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# *Managing Global Transitions*

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# *Managing Global Transitions*

## *International Research Journal*

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### *Table of Contents*

- 331 The Editor's Corner
- 333 Empirical Analysis of the Severance Pay  
Non-Performance in Slovenia  
*Milan Vodopivec*  
*Lilijana Madjar*  
*Primož Dolenc*
- 349 Diagnostic Process of Company Productivity  
*Mária Ďurišová*  
*Emese Tokarčíková*
- 367 Does Dividend Policy Follow the Capital Structure Theory?  
*Justyna Franc-Dąbrowska*
- 383 Association of Management Tools with the Financial  
Performance of Companies: The Example  
of the Slovenian Construction Sector  
*Peter Friedl*  
*Roberto Biloslavo*
- 403 Justifying Environmental Cost Allocation in  
a Multiple Product Firm: A Case Study  
*Collins C. Ngwakwe*



## *The Editor's Corner*

At the end of the seventh year of its existence, I am very glad to announce that the journal has been successfully gaining international recognition; the number of citations in the Web of Science has grown to over 30. The journal will start its eighth year with a partly renewed editorial board. On this occasion I would like to thank everyone who has contributed to the development of the journal. The journal continues focusing on transition research and emphasizing openness to different research areas, topics, and methods, as well as the international and interdisciplinary research nature of scholarly articles published in the journal. The current issue covers topics of the severance pay performance, enterprise diagnostics, dividend payment policies, management tools, and the environmental cost allocation.

This issue (Vol. 7, No. 4) begins with a paper written by Milan Vodopivec, Lilijana Madjar and Primož Dolenc, who investigate the so-called non-performance problem of severance pay in Slovenia. In the second paper, Mária Ďurišová and Emese Tokarčíková present the research about key factors of enterprise diagnostics and their role towards the increase in company productivity in Slovakia. In the third paper, Justyna Franc-Dąbrowska presents the results of research concerning relationships between two capital structure theories (hierarchy theory and substitution theory) and dividend payment policies in the agricultural and foodstuff sector stock companies in Poland. In the fourth paper, Peter Friedl and Roberto Biloslavo study the association of management tools with the financial performance of companies in the construction sector in Slovenia. In the last – fifth paper, Collins C. Ngwakwe examines the effect of environmental cost allocation on production cost and the outcome for environmental management decisions by using a case study of a firm in Nigeria.

Boštjan Antončič  
*Editor*



# *Empirical Analysis of the Severance Pay Non-Performance in Slovenia*

Milan Vodopivec  
Lilijana Madjar  
Primož Dolenc

Combining information from the Firm Survey of Labor Costs with the information about claims filed with the Guarantee Fund by workers whose employers defaulted on their severance pay obligations, the paper analyzes the so-called non-performance problem of severance pay – the fact that coverage, and thus legal entitlement, does not guarantee the actual receipt of the benefit – as experienced in Slovenia in 2000. The findings are threefold: (i) one-third of total obligations incurred by firms failed to be honored and only a small portion of defaulted severance pay claims was reimbursed by the Guarantee Fund; (ii) while both men and women seem to be equally affected, workers older than 40 were disproportionately represented among those whose severance pay claims failed to be honored; and, (iii) among firms that incurred severance pay liabilities, larger and more productive firms were more likely to observe their fiduciary obligations and pay them out. These findings corroborate the weaknesses of severance pay as an income protection program, pointing to the large scale of the non-performance problem and the inequities created by it.

*Key Words:* severance pay, severance pay non-performance,  
Guarantee Fund, Slovenia

*JEL Classification:* J65, J32

## **Introduction**

Being widely used in both the developed and developing world, severance pay is the most prevalent program offering income compensation in the case of job loss.<sup>1</sup> Despite being so widespread, evaluations show that severance pay not only creates important inefficiencies but also often fails to provide adequate protection. On the efficiency front, severance

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*Managing Global Transitions* 7 (4): 333–348

pay reduces employment and labor market flows, hinders technological progress and innovations, pushes workers into the informal sector, and creates significant litigation costs (see Addison and Teixeira (2001) for a review of both theoretical and empirical effects). Its scorecard on the income protection front is also rather negative. First, generous severance pay hinders access to formal sector jobs by disadvantaged groups (OECD 1999). Second, the same amount of severance is paid regardless of the duration of the unemployment spell following the separation, resulting in over-payments to workers with short and under-payments to workers with long unemployment spells. And third, severance pay suffers from the so-called non-performance problem – the fact that coverage, and thus legal entitlement, does not guarantee the actual receipt of the benefit.

The non-performance of severance pay is largely an ‘uncharted territory,’ as only a handful of studies provide hard empirical evidence about this aspect of severance pay. Because severance is not administered by a public authority, information about the incidence of severance pay obligations as well as about how frequently firms actually honor such obligations is rarely accessible. While ad-hoc evidence exists (for example, from litigation cases where workers are suing their employers for the non-payment of severance pay), we are familiar with only two studies that report evidence on non-performance-based on micro-data. One is MacIsaac and Rama (2000), who estimate that in the early 1990s only about half of Peruvian workers legally entitled to severance pay received the benefit (MacIsaac and Rama report that the payment was more likely if workers had a written contract and if they worked in a large, unionized firm that paid social security contributions). The other is Mansor et al. (2001), who report that Malaysian workers who were laid off in 1998 received 83 percent of the total amount of severance pay that they claimed from their employers.

This paper is an attempt to provide further insights into the non-performance problem of the severance pay. It focuses on the Slovenian severance pay program and addresses the following questions:

- How severe is the non-performance problem in Slovenia? That is, of total liabilities arising from the payment of severance, what are (i) the share of severance pay paid out by firms, (ii) the share paid out by the Guarantee Fund of Slovenia, and (iii) the share that failed to be paid out?
- In particular, are any groups strongly affected? That is, what is the



age and sex composition of workers whose severance pay claims are not honored?

- What are the characteristics of the firms that honor their obligations arising from severance pay in comparison to those that fail to do so?

Because of information availability, Slovenia is particularly suitable for studying the above questions. First, in 2000 the Statistical Office of Slovenia carried out a survey of labor costs incurred by firms, the survey that among others provides information about the amount of severance paid out by each firm. Second, Slovenia is one of few transition countries that has introduced the Guarantee Fund to help the laid-off workers with partial reimbursement of their outstanding severance pay claims, and the information collected by this fund is a valuable source for studying severance pay non-performance.<sup>2</sup>

These two sources – the Firm Survey of Labor Costs and the Guarantee Fund – are thus complementary, one providing information about severance pay obligations paid out by firms and the other about obligations that failed to be paid out by firms. Taken together, the data establish a composite rendering of fulfilled and unfulfilled severance pay obligations in Slovenia.

The main findings of the paper are as follows. First, the non-performance of severance pay has been a significant problem in Slovenia, with one-third of total obligations incurred by firms failing to be honored (in 2000, the year focused upon by the study) and only a small portion of non-paid severance pay claims being reimbursed by the Guarantee Fund. Second, while both men and women seem to be equally affected, workers older than 40 were disproportionately represented among those whose severance pay claims failed to be honored. And third, among firms that incurred severance pay liabilities, larger and more productive firms were more likely to pay them out.

These findings corroborate the weaknesses of severance pay as an income protection program, pointing to the large scale of the non-performance problem and inequities created by it.

The paper is organized as follows. The second section describes the legal framework of severance pay in Slovenia. The third section provides a comparison of severance pay programs in transition countries. The fourth describes the data and methodology, and the fifth section presents the results of the empirical analysis of the non-performance problem of the Slovenian severance pay program. The last section concludes with a summary and policy implications.

### **Description of the Legal System of Slovenia's Severance Pay**

In Slovenia, severance pay is regulated by the Labor Code, the Law on the Public Guarantee Fund, and the Law on Bankruptcy and Liquidation, and is further guided by Collective bargaining agreements, as well as individual contracts (on the managerial level). Mandated severance pay is paid to laid-off workers and workers who retire, with the level of pay proportional to the work tenure of the worker with his or her former employer. To address the non-performance problem of severance pay, a Guarantee Fund was introduced in 1997, with the Fund partly reimbursing the unpaid severance pay claims of workers.

Slovenia introduced a Labor Code in 1990 and a new one in 2003. The 1990 Labor Code mandated severance for early retirees as well as for redundant workers. While for early retirees the law did not prescribe the amount of severance pay, it did so for redundant workers. For each year of service, workers with at least two years of service were entitled to half of their monthly average wage for every year of service, with the wage determined on the basis of the wage paid in the last three months of employment. Other cases for severance pay were not legally binding.

The 2003 Labor Code significantly differs from the previous one, by defining more precisely the obligations on the part of employers and the rights of workers. Workers are entitled to severance pay if they retire or they are dismissed (either because of business reasons or bankruptcy or even in the case of his/her incompetence). Retired workers are entitled to the severance pay of two average wages, calculated from three-months' average wage in Slovenia, or (if more favorable to the employee) two average wages, calculated from his/her three-months' average wage before retirement. In contrast, the basis for the calculation of the severance pay for dismissed workers is the average monthly wage which was received by the employee, or which would have been received by the worker if working, in the last three months before the termination is taken. The employee is entitled to severance pay amounting to:

- 1/5 of the basis for each year of employment with the employer, if the employee has been employed with the employer for more than one and up to five years;
- 1/4 of the basis for each year of employment with the employer, if the employee has been employed with the employer for period from five to fifteen years;
- 1/3 of the basis for each year of employment with the employer, if

the employee has been employed with the employer for period exceeding fifteen years.

It is worthwhile to stress that also under the 2003 law, the severance pay program remains unrelated to the unemployment insurance program. That is, qualifying workers receive severance pay and, in addition, they also qualify for unemployment insurance benefits (which can be received for up to two years, see van Ours and Vodopivec 2006).

To protect worker's rights in the case of a firm's insolvency, in 1997 Slovenia – following the 1980 EU directive 80/987 – introduced the Public Guarantee Fund. Workers, legally entitled to severance pay but unsuccessful in its exaction, can claim partial reimbursement of their severance pay claims from the Fund, with the ceiling on such reimbursements being a monthly minimum wage.<sup>3</sup> Moreover, under the 1993 Law on Bankruptcy and Liquidation, workers can sue their former employers that undergo a liquidation or bankruptcy process, with workers' severance pay claims having a priority over other claims (up to a limit – for details, see Kresal Šoltes 1997).

### **Review of Severance Pay Program in Transition Countries**

In putting Slovenia in an international context, we draw heavily on the Schwab (2003) analysis of 21 transition countries.<sup>4</sup> While all these countries mandate severance pay, the countries differ in important details. These include the extent of coverage, eligibility conditions, generosity of benefits and whether benefits should vary with seniority, and what to do when bankruptcy prevents the employer from making severance payments.

#### **ELIGIBILITY**

Transition countries mandate severance pay for economic dismissals such as the employer's liquidation, bankruptcy, or reduction of staff due to economic, technological, structural, or similar changes.<sup>5</sup> Many countries require severance pay only for economic dismissals. These countries include the Czech Republic, Georgia, Hungary, Macedonia, Poland, Serbia, Slovak Republic, Slovenia, and Vietnam. In some other countries, though, workers are also entitled to severance pay for a variety of other dismissals. These other dismissals are generally for individual reasons, such as when the worker proves incompetent for the position or is disabled by health reasons.

Not all dismissed workers, even among those dismissed for economic reasons, are entitled to severance payments. Countries differ in eligibility conditions. One-third of the countries included in our analysis require a minimum length of employment with the firm before a dismissed worker is entitled to severance pay. The required seniority ranges from one to three years for economic dismissals, and up to five years for other dismissals. Slovenia and Vietnam require one year of employment before a worker is entitled to severance pay. Bosnia and Herzegovina, Croatia, and Macedonia require two years of seniority. Hungary requires three years of seniority. Bulgaria requires five year of seniority before a worker is entitled to severance pay for dismissals due to illness (but has no seniority requirements for economic dismissals).

#### LEVEL OF BENEFITS

Of the 21 countries included in our analysis, 13 use a sliding scale connected to years of employment – Bulgaria, China, Croatia, Estonia, Hungary, Latvia, Lithuania, Macedonia, North Korea, Poland, Serbia and Montenegro, Slovenia, and Vietnam; severance pay in the rest of the countries included in the study does not vary with seniority. By design, in sliding-scale countries more senior workers are entitled to more generous severance pay. In general, the level of benefits in sliding-scale countries exceeds those in fixed-benefit countries.

#### DEALING WITH THE NON-PERFORMANCE PROBLEM

A major issue connected with severance pay is the inability of insolvent employers to make severance payments. Fifteen countries have ratified ILO Convention 173, including four transition countries: Latvia, Lithuania, Slovakia, and Slovenia. According to this convention, countries can choose between giving priority to severance pay claims in the employer's bankruptcy proceedings or creating a Guarantee Fund to protect severance-pay claims (together with unpaid wages) – with Slovenia, as mentioned above, opting for both.

### **Data and Methodology**

Below we describe the micro-level data sources and methodology used in the empirical analysis of Slovenia's severance pay.

#### DATA SOURCES

The following data sources are used:

- Firm-level data were obtained from the 2000 Labor Costs Survey in Slovenia, administered by the Statistical Office of Slovenia. The sample comprised 3,021 enterprises, selected among those with 10 or more workers. Information included severance pay that firms paid both to laid-off and retired workers.
- Individual-level data were gathered from worker requests to the Guarantee Fund of Slovenia in the period from 1994 to 2003. For each individual, data included unpaid severance pay obligations, requested amount from the Fund, amount paid by the Fund, the gender and age of the applicant, and previous employer.
- Firm-level measure of efficiency produced by production function estimation. We used the value of the error term  $-\varepsilon_{ijt}$  – for 2000, obtained by the following OLS estimation of translog production function for the Slovenian manufacturing firms for the 1994–2001 period:

$$\ln q_{ijt} = \alpha_0 + \sum_{k=1}^n \alpha_k \ln x_{ijk t} + \frac{1}{2} \sum_{k=1}^n \sum_{l=1}^n \beta_{kl} \ln x_{ijk t} \ln x_{ijl t} + \varepsilon_{ijt}, \quad (1)$$

where the inputs  $x_{ijk t}$  include measures of labor, capital, and material inputs;  $\alpha_k$  and  $\beta_{kl}$  are, respectively, first- and second-order translog production parameters ( $i$  refers to individual firms,  $j$  to two-digit industry categories, and  $t$  to time) – see Orazem and Vodopivec (2008) for details of estimation and data sources used.<sup>6</sup>

Methodology for the analysis of firm-level determinants of severance pay payout. To investigate whether firm efficiency and size affect the likelihood of paying severance pay given that firms incurred such costs, that is, that they laid-off workers, we ran a multinomial logit model with the following options for the dependent variable:

- firm did not incur severance obligations (taken as a baseline),
- firm incurred severance obligations and paid them, and
- firm incurred severance obligations and did not pay them.

As explanatory variables, we used efficiency of the firm and firm size. To capture firm size effects, we used a dummy variable indicating whether a firm had more than 100 workers.

