidiaries with high parent control stated more than twice less often that they lacked creativity by their junior colleagues (compared to marketing managers in subsidiaries with low parent control). This finding would point to creativity being less supported by these departments than those of subsidiaries with low parent control.

What marketers in subsidiaries with high parental control did lack much more often in their juniors was "brand strategy knowledge". However, this perceived gap in juniors' knowledge is likely to be related primarily to patronage of the global brand positioning, not to brand development or creation and the result thus resonates with the fact, that creativity is not emphasized in these companies.

Our findings corroborate the hypotheses set out in the beginning of this paper, i.e. that there are significant differences between the role marketing plays in subsidiaries of corporations governed by the strategy of standardization, as opposed to those governed by the strategy of localization. Such results are of high importance both for HR managers of multinational corporations as well as for business faculties. Working in subsidiaries with high parent control will be more suitable for employees who prefer standardized tasks, who do not mind about frequent reporting and who do not mind following strict regulations. On the other hand, a job in subsidiaries with low parent control should be more suitable for those employees who appreciate less structured tasks, who enjoy complexity of the marketing function and who are strong in strategic and creative thinking. The results are also important for top management of multinationals who compare pros and cons of strategies of standardization and localization, as the cost of de-motivation of the local marketing department is seldom taken into account.

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Abstract

THE ROLE OF MARKETING IN MULTINATIONAL SUBSIDIARIES: STANDARDIZATION VERSUS LOCALIZATION

Miroslav Karlíček, Zuzana Chytková, Nikola Hořejš, Hana Mohelská, Jakub Fischer

This study focuses on differences between the character of marketing activities in subsidiaries governed primarily by the philosophy of standardization and those governed primarily by the philosophy of localization. 87 Czech marketing managers who were in charge of marketing departments in multinational subsidiaries were asked about the activities their department was involved most of the time. In case of high parent control, marketing managers' involvement with strategic marketing activities, such as brand strategy, positioning and new brand development, tended to be limited. On the other hand reporting to the headquarters was quite often mentioned as one of the most frequent activities of the marketing department. Opposite pattern was typical for marketing managers working in subsidiaries with low parent control. At the same time both group of marketers differed also in ambitions they had, as well as in knowledge and skills gaps of their junior colleagues they perceived. The findings are of high importance especially for HR managers of multinational corporations and for business faculties. Working in subsidiaries with high parent control will be more suitable for employees who prefer standardized tasks and who do not mind following strict regulations. On the other hand, working in subsidiaries with low parent control should be more suitable for employees who appreciate less structured tasks, who enjoy complexity of marketing and who are strong in strategic and creative thinking. However the findings of the study can be useful also for top management of multinationals who compare pros and cons of strategies of standardization and localization.

Key Words: *multinational subsidiaries, international marketing, role of marketing, marketing department.*

JEL Classification: *M31, M51, M16.*

TVORBA STRATEGIE A STRATEGICKÉ PLÁNOVÁNÍ. TEORIE A PRAXE

Autoři: Jiří Fotr, Emil Vacík, Ivan Souček, Miroslav Špaček, Stanislav Hájek
Nakladatelství: Grada, Praha, 2012

Na knižním trhu se v roce 2012 objevila kvalitní monografie, na které se podíleli jak významní pedagogové několika vysokých škol, tak praktici. Jde o dobrý počin vydavatelství, protože kniha je velmi vhodná pro manažery a podnikatele, kteří stojí před rozhodnutím o strategii podniku a zpracování strategických plánů.

Kniha se soustřeďuje na vymezení strategického záměru, tvorbu strategického plánu, na proces rozhodování o investičním programu a finančním plánu podniku. Velmi podnětnou částí knihy je pátá kapitola věnovaná realizaci, hodnocení a controllingu strategie. Mnohé specialisty potěší kapitoly věnované řízení růstu, fúzím a akvizicím, případně managementu rizika a krizovému řízení. Velmi zajímavá je osmá kapitola zaměřená na problematiku Business Intelligence a Competitive Intelligence, kde se čtenář dočte nejen o metodách využívaných při strategickém plánování, ale jsou zde naznačeny i praktické přístupy Business a Competitive Intelligence. Závěr knihy je věnován strategickému plánování v hospodářské praxi a používaným finančním a ekonomickým ukazatelům. Druhou přílohu tvoří příklady praxe, což výrazně obohacuje kvalitu této monografie.

Nutno konstatovat, že kniha je vhodná nejen pro manažerskou a podnikatelskou praxi, ale též pro akademickou obec ekonomického, manažerského a podnikatelského zaměření. Je potěšitelné, že se tato kniha zařadila k těm publikačním počinům na knižním trhu v letech 2011 a 2012, které reagují na soudobé trendy v globálním a turbulentním podnikatelském prostředí.

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