### **Empirical Results**

This section presents the results of our empirical analysis of the severance pay non-performance in Slovenia. As explained above, we focus on

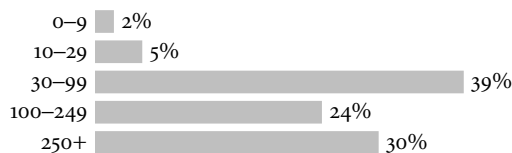


FIGURE 1 Paid severance pay – structure by size, 2000 (computations based on the 2000 Labor Cost Survey)

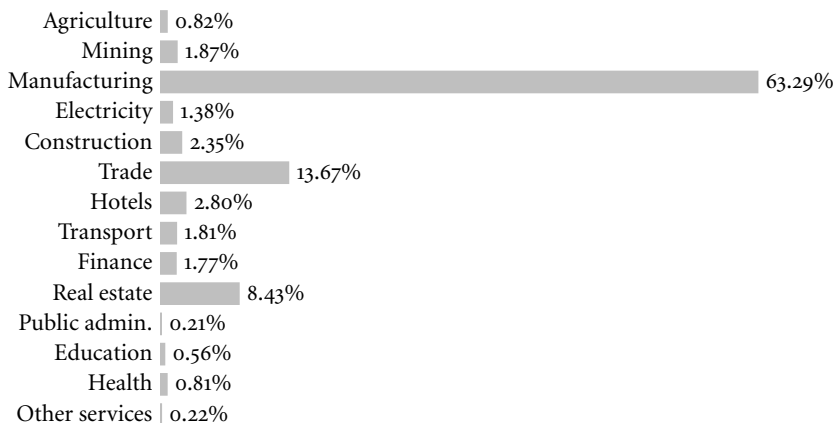


FIGURE 2 Paid severance pay – structure by industry, 2000 (computations based on the 2000 Labor Cost Survey)

the following aspects: the severity of the non-performance problem, the composition of workers whose severance pay claims fail to be paid out, and the characteristics of firms that fail to pay their severance pay obligations.

To put these questions in the context, however, let us first present statistics about severance pay liabilities that were paid out. We focus on year 2000, the year for which we have Labor Cost Survey data. First, the overall amount of severance pay liabilities paid out in 2000 was €17.5 million – 0.085 percent of GDP or 0.2 percent of the total wage bill. While this is a rather modest amount, it certainly is not a negligible one. Second, most of severance pay obligations was paid by large firms; for example, 93 percent of severance pay was paid out by firms with more than 30 workers (see figure 1). Third, the majority (more than 60 percent) of paid severance pay obligations was incurred in manufacturing (figure 2), suggesting that in 2000 this sector was still undergoing an intense restructuring.

TABLE 1 Severance pay payments, reimbursements, and unpaid claims, 2000

	(1)	(2)	(3)	(4)
Payments made by firms	17.5	64.3	0.085	0.162
Reimbursements made by the Guarantee Fund	0.7	2.7	0.004	0.007
Unpaid severance pay claims	9.0	33.0	0.044	0.083
Total	27.3	100.0	0.132	0.252

NOTES (1) amount (€ million), (2) structure (%), (3) share in GDP (%), (4) share in worker compensation (%). Computations based on 2000 Labor Costs Survey and the Guarantee Fund of Slovenia.

SEVERITY OF SEVERANCE PAY NON-PERFORMANCE

Our results show that in 2000, the non-performance of severance pay posed a serious problem in Slovenia. Out of the total of €27.3 million severance pay obligations, €9.0 million – 33 percent – failed to be honored (by firms that incurred these obligations or by the Guarantee Fund – see table 1). The role of the Guarantee Fund in helping with unpaid obligations proved to be very limited, as the Fund only reimbursed €0.7 million or 7.2 percent of total unpaid severance pay obligations.<sup>7</sup> Indeed, according to its rules (see above), the Guarantee Fund reimbursed unpaid severance pay claims only partially, and so less than 10 percent of the average claim was actually reimbursed (see figure 3).

In the 1990s, the magnitude of the non-performance of severance pay was most likely even larger. Figure 4 shows the number of cases of severance pay reimbursements by the Guarantee Fund in the period from 1994 until 2003. This figure reflects the pattern of transition and suggests that the problem of severance pay non-performance was probably even more serious in the mid-1990s, when the number of workers turning to the Guarantee Fund for reimbursements was more than double the number in 2000. Moreover, in the period from 1994 to 2003 around 43,000 workers failed to receive payment from their former employers despite their legal entitlement.

WHICH WORKERS ARE AFFECTED BY NON-PERFORMANCE OF SEVERANCE PAY?

To find out whether some groups of workers were disproportionately affected by severance pay non-performance, we analyzed the composition of workers reporting unpaid severance claims. We found no evidence of differences between men and women, but workers above 40 years were more affected by severance pay non-performance than younger workers.

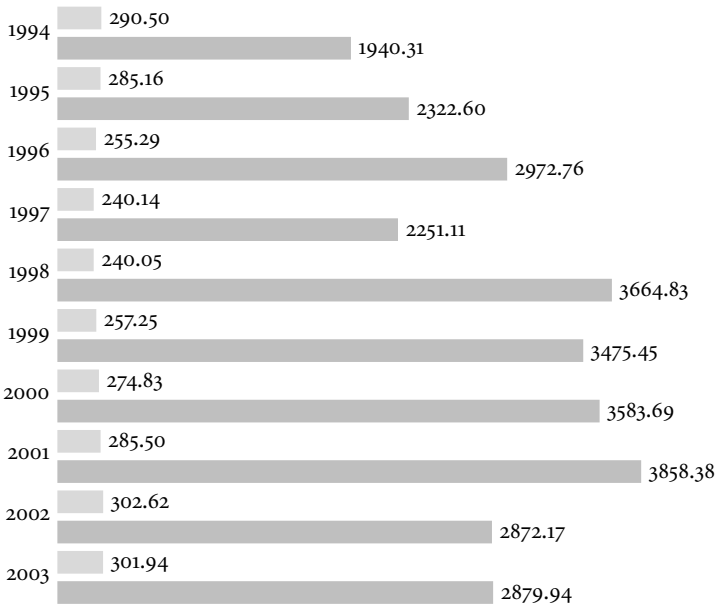


FIGURE 3 Average severance pay claims and reimbursements, 1994–2003 (€, light gray – average reimbursements, dark gray – average claims; computations based on information provided by the Guarantee Fund of Slovenia)

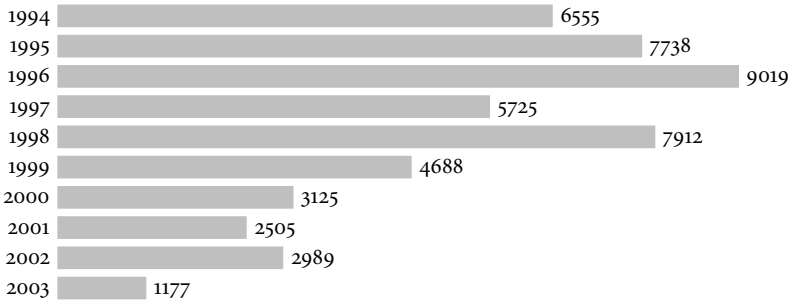


FIGURE 4 Number of cases of reimbursements, 1994–2003 (based on information provided by the Guarantee Fund of Slovenia)

Figure 5 shows that severance pay non-performance has not affected men and women differently, as the reimbursements to men and women were rather similar in size. Over the 1994–2003 period, the Guarantee Fund paid 50.8 percent of total severance pay reimbursements to women and 49.2 percent to men), which correspond well to the employment shares of these groups (in 2000, men represented 51 percent of total employment and women 49 percent).



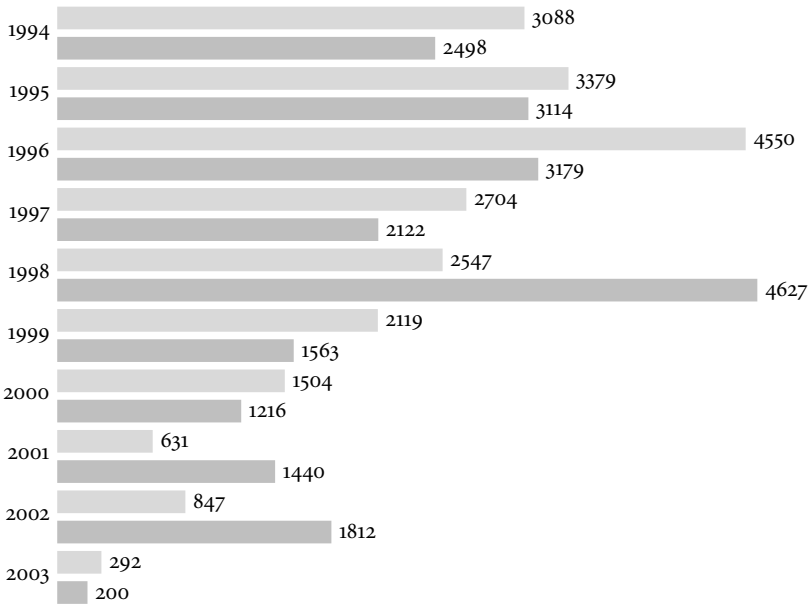


FIGURE 5 Structure of severance pay reimbursements by gender, 2000 (€, light gray – men, dark gray – women; based on information provided by the Guarantee Fund of Slovenia)

Turning to the age distribution of claimants, figure 6 compares the age distribution of severance pay claimants with the age distribution of the active population in Slovenia in the same period (1994–2003). Clearly, among the claimants, workers over 40 years of age are over-represented – while their share in the population is 47 percent and 42 percent for men and women, respectively, their share among the claimants is 64 percent and 51 percent for men and women, respectively.

FIRM CHARACTERISTICS AND NON-PERFORMANCE

The last part of our analysis sheds light on characteristics of firms that are paying out severance pay in comparison to those that are failing to honor their legal entitlements. The estimation of the multinomial logit model (see table 2) shows that the larger and more productive the firm, the more likely it is to honor its severance pay obligations.

**Concluding Remarks**

Being one of the rare examples of its kind, the paper seeks to provide insights into the non-performance problem of severance pay by analyz-

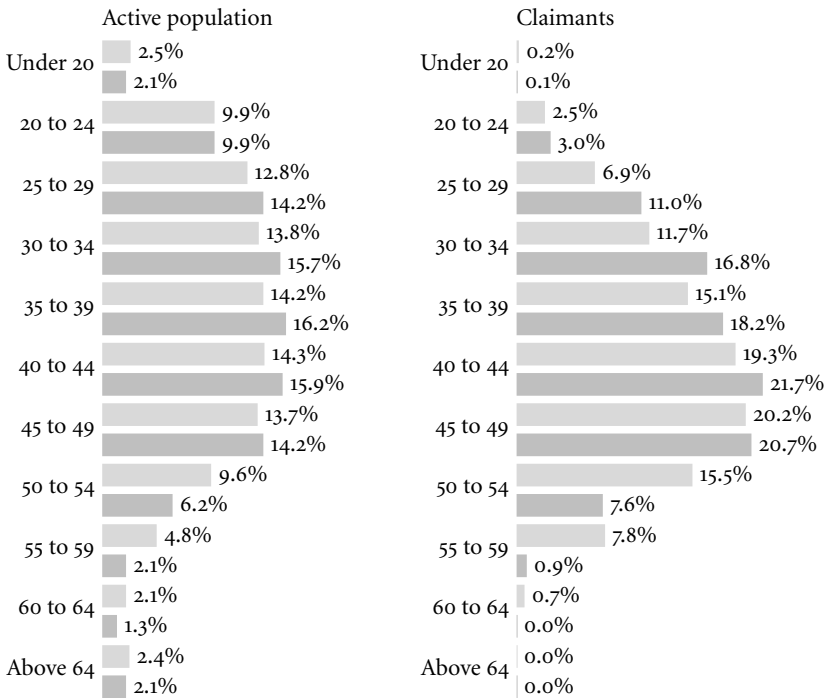


FIGURE 6 Age distribution of claimants and active population in Slovenia, 1994–2003 (light gray – man, dark gray – women; based on the information provided by the Guarantee Fund of Slovenia)

ing the working of this program in Slovenia. Our findings suggest that severance pay non-performance has been a significant problem in Slovenia. In 2000, only two-thirds of total severance pay obligations were actually honored, a small portion of non-paid severance pay claims was reimbursed by the Guarantee Fund, and the rest – one-third of total obligations – was not paid at all. Moreover, we showed that while both men and women were equally affected, workers older than 40 years were more likely than younger ones to be confronted by severance pay non-performance. And, finally, we also found that among firms that incurred severance pay liabilities, larger and more productive firms were more likely to pay them out.

Taken together, these findings shed a rather negative light on severance pay as an income protection program for the unemployed. First, the program fails to protect a significant share of those who are legally entitled to such protection – even after the introduction of the Guarantee Fund.

TABLE 2 Multinomial logit estimates of the likelihood of severance pay non-performance

	Multinomial logit estimates				Descriptive statistics <sup>1</sup>	
	Paying severance obligations		Failing to pay severance obligations		(3)	(4)
	(1)	(2)	(1)	(2)		
(a)	-0.04	0.49	-5.76**	2.17	0.07	0.21
(b)	1.38**	0.28	0.47	0.88	0.61	0.49
(c)	-286**	0.25	-5.35**	0.81		

NOTES The definition of dependent variable: not incurring severance obligations is taken as a baseline, and incurring severance obligations and paying them, and incurring severance obligations and failing to pay them, as other options. No. of observations: 816, pseudo  $R^2$ : 0,056. <sup>1</sup> Mean value of dependent variable is 0/08, and its standard error is 0.27. (a) Efficiency of the firm, (b) size of the firm (1 if firm’s employment exceeds 100 workers, 0 otherwise), (c) constant; (1) coefficient, (2) robust standard error, (3) mean, (4) standard deviation. Significance at 1 and 5 percent levels are indicated by \*\* and \*, respectively.

Second, the program is prone to creating inequities, as it disproportionately affected older workers. At the same time, our findings also provide some clues about how to make the program more effective. The fact that less productive – and hence less profitable – firms are less likely to honor their obligations suggests that non-performance is strongly related to the non-funded nature and limited risk-pooling of severance pay, and thus the recommendation of converting severance pay to a funded program.

Let us conclude with recommendations for better coordinating severance pay with other income support systems for the unemployed. First, countries with both unemployment insurance and severance pay programs (Slovenia being one of them) can save on costs without reducing insurance by better coordinating payments under the two programs. Namely, unemployment insurance eligibility rules could be adjusted so that insurance benefits would only start after the severance benefits ‘expire,’ that is, after  $n$  months, if the individual received  $n$  monthly wages as the severance payment (such a program is in place in some developed countries, for example, in Canada – see Vodopivec 2004).

Another possibility – explicitly addressing the non-performance problem – is the conversion of severance pay to pre-funded unemployment insurance savings accounts (UISAS), a reform implemented by Austria in 2002.<sup>8</sup> Besides correcting for the non-performance problem, UISAS would improve efficiency by removing obstacles to labor market flexi-

bility and reducing litigation costs. Lastly, the most radical option is the introduction of an integrated severance and UI system (Chilean model), consisting of two components: *UISAS* and a solidarity fund, with benefit recipients first drawing benefits from their *UISAS* and upon depletion, reverting to the solidarity fund (for details of the reform, see Acevedo, eskenazi, and Pagés 2006, and for theoretical considerations, Parsons, forthcoming).

### **Acknowledgments**

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### **Notes**

- 1 See Holzmann, Iyer, and Vodopivec (2008) for a survey of the incidence of the severance pay around the world and a review of the origin, economic rationale, and current attempts to reform severance pay programs.
- 2 Guarantee Fund also exists in Estonia, Romania and Uzbekistan.
- 3 Under the 1993 Law on Bankruptcy and Liquidation, workers can sue their former employers that undergo a liquidation or bankruptcy process, with workers' severance pay claims having a priority over other claims (up to a limit – for details, see Kresal Šoltes 1997).
- 4 Three socialist countries (China, North Korea, and Vietnam); eight successor countries of USSR (Azerbaijan, Estonia, Georgia, Kazakhstan, Latvia, Lithuania, Russia, and Ukraine); five successor countries of Yugoslavia (Bosnia and Herzegovina, Croatia, Macedonia, Serbia and Montenegro, and Slovenia); two successor countries of Czechoslovakia (Czech Republic and Slovak Republic), and three former socialist European countries (Bulgaria, Hungary, and Poland).
- 5 Most OECD countries also have mandatory severance pay programs, but some – including Australia, Denmark, Finland, Germany, Japan, Netherlands, New Zealand, Norway, Sweden, and the United States – leave such arrangements to collective bargaining or rely on the common law provisions. For example, in the Netherlands, even though the law does not require severance pay, employers often make payments to dismissed workers to avoid legal proceedings for an 'obviously unreasonable dismissal.' The cantonal courts have even created a statutory-like formula for the amount of severance payments.
- 6 Alternative measures of efficiency, obtained via fixed effects and random effects estimation of the above translog production function, yielded similar results.

- 7 It is possible that some workers received additional reimbursement from bankruptcy or liquidation proceeds – we do not have any information about such reimbursements.
- 8 In 2002, Austria converted its severance pay to a fully funded contributory system akin to unemployment insurance savings accounts (Koman, Schuh, and Weber 2005). The reform extended the entitlement to workers with short tenures and removed obstacles to worker mobility, granting full portability and allowing the accumulation of benefits from the beginning of an employment spell. Employers pay 1.5 percent of each worker's salary to each individual worker, with resources held in a central account and invested in the capital market. Laid-off workers with job tenure of three years or more can withdraw accumulations in their accounts or keep them and claim them upon retirement. Workers who separate voluntarily or have tenures of less than three years are denied the right of immediate withdrawal, a feature that may hinder worker mobility.

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# *Diagnostic Process of Company Productivity*

Mária Ďurišová  
Emese Tokarčíková

This paper deals with an actual topic of how key factors of enterprise diagnostics can help to increase company productivity. Recognition and use of relevant internal and external information in this field determines the success of the enterprise. Application of the general diagnostic model of company productivity to the net income has been a frequent problem of company practice. This problem is of profit showing, which is an inevitable precondition for long-term company development and growth. Diagnostic access of company productivity allows recognition of specific problems in greater detail, which results from the activity of each company. This article also presents an introduction to the researched area of enterprise diagnostics, which opens opportunities for other publishing activities and can lead to information exchange.

*Key Words:* enterprise diagnostics, company productivity, diagnostic model

*JEL Classification:* D21, D24

## **Introduction**

Diagnostics of a company is a part of company management. It includes organization, planning, decision-making, control and leadership. The inevitable precondition of the above management functions is information, which has recently been characterized by fast accumulation and spreading due to the use of information and telecommunication technologies.

Information on productivity is an important resource for company management. Productivity is the ability of the capital invested to appreciate. It indicates a company's ability to achieve a certain level of recurrent and steady entrepreneurial activity. The economic category called Productivity is tightly connected to another economic category called Performance. However, they are not synonymous. A company's outputs

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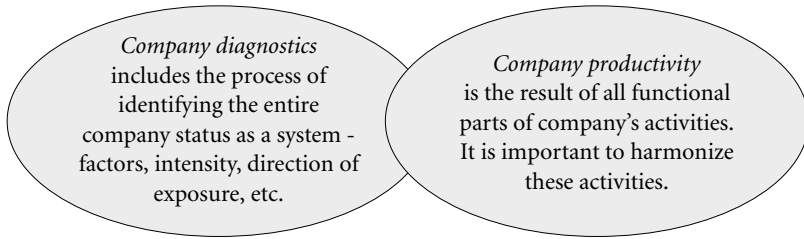


FIGURE 1 Diagnostics and productivity relation

are the results of a transformation process where inputs change into outputs. Outputs determine the level of company productivity.

Company productivity increase is the precondition for its value growth. Productivity is a permanently actual topic. It includes all parts of a company's activities, which must be fitted together to reach the maximum effect of continually increasing performance. To fulfill this aim it is important to work out a system of productivity measures, situation analysis, results evaluation and suggestions for current situation improvement. This is the subject of company diagnostics. The results of individual company functional parts diagnostics include determination of the company's current situation and identification of unused potential. Figure 1 points to the mutual relation of diagnostics and productivity.

Recently, it has become very important to increase the productivity of companies in the Slovak Republic, mainly in connection with continuing European integration processes.

### **Diagnostics of Company Productivity System**

Company diagnostics is a process including relatively separate activities related to each-other: introductory phase, description of situation and of the diagnosed object's development, diagnostic test, diagnostic analysis, synthesis and the final phase; as shown in figure 2.

The main idea of the introductory phase is the selection of a diagnostics object, in this case the company productivity and definition of its behavior parameters. It is followed by a description of the situation and of company productivity development through the diagnostic apparatus. The following diagnostic test includes comparing the company productivity situation with the tested criterion, identification of abnormalities and definition of existing problems.



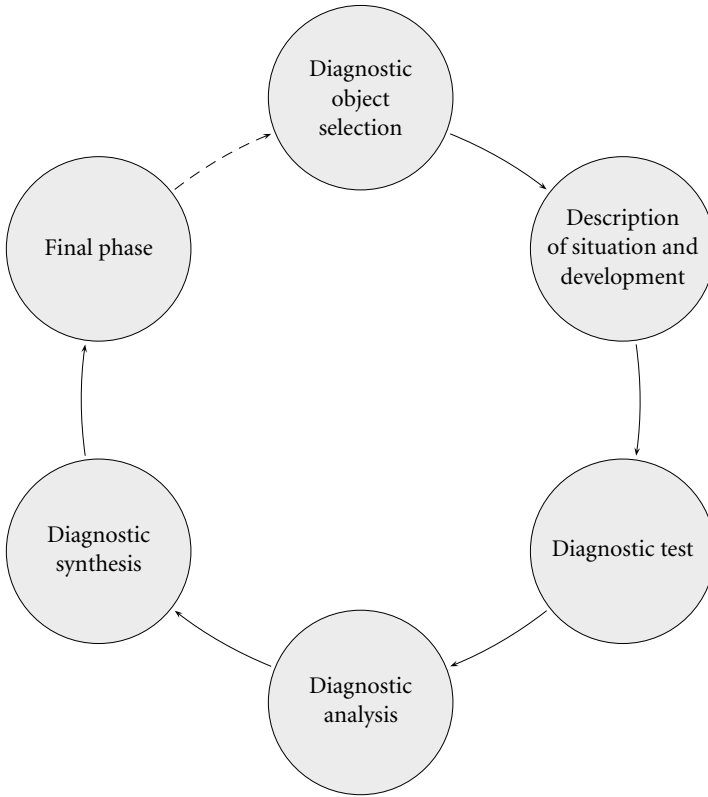


FIGURE 2 Diagnostic process structure

The fourth step of the diagnostics process is diagnostics analysis. This covers intensity, frequency, cause and direction of the problem as well as quantification of consequences and the prediction of trend. A goal of diagnostic synthesis is to define diagnosis, i. e. relevancy of a problem and urgency of its solution, as well as its main causes.

The diagnostic process culminates with the cooperation of diagnosticians to provide problem-solving suggestions and assure their effectiveness.

#### COMPANY PRODUCTIVITY

Company productivity is currently one of the most frequently used terms. Its content is not exactly defined; it depends on the way of interpretation according to the stakeholders or on the means of expression and quantification.

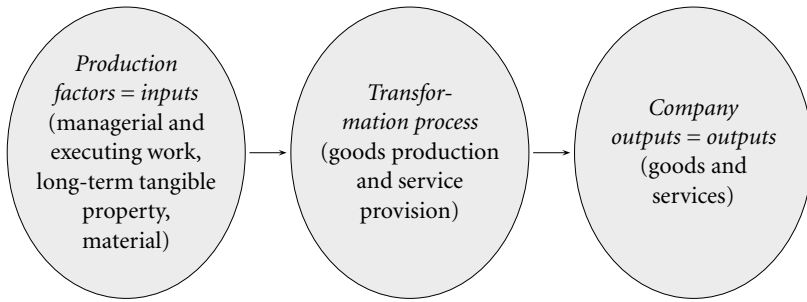


FIGURE 3 Company Transformation Process

‘The most general definition of Productivity as per the economic dictionary is the capability of capital valorization. The criterion of capital valorization is net present value.’ (Fibírová and Šoljaková 2005.) Invested capital is valorized through the company transformation process. This is the process of transformation of the production factors (inputs) into the company outputs (outputs). The output volume in the transformation process has to be higher than the input volume. The transformation process is the process of goods manufacturing or service providing.

The inputs and outputs – in this article, economic and transformation processes are understood with the same economic fundament, as goods production and service providing processes – can be quantified either physically or financially. Financial quantification of transformation process inputs and outputs is the subject of accounting. The main task of the accounting information is not only to illustrate the entrepreneurial process in terms of money income and expense but also to present the entire finance circulation in its reproduction process.

#### DESCRIPTION OF THE STATUS AND DEVELOPMENT OF COMPANY PRODUCTIVITY

Productivity as defined in the previous chapter shows the necessity of creating a set of indicators to assess the company productivity. It is important to break down net present value (the topmost indicator of company productivity) into financial indicators, which are connected to non-financial indicators. The non-financial indicators are the moving power for the financial indicators.

Financial indicators are variables expressed by the same measuring unit – the financial unit –, which is significant for their comparability.

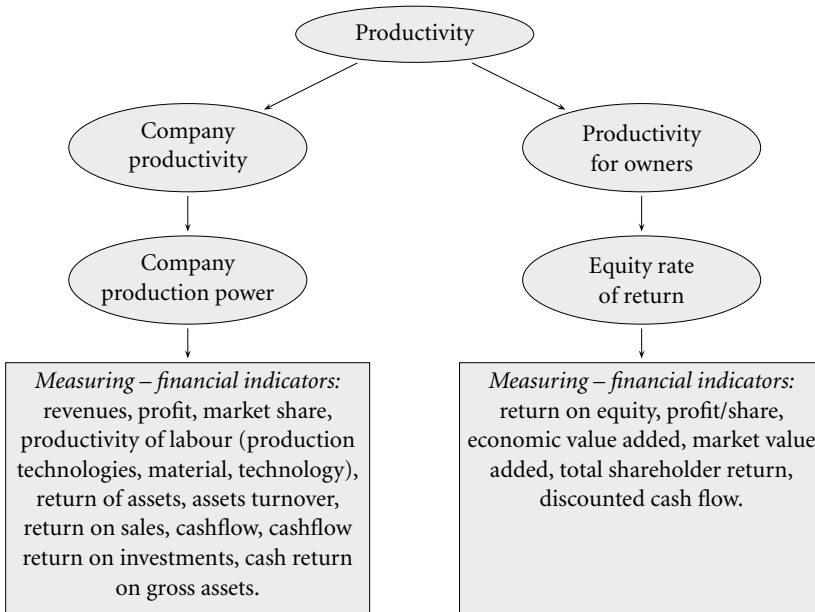


FIGURE 4 Financial indicators for measuring company’s productivity

These indicators are illustrated in figure 4 (Ďurišová 2006a; 2006b), divided into financial indicators of company productivity and productivity indicators for owners. All factors influencing the level of company productivity indicators affect the level of productivity indicators for owners. But this is not true vice-versa.

The non-financial indicators are metrics based on the value and realization chains. They include delivery time, quality, service, customer satisfaction, innovation, etc.

When creating the set of principles for company productivity measurement it is necessary to keep the primary principles as follows:

- appropriate quantity;
- measurability;
- ability to influence;
- aggregation ability and possibility of up-to-down conjunction;
- transparency;
- simple definition and data collection for processing;
- recency.

## COMPANY'S PRODUCTIVITY DIAGNOSTIC TEST

After description of the situation and development of the diagnosed object, the diagnostic process continues with the diagnostic test, which includes:

- definition and selection of testing criteria;
- comparison of actual situation with testing criteria;
- identification of problems.

Testing criteria are predetermined entries expressing a desired state.

The actual productivity level of a company is documented in the Balance Sheet, the Income Statement and in the Cash Flow Statement. The Balance Sheet includes information on company assets and on financial resources of their settlement. The Balance Sheet also describes conditions under which the transformation process in the company was realized. Everything is expressed in financial units. The Income Statement presents the transformation process progress and results expressed in financial units based on comparison of revenues and costs in the accounting period. The Cash Flow Statement represents all changes in the financial position through the company's cash flow. It allows evaluation of the capability of every single company activity to create cash. At the same time it shows the necessity of financial sources.

The Cash Flow Statement interconnects the Balance Sheet and Income Statement information. If there is divergences detected in the comparison of the real and desired state, problems are to be identified and classified according to their types. The existence of problems is an integral part of every company. They arise if there are any contradictions between targets, tasks deduced from them and their realization possibilities (Kašík et al. 1996; 1998).

Problems resulting from the company productivity diagnostic:

- revenues decrease;
- decrease of profit per output unit;
- decreasing market share;
- labor productivity decrease;
- decrease of return on assets, return on sales and return on equity;
- decrease of the assets turnover;
- increase in the period of operation return of investments;
- decrease of the profit per share or per investment (contribution);

- decrease of economic and marked value added;
- increasing time taken to accomplish orders;
- decrease of production quality;
- dissatisfied customers;
- problem with outputs innovation, or in process of innovation.

DIAGNOSTIC ANALYSIS AND SYNTHESIS OF COMPANY  
PRODUCTIVITY

The primary precondition for successful diagnostic analysis is high accuracy description of current status and of development of company productivity, and diagnostic test.

The content of diagnostic analysis is the examination of company productivity indicators, exploration of relationships, attributes and factors influencing the given situation.

Specifically, the following items are investigated in the diagnosed field:

- Periodicity or randomness of company productivity increase/decrease expressed through financial and non-financial metrics;
- Intensity (levels of) increase/decrease of indicators;
- Frequency of changes;
- Influence of the price change, production capacity, range, proportion of fixed and variable costs influencing increase/decrease of productivity;
- Reasons for output decrease – change of realization price, range of goods, and unsuitable capacity representation of each kind of output.

Diagnostic synthesis aggregates and summarizes the knowledge acquired by diagnostic analysis. It describes the seriousness of the problem, the urgency of its solution and its main causes.

Diagnostic synthesis results in diagnosis assigning, i. e. based on all activities realized in the previous phases of the diagnostic process, the status quo of company productivity is found out.

Especially, the essential problems in company productivity which endanger company existence include:

- decrease of company revenues;
- output not even reaching its critical amount resulting in insufficient fixed costs contribution (decrease of production facilities productivity, which means insufficient utilization of production capacity);

- decrease of labor productivity, material extraction;
- decrease of customer satisfaction;
- consumption increases (expressed in expenses) without adequate revenues increase.

#### THE FINAL PHASE OF COMPANY PRODUCTIVITY DIAGNOSTIC PROCESS

The content of the final phase of the company productivity diagnostic process is the projection of therapy for a given problem, i. e. the means of solving the problem, elimination of weaknesses, fortification of strengths, and prevention of crisis. The therapy includes time, financial and personal dimensions.

The therapy for the area of company productivity mostly includes:

1. Measures for output increase:
  - gaining new customers;
  - fulfilling customers' needs and wishes by means of quality service provision.
2. Measures for exploitation of competitors' strengths:
  - higher quality;
  - fair price;
  - service packages.
3. Lower expenses:
  - introduction of modern technologies;
  - improvement of labor and management organization;
  - increase of employees' culture-technical level.

#### **General Diagnostic Model of Company Productivity and its Application to a Particular Problem**

The general diagnostic model of company productivity includes individual activities and their effects, which it is important to realize in frames of the company productivity diagnosis. Like every other model, it provides a simplified content of economic reality according to selected criteria and answers the questions arising from its creation.

The general diagnostic model of company productivity is thereafter applied to the net income.

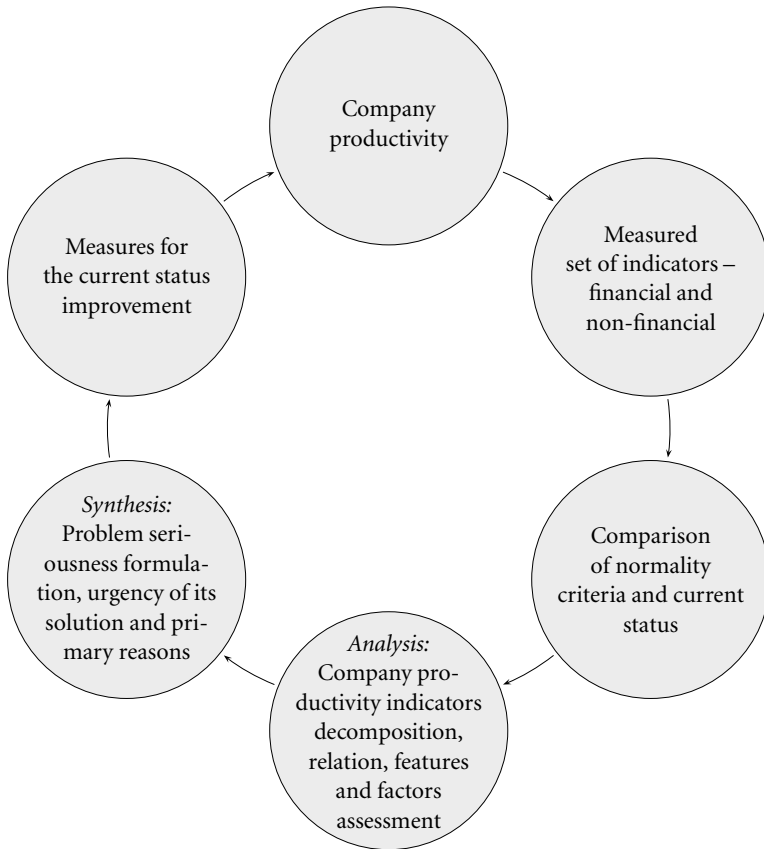


FIGURE 5 General diagnostic model of company productivity

Company’s net income is a quantity indicator giving information on the company’s activities and is expressed as a margin between the company’s total revenues and costs. If revenues exceed costs, profit is arising, otherwise loss is created.

The goal of learning the economy structure of the trading income and the analysis of factors determining its creation is to discover possible weaknesses in the transformation process, which may decrease the company’s profit potential. Information on profitable as well as loss-making activities is very valuable for successful productivity management of a company.

The main source of profit is the income from economic activities, which is one part of the income from operating activities. It is created

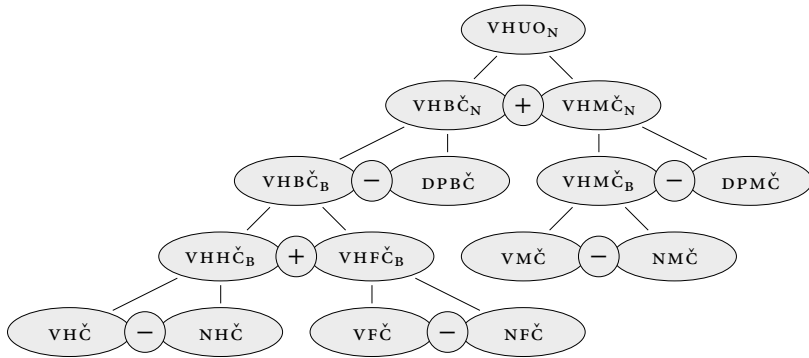


FIGURE 6 Income disaggregation model (adapted from Zalai et al. 2000), where:  $VHUO_N$  – income in accounting period after taxation (net),  $VHB\check{C}_N$  – income from operating activities after taxation (net),  $VHM\check{C}_N$  – income from extraordinary activities after taxation (net),  $VHB\check{C}_B$  – income from operating activities before taxation (gross),  $DPB\check{C}$  – income tax from operating activities,  $VHM\check{C}_B$  – income from extraordinary activities before taxation (gross),  $DPM\check{C}$  – income tax from extraordinary activities,  $VHH\check{C}_B$  – income from economic activities before taxation (gross),  $VHF\check{C}_B$  – income from financial activities before taxation (gross),  $VH\check{C}$  – revenues from economic activities,  $NH\check{C}$  – costs from economic activities,  $VF\check{C}$  – revenues from financial activities,  $NF\check{C}$  – costs from financial activities,  $VM\check{C}$  – revenues from extraordinary activities,  $NM\check{C}$  – costs from extraordinary activities

as a difference between revenues from sales of goods and services and pertaining costs, i. e. realization profit representing the company's main production power. The level of the income from economic activities is influenced by the realization capacity, by the range of goods, by costs per unit, and by sales price per unit.

The income from financial activities, which is also part of the income from operating activities, is the resultant of financial revenues and financial costs. They are mostly associated with utilization of outer sources, with keeping bonds and other financial investments and with exchange rate impacts in foreign trade.

The income from extraordinary activities is determined by accidental, unpredictable events that it is not possible for company management to influence.

Summation of the income from operating activities and the income from extraordinary activities gives the income in an accounting period.

It is possible to analyze the income structure through the model of



TABLE 1 Values of the income desaggregation model in the period of 2001–2005 (in 1000 SKK)

Entry	2001	2002	2003	2004	2005
VHČ	78,191	60,014	51,113	57,887	67,751
NHČ	78,685	59,313	50,821	57,191	69,856
VHHČ <sub>B</sub> (r.1 – r.2)	-494	701	292	696	-2,105
VFČ	4,377	95	31	9	6,742
NFČ	2,640	600	742	643	3,419
VHFČ <sub>B</sub> (r.4 – r.5)	1,737	-505	-711	-634	3,323
VHBČ <sub>B</sub> (r.3 + r.6)	1,243	196	-419	62	1,218
DPBČ	22	83	24	22	248
VHBČ <sub>N</sub> (r.7 – r.8)	1,221	113	-443	40	970
VMČ	20	44	88	118	47
NMČ	0	0	2	0	0
VHMČ <sub>B</sub> (r.10 – r.11)	20	44	86	118	47
DPMČ	0	11	22	22	9
VHMČ <sub>N</sub> (r.12 – r.13)	20	33	64	96	38
VHUO <sub>N</sub> (r.9 + r.14)	1,241	146	-379	136	1,008

disaggregation that reflects balance sheet and income statement forms (as shown in figure 6).

According to recent economists, the main company goal is long-term company progress. Achievement of profit is the precondition for achieving this goal. Profit is the goal and motive for running a business (Kupkovič et al. 1996, 333).

Besides profit as an entrepreneurial goal, businessmen strive to achieve other monetary goals (securing solvency, turnover maximization etc.) and non-monetary ones (e. g. achieving economic power; obtaining independence and self-containment, achieving goodwill and creating trademark). Profit and productivity are decisive factors for strategic and tactical decision-making. Profit maximization is a prevailing criterion for decision making in a company. The level of profit is associated with a certain level of risk. The higher the expected profit (invested capital profitability), the higher the level of risk. The manager must attempt to achieve the highest possible profit, as profit is the main source of company progress and of the owner's property increase. Profit is the difference between company revenues and costs.

TABLE 2 Total Revenues Structure in 2001–2005 (in 1000 SKK)

Revenues type	2001	2002	2003	2004	2005
Sales of self produced goods and services	75,127	56,713	46,686	54,639	65,672
Changes in inventories of finished goods and work in progress	1,679	1,715	1,046	1,181	823
Revenues from long-term inventory and material sale	116	105	2,700	1,259	374
Other revenues from economic activities	1,269	1,481	681	808	882
Total revenues from economic activities	78,191	60,014	51,113	57,887	67,751
Revenues from bonds and shares	0	0	0	0	6,740
Revenues from long-term financial property	4,280	0	0	0	0
Revenue interests	97	95	31	9	2
Total revenues from financial activities	4,377	95	31	9	6,742
Revenues from extraordinary activities	20	44	88	118	47
Total revenues	82,588	60,153	51,232	58,014	74,540

There are two ways to increase profit: through cost saving (i. e. increasing efficiency), and through revenues increase, or through a combination of both. Both variables are global and are influenced by many other factors. A company obtains revenues from its activities. They are reflected in increased assets or decreased liabilities. Company costs represent financial sources effectively spent to obtain revenue. Tables 2 and 3 show the structure of total revenues and costs.

Profit is determined in the Income Statement. It is to be compiled on a monthly basis and presented as accumulated profit as of the year beginning.

Profit is monitored as EBIT that stands for profit before interest and taxes payment.

Table 4 shows income values before interest and taxes.

EBIT has a remarkable information capability, as the tax burden has been changed in the measured period. The legal entities income tax was 29 % in 2001, it dropped to 25 % in 2002 and 2003, and it has been 19 % since 2004. The level of profit after interest and taxes changes according to the tax level. Higher tax decreases profit and vice-versa. Therefore EBIT has a better information capability than profit after interest and taxes. It shows the company results more objectively, because profit after interest and taxes is influenced by the tax rate.

EBIT has been decreasing in the company since 2003, which has been

TABLE 3 Total Costs Structure in 2001–2005 (in 1000 SKK)

Cost type	2001	2002	2003	2004	2005
Material and energy consumption	28,101	28,057	17,860	21,488	26,064
Services	27,962	6,926	9,888	16,599	24,292
Salary costs	15,522	16,583	13,168	12,061	12,802
Social costs	5,735	6,084	4,947	4,419	4,630
Taxes and charges	505	655	968	731	762
Depreciation and amortization expense	647	833	775	669	784
Depreciated price of sold assets and material	145	86	2,999	1,181	101
Allowance	0	0	0	0	371
Other costs of economic activities	68	89	216	43	50
Total costs of economic activities	78,685	59,313	50,821	57,191	69,856
Sold bonds and shares	2,140	0	0	0	2,873
Other financial costs	500	600	742	643	546
Total costs of financial activities	2,640	600	742	643	3,419
Costs of extraordinary activities	0	0	2	0	0
Total costs	81,325	59,913	51,565	57,834	73,275

TABLE 4 EBIT structure in the period of 2001–2005 (in 1000 SKK)

Income type	2001	2002	2003	2004	2005
Income from economic activities*	-494	701	292	696	-2,105
Income from financial activities*	1,737	-505	-711	-634	3,323
Income from extraordinary activities*	20	44	86	118	47
EBIT	1,263	240	-333	180	1,265

\* Before interest and taxes.

caused by company productivity decrease. The company shows a loss in 2003. Since then, EBIT has started to increase step by step and productivity has started to rise. In 2005, EBIT of SKK was only 2000 higher than its amount in 2001. Although the costs (one of the factors influencing profit increase) decreased in 2003, the revenues were reduced as well due to a lower amount of orders. This has negatively influenced the profit level.

Tables 5 and 6 show EBIT changes and the influence of each income type on EBIT in the monitored period.

Percentage of interannual EBIT changes was calculated through horizontal analysis, which calculates the monitored indicators as a ratio of their values in the base year and in the previous year. This method is

TABLE 5 Interannual EBIT changes (in %)

Income (NI) type	2001/2002	2002/2003	2003/2004	2004/2005
EBIT	-81.00	-238.75	154.05	681.67

TABLE 6 Interannual share on EBIT change (in %)

Income type	2001/2002	2002/2003	2003/2004	2004/2005
Income from economic activities*	94.62	-170.42	121.32	-1556.11
Income from financial activities*	-177.51	-85.83	23.12	2198.33
Income from extraordinary activities*	1.90	17.50	9.61	39.44

NOTES \* Before interest and taxes.

used to discover eventual long-term trends in each of the income statement and balance sheet elements, as shown in the EBIT indicator. Until 2003, a decreasing trend is noticeable in the indicator's development, as is an increasing trend as of the next year.

The company situation analysis found that company productivity was decreasing in the period of 2001–2003, whereby the company recorded a loss in 2003 and decreased the owners' property value.

Based on the above diagnostic analysis and synthesis, the action plan for productivity increasing was elaborated:

- output level increase;
- expansion of product range;
- costs decrease;
- focus on profit growth;
- marketing investments.

The forecast for costs increase and company productivity (measured

TABLE 7 Total revenues, costs and EBIT in different output types

Output type	Revenues <sup>1</sup>	Costs <sup>1</sup>	Costs <sup>2</sup>	EBIT <sup>1</sup>	EBIT <sup>2</sup>
Goods A	3,430	3,364	98.08	66	1.92
Goods B	10,070	9,755	96.87	315	3.13
Goods C	900	827	91.89	73	8.11
Goods D	3,700	3,330	90.00	370	10.00
Services XY	1,900	1,843	97.00	57	3.00
Average	4	3,823,800	94.77	176,200	5.23

NOTES <sup>1</sup> In 1000 SKK. <sup>2</sup> Percentage.

TABLE 8 Forecast of costs increase and company productivity measured through income at each type of output level increase

Output type	Output increase <sup>1</sup>	Output increase <sup>2</sup>	Costs increase <sup>3</sup>	Costs increase <sup>2</sup>	EBIT increase <sup>3</sup>	EBIT increase <sup>2</sup>
Goods A	2	10,00	7,310,570	9,98	143,430	11,34
Goods B	1	10,00	7,220,831	9,85	233,169	18,43
Goods C	8	10,00	6,849,398	9,35	604,602	47,79
Goods D	2	10,00	6,708,600	9,16	745,400	58,92
Services XY	4	10,00	7,230,380	9,87	223,620	17,68
Average	3	10,00	7,063,956	9,64	390,044	30,83

NOTES <sup>1</sup> Amount. <sup>2</sup> Percentage. <sup>3</sup> In 1000 SKK.

TABLE 9 Comparison of costs of company employee per hour and outsourcing costs

Costs items	Carpenter	Electrician	Locksmith
Total costs per company employee (SKK/hour)	200	240	200
Total costs per person in outsourcing (SKK/hour)	120	160	120
Costs saving per hour (SKK)	80	80	80
Costs saving per hour (%)	40.00	33.33	40.00

through EBIT) was a 10 % output increase and an expansion of product range (table 8). They were expressed in SKK and in %, and compared to 2005 for each output type separately as well as for the average values.

One solution for cost saving can be to outsource supporting activities to external companies (self-employers), which allows for saving of labor costs. Companies specialized in particular activities can do their jobs with lower costs, which is an important outsourcing advantage. Table 9 shows comparison of costs per hour of company employees and outsourcing costs.

Finding suppliers able to offer materials of expected quality at lower prices will influence cost reduction. However, price decrease must not mean quality decrease. It is important to find the best supplier in terms of quality, price and delivery time.

Cost saving can also be achieved through reduction of acquisition costs. This requires that work be well organized to achieve continuous supplies and correctly timed deliveries without wasted time. If possible, it is important to plan in advance activities connected with selecting suppliers and purchasing materials.

As far as labor costs (payload) are concerned, it is important to keep

the right relationship between labor productivity development and average salaries. The average salary should grow more slowly than the work productivity. By increasing productivity, it is possible to achieve labor cost savings.

Increasing profit by raising outcomes prices is only possible in the short-term period. High profit calculated in prices encourages competitors and causes increased supply. Consequently, the growing supply pushes the prices down. In the long term period, it is more suitable to maximize profit by increasing production, which is determined by the market saturation. Costs and profit work in opposition to each other. Cost savings with the same pricing level cause increased profit and vice-versa.

### **Conclusion**

In a world of globalization and information technologies, a company is influenced by new or modified aspects of its environment. These mainly concern customers (raising their needs, decreasing customers' loyalty, etc.), competitors (increasing pressure from the existing ones, creation of new companies, etc.), and time (shorter supply time, shorter innovation cycles).

Significant criteria for a company to succeed and survive on the market include high quality and low costs, which together with good value for customers, flexibility and speed of order fulfilment create a certain standard.

Diagnostics as a science dealing with analysis of company productivity is a precondition for helping the company to succeed in the competitive environment. It is necessary to point out that enterprise diagnostics is not an economic analysis. Enterprise diagnostics includes all relations and connections of the researched economical event; also its evaluation, comparison with testing criteria, valuations of comparison and setting diagnosis and therapy.

Application of the general diagnostic model of company productivity to the net income has pointed to a frequent problem of company practice. This is the problem of profit showing, which is an inevitable precondition for long-term company development and growth. Diagnostic access to company productivity allows the recognition of specific problems in greater detail, which results from the diagnostic nature of each company activity.

In this stage of research there are no actual examples of company pro-

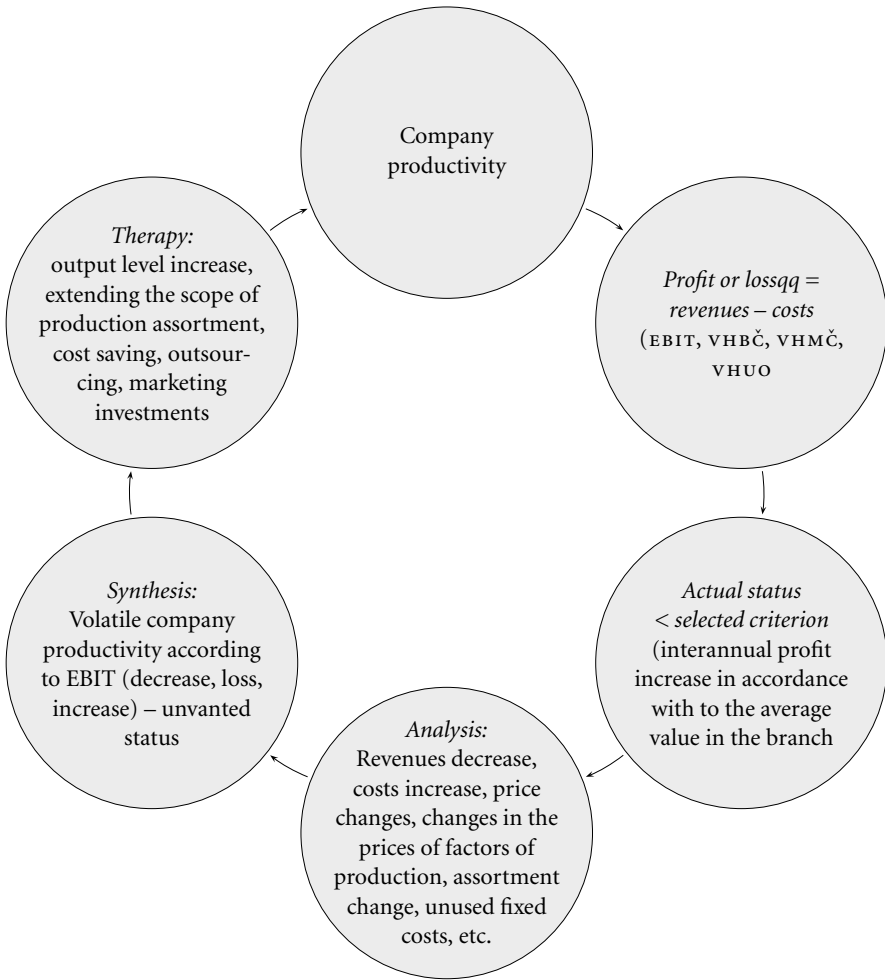


FIGURE 7 Model of company productivity diagnosis

cesses that could be verified with more empirical data assertions, but wider discussions in this area are still continuing, so all views, suggestions or notes are acceptable and shift basic knowledge about enterprise diagnostics on to the qualitatively higher level.

At present the dominant subject dealing with the problematic of enterprise diagnostics is všB-TU in Ostrava, that is building on knowledge from the past and cooperating mainly with Faculty of Operation and Economics of Transport and Communications, University of Žilina and also with Akademia Ekonomiczna in Krakow, and universities in

Bratislava. The authors dealing with this topic also publish the results of research at international conferences, which are organized by Faculty of Operation and Economics of Transport and Communications University of Žilina over a two-year period.

### **Acknowledgments**

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# *Does Dividend Policy Follow the Capital Structure Theory?*

Justyna Franc-Dąbrowska

Decisions concerning the most optimal choice of financing sources and dividend policy are some of the most difficult financial decisions. This article presents the results of research concerning relationships between two capital structure theories (hierarchy theory and substitution theory) and dividend payment policies in Polish stock companies of the agricultural and foodstuff sector (2001–2006). The research hypothesis was verified positively; company management limits dividend payment according to the hierarchy theory and prefers internal sources of financing economic activities. In order to verify the hypothesis, the methods of descriptive analysis, financial analysis and descriptive statistics were applied, together with a fixed effects model.

*Key Words:* dividend policy, hierarchy theory, substitution theory, stock companies, model fixed effects

*JEL Classification:* G32, G35, G38

## **Introduction**

For about 50 years the search for the optimal sources of activity financing and their share in the capital structure occupied the deliberations of the greatest minds in economics and finances. An issue that is strictly connected with the choice of financing sources is dividend policy, which also constitutes a broad research area. The issue of the optimal capital structure (target capital structure), as well as the choice of dividend policy, remains unsolved. Both those areas of research are interconnected and dependent on each other. In addition, the choice of capital structure and dividend policy is dictated by different factors that are difficult to identify and not easy to consider in research. The importance of the issue is underlined by the recognition granted to Modigliani and Miller in the form of the Nobel Prize (the ‘Nobel Prize’ shall be reformulated as Bank of Sweden Prize in Economic Sciences in memory of Alfred Nobel) for their contribution to the development of the science of economics,

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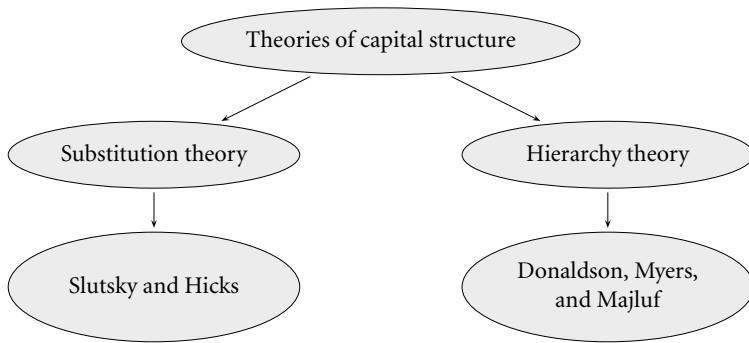


FIGURE 1 Theories of capital structure in the context of dividend policy (based on Hicks and Allen 1934; Donaldson 1961; Myers 1984; Myers and Majluf 1984; Damodaran 1994)

specifically as regards the issues of forming capital structure and, indirectly, dividend policies.

In the theory of economics, and specifically finances, we can observe different attitudes to the issue of shaping the most favorable sources of activity financing, described in the theory of substitution and in the theory of hierarchy (Van Auken 2005). Figure 1 presents two divisions of the theory of capital structure, in whose scope the analysis of dividend policy is conducted.

The substitution (trade-off) theory assumes that entrepreneurs look for such a debt capital to equity capital ratio that will allow them to achieve maximum enterprise value. The risk connected with financing enterprise activities with debt capital is compensated by tax advantages (Theobald 1979; Duliniec 1998) resulting from the decrease of the tax base by interest forming a cost element (this theory assumes the existence of benefits as a result of the tax shield mechanism). This approach is consistent with the Value Based Management concept (Franc-Dąbrowska 2007). Erasmus and Scheepers (2008) discussed the value creation concept not from the capital structure and dividend point of view but highlighting the importance of innovation and entrepreneurship. The substitution theory pays special attention to the occurrence of costs of financial difficulties and the fact that an increase of the debt capital share in the financial structure increases the risk of losing financial liquidity and of bankruptcy (bankruptcy costs include among others administration costs, costs of court proceedings, costs of legal representation related to the staging of liquidation or reorganizing the enterprise, and costs of the

sale of assets in order to save the enterprise from the loss of financial flow). An essential aspect that cannot be omitted in any deliberations concerning the financial situation of enterprises is the necessity of maintaining financial liquidity, the loss of which creates a danger of imminent bankruptcy. From the point of view of choosing the most favorable dividend policy, a crucial point is highlighting the necessity of maintaining financial liquidity (which is essential according to the substitution theory). It cannot be forgotten that any resolution to pay dividends adopted by the management board becomes a binding liability of the company and has to be settled. For this end it is necessary to collect a certain amount of cash (Ross, Westerfield, and Jordan 2006).

Another issue essential from the point of view of dividend policy and considered in the aspect of the substitution theory is the problem of separating the ownership and management functions. This applies to enterprises organized as joint-stock companies and some other entities with a different organizational and legal form. This issue is widely examined by the agency theory; deliberations about the separation of ownership and management were already initiated (but not dwelt upon) by Marshall, who is recognized as the founder of neoclassical economics (Gruszecki 2002). Even though the theory of economics was dominated by the belief that the basic objective of an enterprise is the maximization of profit (although it was rejected by the managerial and behavioral theories, which do not consider it as a paradigm, but as a very important though not the only one objective) (Blaug 2000), Monsens and Downs in the life income maximization theory noticed that managers act in a manner that maximizes their life income and not the profits of the enterprise (Wiszniewski 1994). When ownership and management are separated, the expectations of various groups of interests can be contradictory. The owners may strive after profit from the shares owned (in the form of dividends), while managers may focus on their remunerations. Ultimately, it is accepted that managers should achieve profits on a level that gives the shareholders peace of mind.

The substitution theory therefore consists in replacing equity with debt until a capital structure is obtained that allows achieving maximum enterprise value with the minimum level of the weighted average capital cost. This theory allows one to establish the optimum (it must be remembered that a perfect optimization does not exist, and what is meant here is a quasi-optimum) capital structure, considering the profits and risk of engaging debt capital (Duliniec 1998). Figure 2 presents a graphi-

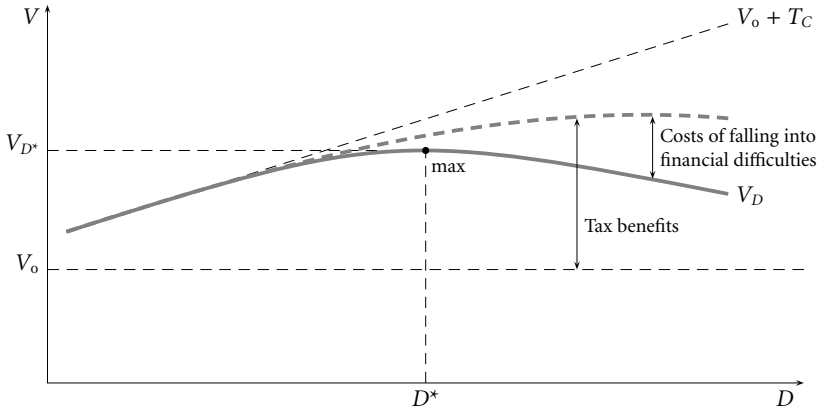


FIGURE 2 Substitution theory in aspect of market value of the enterprise and the value of debt capital (where:  $V_0$  – value of the enterprise without debts,  $T_C$  – income tax,  $D^*$  – level of debt,  $V_{D^*}$  – market value of the enterprise; drawing based on Modigliani and Miller 1958; 1963; Duliniec 1998)

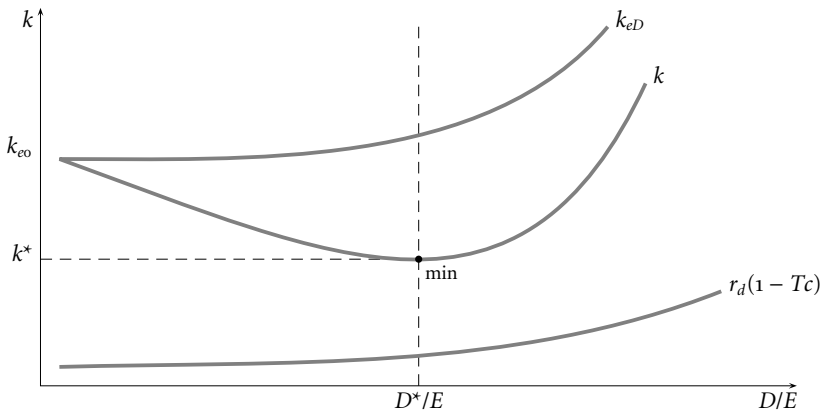


FIGURE 3 Selected indicators characterizing Polish companies of the agricultural and foodstuff industry (average values for the sector) between 2001 and 2006 (where:  $k^*$  – weighted average capital cost,  $k_{eD}$  – cost of equity capital in an indebted enterprise (using the tax shield mechanism),  $r_d$  – effective rate of return on investment,  $D^*/E^*$  – optimal capital structure; drawing based on Modigliani and Miller 1958; 1963; Duliniec 1998)

cal picture of the structure theory expressed by the relationship between the market value of an enterprise and its level of indebtedness, and figure 3 – the relationship between the cost of capital and the debt to equity capital ratio.

Ultimately, the substitution theory indicates several factors that exert

an influence on the decisions concerning the shaping of the optimal capital structure, including:

- the amount of taxable income and income tax rates,
- the level of operational risk,
- the structure of enterprise assets, taking into account their classification as tangible (slower loss of value in case of financial difficulties of the enterprise) and intangible (faster loss of value when the enterprise's financial situation becomes worse) (Duliniec 1998).

The hierarchy theory (pecking order theory) assumes that entrepreneurs define priority sources of capital and not the optimal relationship between liabilities and equity capital. In this theory, the following assumptions are taken:

- entrepreneurs prefer to finance their activities with internal sources, such as: net profit less dividends, depreciation allowances and revenue from sale of short-term securities and others redundant assets,
- in cases when it is necessary to finance activities with debt capital, debt securities are issued first, followed by new shares (Duliniec 1998; Quan 2002; Mazur 2007).

In the hierarchy theory, entrepreneurs look for the cheapest sources of activity financing in order to minimize risk and limit the costs of equity issue or payment of interest on credits and loans. If it is necessary to use the debt capital, debt securities are issued first (McManus, Gwilym, and Thomas 2006; Duliniec 2007). This is why there is a competition between decisions on reinvestment of achieved profit and payment of dividends.

Although business practice seems to indicate an advantage of the hierarchy theory (Brealey, Myers, and Marcus 1995; Franc-Dąbrowska 2008), it has not been explicitly declared as a leading theory. There is no doubt that the substitution theory is in contradiction with the hierarchy theory. The hierarchy theory assumes that companies which achieve high profits reinvest them and are not disposed to pay dividends and incur debts, while the substitution theory assumes the opposite: that it is the companies in a good financial condition and achieving high profits which are disposed to increase their level of debt (Duliniec 1998).

While the substitution theory emphasized costs of bankruptcy and financial difficulties, the hierarchy theory focused on the problem of asymmetry of information between managers and the external investors, because the enterprise management does in fact have more information about its financial situation than do shareholders and creditors.

This asymmetry of information (Jensen and Meckling 1976), essential in the theory of hierarchy, causes managers to make decisions about issuing shares only when the traded stock is overvalued (its high value is not justified by the situation of the enterprise and its investment needs). A drop in stock prices is also caused by an unexpected, sudden reduction of dividend payments, which is interpreted by investors (who do not know the reasons for such a decision) as a worsening of the financial situation of the enterprise and a decrease of their profit. Conversely, when dividend payments are increased, the price of stock goes up even when this is not justified by the enterprise's current situation and growth potential. Consequently, according to the hierarchy theory the managers:

- prefer internal sources of capital injection by leaving achieved profits within the enterprise,
- try to limit the changes of an established dividend policy,
- when achieved profits are greater than investment needs, liabilities are paid off first, and the remaining surpluses invested in liquid, short-term securities,
- when achieved profits are not sufficient for investment needs, entrepreneurs get rid of accumulated short-term securities, and if the capital is still not sufficient, they issue debt securities, and finally new shares (Duliniec 1998; Pike and Neale 2006).

Dividend policy is directly connected with the theories of capital structure. If an enterprise pays dividends, it decreases the degree of financing of equity capital from internal sources, and as a consequence may require external financing sources. The theory of Modigliani and Miller indicating the neutrality of dividend policy for the value of the company was hedged around with assumptions that are far from reality (Modigliani and Miller 1961; 1963). According to the pro-dividend school, investors prefer to receive income from capital invested in shares in the form of a dividend. In their opinion, dividends are a more certain source of income than capital profits from the sale of securities (Sierpińska 1999). The anti-dividend school on the other hand assumes that paying dividends causes a drop in the price of stock. In the opinion of Litzenberger and Ramaswamy, paying dividends is connected with the necessity of spending cash, which periodically leads to its shortage in companies following a dividend payments policy (Litzenberger and Ramaswamy 1979). Moreover it has been found that increasing the share of dividends in the net profit exerts a negative influence on the price of stock (Poterba and Summers 1984). In this situation, companies should

limit dividend payments and allocate achieved profit to equity capital, i. e. act in accordance with the assumptions of the hierarchy theory.

### **Purpose, Scope, and Methodology of Studies**

The article aims to study the correlation between dividend payout and financing of economic activity with company equity in Polish publicly traded companies operating in the food sector.

The following study hypothesis will be provided for verification: Polish capital companies operating within the food sector have been limiting dividend payouts, prioritizing financing of own activity with equity and reinvesting their obtained profits.

In order to verify the research hypothesis, the methods of descriptive analysis, financial analysis and descriptive statistics were applied. The study examined correlation relationships between the capital structure and amount of dividend paid, as well as the financial results of studied companies and their investment expenditures. The fixed effects type of model was applied, which takes into consideration the influence of all factors (unchanging in time) typical for each entity ( $y_{it} = x_{it}\beta + u_i + \varepsilon_{it}$ ) (Kufel 2007).

The research sample consisted of 15 (panel 90) joint stock companies of the agricultural and foodstuff industry, listed on the Warsaw Stock Exchange between 2001 and 2006. Information about the financial situation of companies was taken from financial statements published in the Monitor B journal and resolutions on the division of profits ('Resolutions on profit division' is a document created at the General Meeting of Shareholders, which provides information on the planned usage of the obtained net profit for the concluded financial year).

### **Description of the Examined Population**

Table 1 presents figures characterizing Polish companies of the agricultural and foodstuff industry listed on the Warsaw Stock Exchange. Conducted analyses demonstrated that the companies were growing, a fact measured by the value of total assets. In the period of 6 years the average value of assets increased by about 34%, from 88 thousand Euro to 117 thousand Euro. At the same time, the level of self-financing of activities ranged around 50%. The smallest share of equity capital in the capital structure was observed in 2004 (46%), and the largest in 2003 (53%). Small fluctuations in this respect indicate a stabilization as regards decisions concerning the structure of activity financing. From the point of

TABLE 1 Selected indicators characterizing Polish companies of the agricultural and foodstuff industry (average values for the sector)

Detailed list	2001	2002	2003	2004	2005	2006
Value of total assets (in 1000 of Euro)	87,545	90,067	90,998	112,899	99,442	116,673
Share of equity capital in fin. sources (%)	47.8	49.7	52.8	46.3	49.4	46.4
Total rate of return on assets (ROA, %)	-0.28	2.17	3.62	5.00	8.86	9.22
Return on equity (ROE, %)	-3.3	6.8	12.2	17.8	17.9	19.88
Return on sales (ROS, %)	0.14	3.45	4.08	4.11	6.44	6.96

NOTES Calculated on the basis of financial statements.

view of the capital structure, the level of debt fluctuated around the maximum (in Polish conditions, an accepted average level of debt is 50%, or 30% assuming the more rigorous approach of some banks (Ostaszewski 1992; Sierpińska and Jachna 2004).

In growing, the joint-stock agricultural business companies achieved increasingly better financial results. In the period under study there occurred a significant increase in the rate of return on total assets – from 0.28% (representing ineffective management) to 5.00% – and additionally the increasing tendency was of a stable and constant character. Equally evident was an increase in the return on equity (in spite of the increase of debt and costs of interest). In 2001 the companies achieved an average loss of 0.03 EUR on each invested 1 EUR of equity capital, while in 2006 they had already gained almost 0.2 EUR of profit on the same amount. Similar to total assets and equity capitals, an upwards tendency was observed in the sales profitability index that increased by about 4 percentage points. To sum it up, in the period under study Polish stock companies of the agricultural and foodstuff industry improved their financial situation and were growing, increasing the value of assets.

Table 2 presents company statistics, taking into account the number of companies that pay and do not pay dividends. Figures show that each year at least 1/5 of the studied entities made a decision to pay cash from profits. The greatest number of companies (1/3) made a resolution about dividend payments in 2003. Additionally, out of the companies that did not make a decision about dividend payments in 2001, 40% registered a loss. In the following years, the share of companies registering losses was lower and amounted to 13% in 2002 and 2005, 20% in the period from 2003 to 2004, and 0% in the 2006.

From the point of view of staged analyses, the amount of paid divi-



TABLE 2 Data characterizing joint-stock companies of the agricultural and foodstuff industry as regards payments of dividend

Detailed list	2001	2002	2003	2004	2005	2006
Number of studied companies	15	15	15	15	15	14
Share of companies paying dividend (%)	27	20	33	27	27	14
Share of companies not paying div. (%)	73	80	67	73	73	86
Share of companies registering loss in re-search sample (%)	40	13	20	20	13	0

NOTES Calculated on the basis of financial statements.

TABLE 3 Data characterizing correlation coefficients between the amount of paid dividends, and selected financial measures and the indicator of capital structure (correlation coefficients for  $p < 0.5$ )

Detailed list	2001	2002	2003	2004	2005	2006
Amount of paid dividends and the value of equity capital	0.87	-0.93	0.99	0.99	1.00	—
Amount of paid dividends and the share of equity capital in financing sources	-0.08	0.61	0.15	0.59	0.37	—
Amount of paid dividends and the value of cash at the end of year	-0.23	-1.00	-0.28	-0.19	-0.37	—

NOTES Calculated on the basis of financial statements.

ends exerts an essential influence on the financial situation of the enterprises. For that reason table 3 presents the results of calculations of the strength of relationship between the amount of paid dividends on one hand, and selected financial measurements and the indicator of capital structure on the other. From the point of view of decisions concerning the shaping of capital structure (decisions about injecting equity capital with profits or increasing debts), the influence of a decision to pay dividends on the value of equity capital remains the basic issue. A strong logical relationship between these two figures is confirmed by the values of correlation coefficients indicating an interrelationship that is statistically important. It proves the existence of a direct relationship between the decisions on increasing the value of equity capital and decisions concerning the applied dividend policy, but in a value-based, not structural, perspective. The relationship is therefore close to the assumptions of the hierarchy theory (one of the companies, Żywiec SA – owner of the largest equity of all studied companies – did not provide a dividend payout in 2002, but did so in subsequent years). Thus, the high value of equity and

the lack of dividend payout have dominated the correlation factor for the entirety of the studied group of entities. This phenomenon can also be explained substantively, in addition to the technical explanation provided above. The high absolute value of a given indicator is not always reflected in relative measurements (for example, equity of large value does not always signify a large share of equity in financing sources).

Extremely interesting results have been obtained while analyzing the strength of relationship between the amount of paid dividends and the share of equity capital in activity financing. Staged analyses demonstrate that the relationship is not as strong and unequivocal as was the case for the value of equity capital. Moreover, in 2001 and in 2003 such a relationship was statistically unimportant. This proves that decisions to pay dividends do not have a direct relation to the capital structure, although they do exert a strong influence on the value of equity capital. It seems therefore that there is no express relationship between the substitution theory and the dividend policy.

Considering that decisions concerning dividend payments influence the amount of cash on hand – and in periods of increased spending it is often necessary to supplement cash with debt capital – the statistical relationship between the amount of paid dividends and the value of cash at the end of the year was examined. Calculations show that a statistically important strong relationship between the studied figures was observed only in 2002. In other periods correlation coefficients appeared to be statistically not essential. Interestingly, in 2002 only 20% of companies passed a resolution to pay dividends, and a strong correlation indicates a competition between cash payments from profit and the level of cash (which is obvious, however in that year the companies had difficulties implementing the decision to pay dividends in a liquid manner).

Among competitive decisions concerning finances, apart from the issue of shaping capital structure and implementing the dividend payment policy, there remains another area that exerts an influence on the two first groups of decisions: decisions of an investment character. In order to study the strength of relationships between these competitive financial issues, correlation coefficients between the amount of paid dividends and the value of investment expenditures were calculated. Staged analyses demonstrated that a strong, statistically essential relationship occurred in 2002. In other years the influence of decisions to pay dividends on investment decisions was not observed. In order to deepen the analysis concerning the shaping of capital structure and implementing

TABLE 4 Data characterizing correlation coefficients between the value of financial result, capital structure, and value of investment (correlation coefficients for  $p < 0.5$ )

Detailed list	2001	2002	2003	2004	2005	2006
Amount of paid dividends and the value of investment expenditures	0.21	0.94	-0.40	-0.19	0.01	—
Financial result and the value of investment expenditures	-0.91	0.05	0.07	0.26	0.53	—
The value of investment expenditures and the value of debt	0.90	0.00	-0.10	0.30	0.51	—

NOTES Calculated on the basis of financial statements.

investments, correlation coefficients between the amount of net financial result and the value of investment expenditures were estimated. A strong, statistically essential relationship occurred in 2001, when significant investments were implemented in the studied group of companies (explaining why a 'competition' between paid dividends and investment expenditures occurred in 2002). In the following years (2002–2004) investment expenditures were not dependent on the amount of achieved profit.

The observations are confirmed by ratios between the value of investment expenditures and the value of debt. Similar to the value of financial result, a statistically important relationship of debt level to investment decisions, with strong correlation, was observed in 2001, while in the following years it was statistically not essential, which demonstrates a smaller intensity of investments in the studied companies.

As demonstrated by the studies, the management of Polish stock companies of the agricultural and foodstuff industry gave priority to internal sources of financing, acting in accordance with hierarchy theory, and to a smaller degree focused on the choice of the optimum structure of activity financing.

In order to identify the influence of capital structure on dividend policy, studies were conducted on the basis of panel data. A fixed effects model was applied, taking into consideration the influence of all factors (unchanging in time) typical for each entity. In the studies, the amount of paid dividends was accepted as a dependent variable. Independent variables consisted of financial data derived from financial statements of companies after eliminating financial variables on the basis of colinearity and correlation coefficients (VIF). Calculation results are presented

TABLE 5 Estimated results of the panel analysis

	Factor	Std. error	<i>t</i> -student	<i>p</i> -value
Const.	-6015.16	2820.47	-2.1327	0.03673**
Long-term investments	0.127514	0.0237261	5.3744	<0.00001***
Provisions for liabilities	-0.281638	0.132126	-2.1316	0.03683**
Long-term liabilities	0.254003	0.0868887	2.9233	0.00476***
Management costs <sup>1</sup>	0.102893	0.0931122	1.1050	0.27321
Net financial result	0.457222	0.0466601	9.7990	<0.00001***
<i>dt</i> _2	-5151.43	3364.6	-1.5311	0.13061
<i>dt</i> _3	-4957.5	2899.99	-1.7095	0.09213*
<i>dt</i> _4	-5302.27	3141.4	-1.6879	0.09623*
<i>dt</i> _5	-6457.16	4064.56	-1.5886	0.11699
<i>dt</i> _6	-6288.57	6162.96	-1.0204	0.31133

NOTES Model – estimation established effects with the use of 90 observations; Time series of length = 6; Dependent variable: amount of dividend payment; Resistant standard errors (robust HAC).  $R^2 = 0.96694$ , adjusted  $R^2 = 0.95473$ ,  $F(24, 65) = 79.2061$  ( $p < 0.00001$ ). <sup>1</sup> In the following estimations the management costs achieved the status of a variable that is statistically important for the model – in the final estimation they did not demonstrate such a relationship. \* Significant at the 10 percent level. \*\* Significant at the 5 percent level. \*\*\* Significant at the 1 percent level. Calculated on the basis of financial statements.

in table 5. Factors explaining the dividend payout phenomenon in Polish publicly traded companies of the food sector have been divided into stimulants and destimulants. The creation of reserves for any obligations is a factor that negatively impacts the dividend payout phenomenon, as it reduces the level of profits available for division. The remaining descriptive variables constitute positive influences on the level of dividend: the larger the value of long-term investments, the bigger the dividend level. This occurrence can be explained by the fact that the companies that most often decide to provide dividend payout are either in good financial condition or in their stage of maturity. Thus, they have enough assets for long-term investment and dividend payout (the same results were achieved by the author during her studies of agricultural enterprises in the form of limited liability companies). Long-term obligations are also a factor that increases with the amount of dividend. This phenomenon can be explained in two ways. On one hand, the payout of a dividend results in a limited amount of assets for reinvestment, and the companies are forced to make use of external financing sources (Polish food sector

companies rarely decide to issue more stock). On the other hand, companies that provide dividend payout and have temporary problems with their financial fluidity must utilize external financing measures to finance dividend payout. These situations may occur separately and jointly. The financial result is the biggest stimulating factor. Model research shows that the dividend level is directly proportional to the value of the financial result. Thus, the level of dividend payout in the studied companies is most influenced by the level of obtained profit (the studied companies did not exhibit the behaviour of paying out dividends if a loss was reported at the end of the year).

Attention may be drawn to a good matching of the model and its positive verification using the Fischer-Snedecor test (Baltagi 2003). For the constructed model, the following statistic was achieved:  $F(24, 65) = 79.2061$  ( $p < 0.00001$ ) for  $F_{0.05}(24, 65) = 1.6860$ . Thus,  $79.2061 > 1.6860$ , so the model is a statistically significant description of a dividend payout in the studied enterprises. In addition,  $R^2 = 0.96694$  and corrected  $R^2 = 0.95473$  demonstrate that the constructed model provides a very meaningful explanation of the dividend payout effect in the studied enterprises. Estimation results indicate an interrelationship between the decisions to pay dividends and the shaping of capital structure.

On the basis of Doornik-Hansen statistic test (Kufel 2007) performed,  $\chi^2(2) = 8,456$  with the  $p$ -value  $< 0,01458$ , it must be acknowledged that the cumulative distribution function has a normal distribution. It constitutes therefore additional argument for validity of the model.

### **Research findings**

Decisions concerning the optimal choice of financing sources (capital structure) belong to the most difficult financial decisions. Equally difficult are decisions concerning the choice of the dividend policy that is optimal for the current financial situation. Recognition of relationships between the theories of capital structure and dividend policy may support financial decision processes and allow for choosing such decisions that will influence the financial situation of the enterprise in the most beneficial manner.

### **Conclusions and Implications**

On the basis of staged analyses the following conclusions were formulated:

1. Most Polish joint stock companies of the agricultural and foodstuff industry did make a decision on not paying dividends, preferring to set aside the achieved profit for injecting equity capital.
2. Study results indicate a strong statistical relationship between the amount of paid dividends and the value of equity capital, however they do not confirm such a relationship between the amount of paid dividends and the share of equity capital in sources of activity financing. This confirms the assumption of an interrelationship between theories of capital structure and dividend policies, indicating at the same time the dominance of the hierarchy theory and the smaller practical importance of the substitution theory (from the point of view of decisions to pay dividends).
3. Similar conclusions were formulated on the basis of analyzing the relationship between the amount of paid dividends and investments, and between investments and the levels of financial result and indebtedness, indicating a statistically strong relationship only in periods of significant investment expenditures (it should be assumed that a statistically important relationship will occur periodically when the investments are made, which however cannot be verified because the research period is too short).
4. The results of the analyzed studies undertaken on panel data using a fixed effects model confirmed a relationship between the amount of paid dividends and capital structure (by including the level of long-term investment and provisions for liabilities in the model).

To sum it up, it has been found that Polish companies of the agricultural and foodstuff industry listed on the Warsaw Stock Exchange made decisions concerning dividend policy, in the context of choosing the sources of financing, on the basis of relationships typical for the hierarchy theory. The management of companies preferred internal sources of activity financing, at the same time limiting the payment of dividends.

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# *Association of Management Tools with the Financial Performance of Companies: The Example of the Slovenian Construction Sector*

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The research problem dealt with in this article addresses the association of management tools with the financial performance of companies in the Slovenian construction sector. The aim of the quantitative empirical survey is to collect data on five of the most relevant accounting scores and indicators in the construction sector for the studied period 2001–2005, and to analyse their correlation with the management tools of Slovenian construction companies. The analysis of the relationship between quantitative indicators and scores with the dimensions of the factors in choosing management tools proved no strong correlation. The results of the analysis show that the dimensions of undesirable consequences of transformation and the financial performance of the companies are essentially unrelated. A comparative study of the arithmetic mean of the indicators and scores with the disadvantages in introducing the management tools, however, indicated that there is a certain relationship between them.

*Key Words:* indicators, scores, financial performance, construction industry, Slovenia

*JEL Classification:* L20, M20

## **Introduction**

With the transition from the self-management to the market economy, companies in Slovenia have been exposed to the rules of the market. This is why, in order to be successful in the long run, companies have to take into account the situation on the market, adapt to it and incorporate in their development strategies elements of efficient management, which are frequently unpleasant for the employees. The companies which have

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been adapting to this situation at too a slow pace found themselves in trouble or simply ceased to exist. Ownership transformation of the companies, strategic capital concentration with the aim of preserving healthy business cores and improved cooperation, as well as takeovers and mergers of the companies can also be observed. Considering that Slovenian companies are likely to put special emphasis on the implementation of strategic mergers and growth strategies, such as development of the market, diversification of products and markets and conglomerate diversification (Buble et al. 2003), it is also expected from construction companies to look for their strategies within this framework.

Regardless of all the difficulties and problems the construction sector was facing in the last decade, construction companies were more or less in line with other Slovene companies, which achieved 50% growth in business performance (companies undergoing bankruptcy were not included) while, simultaneously, the number of the employees decreased by 20% (Uršič and Mulej 2005). In the last ten years, efficient and competitive have companies continued to replace those which were less efficient (Bojnec and Xavier 2004), leaving the impression that relatively steady conjuncture cycles tend to appear every three to four years (Jagrič 2003).

However, the still ongoing problems, which are more or less known, should be pointed out: a surge in the prices of reinforcing bars and non-ferrous metals on the world market, which have to paid primarily by constructors, the increasing oil prices, fierce competition among construction companies, because of which some of them accept contracts under the limit of profitability, as well as liquidity issues and shortage of workers.

The introduction of the article describes the situation on the market to which Slovenian companies have to adapt. The inclusion of the elements of efficient operation in development strategies of companies has also been emphasised. This is followed by theoretical starting points with an emphasis on the main findings of previous relevant surveys from the area of company transformation management and identification of the key weaknesses of the construction sector. The third chapter defines the purpose and key goals of the survey. Methodological tools, the sampling frame, limits of the survey and the realised sample are defined in the fourth chapter. The fifth chapter presents the results of a quantitative survey. The sixth chapter contains an analysis of the influences of management tools on companies' financial performance.

The conclusion of the article contains a substantial interpretation of the findings.

### **Theoretical Bases**

The transformation of a company can ensue from spontaneous, intuitive managerial actions, which is possible in simple and transparent companies with stable external environments (Češnovar 2003). In companies with more complex external and internal environments, an intentional, planned and formalized process of transformation is more appropriate, based on established rules for the transformation of processes, structures and systems, and which can also be considered as a method or 'approach to transformation' (Strebel 1992; Champy 1996; Nohria and Berkley 1996; Rigby 2001b; Mintzberg 1996; Mintzberg, Ahlstrand and Lampel 1998; Grint 1997; Drucker 1995). Globally, the scientific literature lists up to 65 different approaches to transformation (Rigby 2001a). There is substantial pressure put on generating new approaches, since Grint (1997) states that at least one new approach to transformation has emerged every year in the last forty years. Regrettably, there are not many methodologically substantiated scientific research cases in a position to give advice to senior management on choosing the right method, what kinds of positive and negative effects a particular method introduces, which methods complement each other and which oppose one another, what the necessary initial knowledge is, and last but not least, what the appropriateness of that individual method is in relation to the existing culture and the coalitions of interest in the internal and external environment of a company (Češnovar 2003; Rosenzweig 2007).

In 1988, the construction industry, as a whole, operated profitably for the first time in a long period – thanks in great part to the flourishing motorway programme. However, we can still talk about the business environments that are not open enough, about the lack of financing mechanisms for smaller companies as well as the lack of financial discipline which typically affects smaller companies and subcontractors in particular. Aside from heavy competition, enormous increases in the prices of wire rod, non-ferrous metals and oil, other key restrictive factors in the construction industry are a chronic deficit in workforce and high material and labour costs (taxes, contributions, etc.). However, the latter should decrease with the introduction of new economic reforms. The following weaknesses have been identified in the development strategy of the Slovenian construction sector:

- Insufficient productivity and insufficient gross added value generated, which are the consequences of inefficiently reducing the cost of current operations;
- Poor structure regarding the qualification of employees, which is reflected by the low level of education, further reflected in the insufficiency of personnel in different professional areas (construction technicians) and at the management level (developers, technologists, marketing professionals);
- Insufficient understanding of foreign markets and achieving competitive price brackets due to the low level of usage of external knowledge (research and development, education, counselling, etc.);
- Improper assurance of quality concerning the starting materials (questionable use of total quality management) and the expensive purchase of starting components.

All of the above-stated shortcomings show that the Slovenian construction industry is in critical need of transformation and adaptation to the new requirements of the business environment which is increasingly open to global competition. Long-term positive business operations may only be successfully solved and ensured in 25% of cases, after crisis in a company has already started (Slatter 1984).

The research problem discussed in the article examines the relationship between management tools (mostly the methods of transformation of companies, the factors involved in their process of selection, shortcomings in their introduction and in particular the undesired consequences of transformation) of Slovenian construction companies and the most relevant accounting scores and indicators of financial performance of those companies. Examined methods of transformation of the companies are the following:

1. Shortening of Flow Times
2. Strategic Planning
3. Total Quality Management
4. Creating a Vision and Mission
5. Outsourcing
6. Benchmarking
7. Vertical Integration
8. Creating Crucial Competitive Advantages

9. Measuring the Level of Customer Satisfaction
10. Growth Strategy
11. Business Process Reengineering
12. Cost Optimisation by Business Process Activities of (ABC method)
13. Customer Relationship Management
14. Knowledge Management
15. Strategic Alliance
16. Balance Scorecard

Choice factors are considered to be the factors created by the external and internal company environments which could have impact on choosing the management tools. In creating the factors, we considered the characteristics of the internal environment (structure, processes, systems, culture, the source of the company, etc.), the characteristics of the external environment transformation, the concepts of the company's response to environment transformation, and models for analysing the situation in the companies in relation to the external environment.

In relation to the disadvantages and barriers that can occur while introducing the management tools to companies, the notion of substantial disadvantages is not referred to as a negative connotation, but as deviations from theoretical norms and guidelines. The panel of possible negative consequences that can occur after introduction of the company's management tools is also an integral part of the research.

### **The Purpose and the Aim of the Survey**

The aim of the quantitative empirical survey is to collect data on the five most relevant accounting scores<sup>1</sup> and indicators<sup>2</sup> in the construction sector, and to analyse their relationship with the management tools of Slovenian construction companies. The average value of the individually chosen scores and indicators will be calculated for the period 2001–2005.

The main aim of the survey is to verify the hypotheses and to determine:

1. The differences between the arithmetic means of the five accounting indicators and indicators of participating and non-participating construction companies in the survey.
2. The existence and the strength of influences caused by the size of companies, in accordance with Article 55 of the Companies Act

(ZGD-1), on their financial performance, expressed with five accounting indicators.

3. The existence of influence and strength of connection (correlation) of the five accounting indicators with Management tools (methods, factors, deficiencies and unwanted consequences of the transformation).

### **Definition of the Research Method**

In designing and implementing this empirical research, we used an appropriate combination of research methods, namely:

- Descriptive Statistics for ranking the findings according to the set criteria;
- Contingency tables with the Chi-squared test, which is used to establish whether two categorical variables are related to each other or not;
- Student's *t*-test for testing statistical differences between average values of scores and indicators of the financial performance of the cooperating and non-cooperating companies in the research to test the representative value of the acquired sample;
- Principal Component Analysis to search new latent (immeasurable) dimensions which are common to a larger number of variables;
- Variant Analysis, Correlations and Multiple Regression Analysis.

In the context of data collection, the empirical survey can be divided in to two parts. The *first* part, which is not subject to detailed discussion in the article, relates to the survey questionnaire intended for the collection of data on the impact of the factors in choosing management tools on the performance of the transformation of companies in the Slovenian construction industry. Using a questionnaire that comprised four sets of closed-ended questions, we established the intensity of usage of sixteen methods of management tools, measured the frequency of usage of thirty factors that influence the choice of individual management tools, and detected the occurrence of twenty-one disadvantages of introducing the methods, as well as nine undesired consequences of transformation in the company.

In the context of clarity and comprehensibility of the questions asked and to avoid potential duplication, we pilot-tested the survey questionnaire before starting the research, using a control group consisting of six senior managers that were included in the research.

The *second* part of the survey, which represents the main focus of this article, refers to data collection on the financial performance of the companies for which data on the methods of choosing and introducing the sixteen methods of management tools by the companies were collected in the *first* part of the survey. After the initial consultation with the financial experts in the field of construction business, we chose the five most relevant accounting scores and indicators for all of the examined population units in the period (2001–2005) from the IBON (2006; data on business operation of Slovenian companies and private entrepreneurs and insight into business credit rating between 1994 and 2005) and from the AJPEŠ (2006; Agency of the Republic of Slovenia for Public Legal Records and Related Services), namely:

1. *Equity* as a category of result.
2. *Return on equity* is an indicator which reflects the ratio between net profit and equity. It gives the company the information on how many cash units of net profit it created per one cash unit of equity. This is one of the most summary indications of company performance and is also comparable between sectors. It is particularly important from the owners' point of view. It explains how a successful management staff manages the assets of the owners.
3. The *financial (in)dependence indicator (ownership of financing)* reflects the ratio between the equity and the assets of a company. The higher the ratio, the greater the borrowing opportunities a company has, but only if it is able to cover the interest from the profit and loss. Financing through borrowing affects the financial risk and profitability of an undertaking.
4. The horizontal financial structure indicator *borrowing* indicates the level of indebtedness, i. e. the portion of a company's equity financed by the companies' long-term and short term liabilities and not by their own resources.
5. The *added value per employee* indicator measures the created value over a certain period. This means that the return (on production and/or services performed) is diminished by the inputs of other business systems (materials, goods, etc.). It is the gross added value, a gross return (a sum of income and change in inventories of finished products), diminished by the costs of material, goods and services as well as other costs (but not depreciation).

While processing the survey results we considered the values of scores and indicators from the period 2001–2005. The choice of the period is substantiated by the fact that certain companies featured in the sample did not have data in the *IBON* before 2001. The 2001–2005 period is also appropriate because, in that time period, the same accounting standards were in force (before that period, there were no unified standards).

#### SAMPLING FRAME

On 1 January 2005 (Ramovš, Žemva and Gržinič 2006), in the registry of the Chamber of Commerce and Industry of Slovenia (2006), according to the criterion ‘number of employees’ there were 85 companies<sup>3</sup> with more than 50 employees according to the Standard Classification of Activities (SCA) from sectors 45.210 – General construction work and 45.230 – Construction of roads, railways, airports and sports utilities.

Five of these companies were ‘undergoing bankruptcy’ and were eliminated from the survey. This means that the survey included 80 companies, which at the same time represents the extent of the examined population. Based on the average number of workers, net income on sales and the extent of assets at the end of the business year, the criterion in Article 55 of the Companies Act (ZGD-1) classifies the commercial companies into micro, small, medium-sized and large enterprises. Taking into consideration the criteria of Article 55 ZGD-1, the examined population in the research comprises 18 small (22.5%), 32 medium-sized (40.0%) and 30 large enterprises (37.5%).

#### LIMITATIONS OF THE SURVEY

For the purposes of research work we chose companies with more than 50 employees, which assures equal presence of commercial companies according to the criterion of Article 55 of the ZGD-1. For the purpose of commenting on the results of the empirical survey, it should be noted that the survey was implemented in a branch that was in a crisis during the examined period (Ramovš, Žemva and Gržinič 2006) and is classified among the least profitable industries in the Slovenian economy in general.

Due to the limitations of the survey regarding the examination of financial performance of the companies, the five-year period (2001–2005) and the Slovenian construction industry, the results cannot be interpreted as a general rule of financial performance.



## REALISED SAMPLE

In the process of questioning, it turned out that one small company was winded up (2005) and one small company went bankrupt, which led to two units that could not be used in the survey. Four companies declined taking part in the survey. As a result, 78 companies took part in the quantitative survey. We received 74 valid answers, i. e. we achieved a 94.87% response rate. While examining the structure of the realised sample according to the size of the construction companies, it can be observed that 15 small companies (83.33% response rate), 30 medium-sized companies (93.75% response rate) and 29 large companies (96.66% response rate) took part in the survey, which means that the highest response rate was achieved among large companies.

## REPRESENTATIVE VALUE OF THE SAMPLE

The population was divided into two groups (companies taking part in the survey and those not taking part), and arithmetic means of the scores and indicators of both groups were calculated for the period 2001–2005 (table 1).

Certain differences were discovered between both groups of companies; namely, the non-collaborating companies were better in four out of five indicators (*net profit in the business year*, *return on equity*, *financial (in)dependence* and *borrowing rate*), while the collaborating companies were only better in the *added value per employee* indicator. The only substantial deviance is the *return on equity* indicator, representing one of the most summary indications of company performance. The non-collaborating companies are obviously companies where the management staff manages the owners' equity more successfully.

We can only guess that the reason why these companies were not will-

TABLE 1 Arithmetic means of scores and indicators of the collaborating and non-collaborating companies

Scores and indicators	Collaborating	Non-collaborating
Net profit in the business year*	33,148.34	82,268.5
Return on Equity**	0.05950	0.32575
Financial (in)dependence**	0.29770	0.31500
Borrowing rate coefficient	0.95280	0.83000
Added value per employee*	4,785.61	4,449.25

NOTES \* Amounts are in SIT 1,000. \*\* Values are in percentages. Source: iBON 2006.

ing to participate in the survey is the fear of revealing those characteristics of the company that represent the source of their competitive advantage. However, since their total share of gross income in comparison to the total population is negligible, the influence of the deviation in this indicator can be neglected. On average, the non-collaborating companies have fewer employees (125) than the collaborating ones (233). Due to the small number of non-collaborating companies (only 4), there is no need to confirm the statistically definitive differences – using the Student's *t*-test is not reasonable. Notwithstanding the fact that there are certain differences between the companies, it can be confirmed that the sample is a *representative* one because the deviations are insignificant.

### **Presentation of the Survey Results**

#### THE MANAGEMENT TOOLS

In the period 1995–2005, the examined Slovenian construction companies used on average somewhat less than 9 different management tools, which represents over a half (54.90%) of all 16 methods examined in the survey. The results do not differ significantly according to the size of the company, since both large and small companies used 9 methods on average, while the medium-sized ones used somewhat more than 8 of them. The most frequently used method of transformation was Formalized Strategic Planning, used by 77.00% of all companies in the survey.

#### FACTORS FOR CHOOSING MANAGEMENT TOOLS

The interviewees used a five-grade Likert scale for deciding from 1 (completely insignificant) to 5 (very important) to evaluate the significance of thirty factors that affect the choice of the methods of management tools of construction companies. The factors were designed on the basis of the interpretation of data, collected using preliminarily implemented interviews, and a control group of six senior managers. Due to the insufficient number of units in the sample, using the *Principal Component Analysis* statistical method was not feasible for the set of all thirty factors in choosing the management tools; hence, we divided them into two groups according to the subject matter key. Following this, we implemented the principal component analysis separately for each one in the two groups.

The first group produced six dimensions, and the second group produced three dimensions, meaning that we created a total of nine *dimensions* of choosing factors for management tools (table 2). The values of

TABLE 2 Average values of the dimensions of factors in choosing management tools

Dimension of factors for choosing management tools in construction companies	(1)	(2)	(3)
Employees	3.2760	3.4270	3.3730
Indirect economic interests	2.9655	3.1583	2.9667
Conformity with the company's strategic orientation	3.7356	3.4778	3.3778
Direct economic interests	4.0345	3.9000	3.5333
Social-economic and political interests	2.5517	2.3000	2.1000
Tendency towards planned turnover	3.6207	3.6500	3.5667
Senior management	3.6138	3.5333	3.2133
Popularity of management tools	2.6667	2.8222	2.5556
Parameters available for introduction of transformation	3.2414	3.5167	3.4333

NOTES Company size according to the ZGD-1: (1) large, (2) medium, (3) small.

Cronbach coefficients (Ferligoj, Leskošek, and Kogovšek 1995) are acceptable (above 0.60), except for two dimensions which are merely composed of two statements. Due to substantive reasons, the mentioned dimensions cannot be combined with any of the other dimensions.

DISADVANTAGES IN INTRODUCING THE METHODS OF TRANSFORMATION TO THE COMPANIES

Here, the average levels of agreement in relation to the enumerated problems and disadvantages are presented, which were encountered by the companies while introducing new methods of transformation. The evaluations of agreement ranged on the scale from 1 (I completely disagree) to 5 (I completely agree). Due to strong positive correlations between the disadvantages and the consequently high value of the Cronbach coefficient (0.92), a new combined variable, *disadvantages*, was generated, representing the average of all evaluations of agreement on the listed disadvantages (table 3).

All the companies in general partially agree that they faced disadvantages upon the introduction of changes (2.97). Small companies faced

TABLE 3 Average values of the disadvantage dimension upon introduction of methods

Disadvantages dimension upon introducing the methods of management tools	(1)	(2)	(3)
Employees	3.0049	3.0444	2.7270

NOTES Company size according to the ZGD-1: (1) large, (2) medium, (3) small.

TABLE 4 Average values of dimensions of undesirable consequences to transformation

Dimensions of undesired consequences of construction companies' transformations	(1)	(2)	(3)
Decrease in worker's performance	2.0000	2.1667	2.0167
Decrease in workers' confidence in transformation	2.6034	2.6000	2.0667
Hindered management process	2.6379	2.8000	2.5000
Redundancy	2.1379	2.5667	1.4000
Average of undesirable consequences dimensions	2.3448	2.5330	1.9960

NOTES Company size according to the ZGD-1: (1) large, (2) medium, (3) small.

fewer disadvantages (2.73). One of the possible reasons for this derives from the fact that small companies tend to be more flexible and are in a position to implement the desired changes more rapidly.

#### UNDESIRABLE CONSEQUENCES OF CONSTRUCTION COMPANIES' TRANSFORMATIONS

On the scale from 1 (completely disagree) to 5 (completely agree), the companies evaluated their level of agreement with the nine undesirable consequences of transformation. The interviewed companies did not face many undesirable consequences upon the introduction of new management tools since the average combined mark totals to only 2.31. Based on the statistical method of the Principal Component Analysis, nine statements were combined into four dimensions whose average values are presented in table 4.

The values of Cronbach coefficients are acceptable (above 0.60), except for the dimension *hindered management process* which is merely composed of two statements. Due to substantive reasons, this dimension cannot be combined with any of the other dimensions. The *redundancy* statement could not be classified in any of the dimensions due to its low correlation with the other statements, and was handled as a separate dimension.

#### Analysis of the Influence on Companies' Financial Performance

In this chapter, different influences on companies' financial performance in the Slovenian construction industry are analysed. In the course of analysis, we were restricted to only the influence of the dimensions of transformation of companies, the influence of disadvantages upon their introduction, and the influence of dimensions of undesirable consequences of transformation, while any influence analysing the effects of

TABLE 5 Correlation matrix between the dimensions of undesirable consequences of transformation and the scores and indicators of construction companies' financial performance

		Indicators <sup>1</sup>				Trends				
		1	2	3	5	1	2	3	4	5
(a)	<i>r</i>	-0.018	-0.080	0.051	0.018	0.004	-0.162	-0.004	0.149	-0.066
	$\alpha^2$	0.878	0.500	0.665	0.879	0.971	0.168	0.975	0.205	0.575
(b)	<i>r</i>	-0.088	-0.206	-0.022	0.031	-0.032	-0.067	-0.023	0.165	-0.047
	$\alpha^2$	0.457	0.078	0.853	0.791	0.789	0.573	0.844	0.161	0.693
(c)	<i>r</i>	-0.040	-0.076	0.086	-0.111	-0.054	-0.008	0.065	0.081	-0.145
	$\alpha^2$	0.736	0.520	0.467	0.346	0.648	0.944	0.584	0.491	0.217
(d)	<i>r</i>	0.107	0.084	-0.082	0.233*	0.065	0.184	-0.026	0.136	0.328**
	$\alpha^2$	0.364	0.477	0.488	0.046	0.583	0.117	0.829	0.247	0.004

NOTES Dimensions of indicators: (a) decrease in workers' performance, (b) decrease in workers' confidence, (c) hindered management process, (d) redundancy.

<sup>1</sup> Average accounting scores and indicators of companies in the period 2001–2005. <sup>2</sup> Dual test. \* Correlation is significant at the 0.05 level (2-tailed). \*\* Correlation is significant at the 0.01 level (2-tailed).

these factors would not be reasonable from the methodological point of view; in case these influences do exist, they can only be circumstantial. Based on the five-year time period (2001–2005), the related trends for accounting scores and indicators of financial performance were calculated.

While examining the relation of accounting scores and indicators from the period 2001–2005 with the methods, factors, disadvantages and undesirable consequences of transformation, the quantitative indicator *borrowing rate* proved inappropriate since it should be handled in the context of other indicators, such as *return on equity*, for example. In simple words, in case a company shows a high profitability rate, it can afford a higher borrowing rate in return – without jeopardizing its business. Since the mentioned indicator only partially reflects the economic independence of a company, it was eliminated in the further stages of the survey and the trend of the indicator *borrowing rate* was maintained.

The correlation analysis of the association of quantitative indicators with the dimensions of the factors in choosing management tools showed *no* strong connection between those mentioned. The results of the analysis show that there is essentially *no* connection between the dimensions of undesirable consequences of transformation and the companies' financial performance (table 5).

The relation between the *redundancy* dimension and the trend added

TABLE 6 Descriptive statistics of scores and indicators according to use of method 12

	(1)	(2)	(3)	(4)	(5)
(a)	Yes	54	76,747.518	128,369.899	17,468.9306
	No	20	-84,569.45	369,641.082	82,654.2587
(b)	Yes	54	0.07872	0.238133	0.032406
	No	20	0.0076	0.282181	0.063098
(c)	Yes	54	0.3048	0.18091	0.02462
	No	20	0.2785	0.18164	0.04062
(d)	Yes	54	4,943.35	3,180.387	432.796
	No	20	4,359.7	2,320.741	518.933
(e)	Yes	54	29,222.944	61,996.8812	8,436.70693
	No	20	-67,907.85	299,136.003	66,888.8437
(f)	Yes	54	-0.02057	0.191891	0.026113
	No	20	-0.0559	0.13349	0.029849
(g)	Yes	54	-0.0054	0.09945	0.01353
	No	20	-0.028	0.0709	0.01585
(h)	Yes	54	-0.1291	0.93368	0.12706
	No	20	-0.04	0.1464	0.03273
(i)	Yes	54	639.96	1,250.081	170.114
	No	20	14.85	698.204	156.123

NOTES (1) use of method, (2) number of units; descriptive statistics: (3) average, (4) standard error, (5) standard error of the average. Scores and indicators: (a) net profit in the business year (in SIT 1,000), (b) return on equity (%), (c) financial (in)dependence (%), (d) added value per employee (in SIT 1,000), (e) net profit in the business year trend (in SIT 1,000), (f) return on equity trend (%), (g) financial (in)dependence trend (%), (h) borrowing rate coefficient trend, (i) added value per employee trend (in SIT 1,000).

value per employee should be mentioned ( $r = 0.30$ ,  $\alpha < 0.01$ ), where it is a fact that by discharging redundant workers, the added value trend increases. Based on the  $t$ -test, which we used to test the difference between the financial scores and indicators and their trends according to the usage of the chosen method of transformation, the difference *cannot* be confirmed for fourteen methods. In these cases, methods which indicate the effect of introduction in the long-term accounting period and in other fields of business are in question. The two remaining methods of transformation are of explicitly financial nature. These are: method 12 (optimisation of costs by activities of business process) and method 16 (balance scorecard). The latter two proved to be directly linkable to

construction companies' financial performance. Those companies (54) that *did* use method 12 do not show in terms of financial performance, a statistically significant difference in relation to the companies (20) that *did not* use this method; however, their trend in the economic indicator 'financial structure added value per employee' is growing more rapidly (table 6).

Based on the 5-year trend, we can expect *added value per employee* in these companies to increase by SIT 639,960 (EUR 2,670.51) every year, contrary to other companies where increases in *added value per employee* can be expected to amount to only SIT 14,850 (EUR 61.97). The difference is statistically significant in the case of 0.05 level ( $t = 2.11$ ;  $\alpha < 0.05$ ; Sig. (2-tailed) = 0.04).

A difference in trends is also evident in the first economic indicator, *return on equity* ( $\alpha = 0.07$ ). In the case of companies that *did* introduce method 12, it can be concluded from the 5-year trend that their return on equity would increase by SIT 29,222,944 (121,945.19 EUR) every year, while return on equity in companies that did not use this method would probably decrease on average by SIT 67,907,850 (EUR 283,374.44).

Those companies (20) which *did* use method 16 *do not* differ in regard to the four accounting scores and indicators statistically significant from the companies (54) that *did not* use this method. A statistically significant difference (table 7) is indicated only in the trend of the third indicator *financial (in)dependence (ownership of financing)*.

Based on the 5-year trend, it can be expected that the ratio between the equity and assets of those companies which *did* use method 16 (balance scorecard) would increase by 0.03 every year in favour of equity, which normally increases borrowing possibilities. For the companies that did not use this method, it can be predicted that their ratio would decrease by 0.03 ( $t = 2.17$ ;  $\alpha < 0.05$ , Sig. (2-tailed) = 0.03). Studying the association of arithmetic means of the accounting indicators and scores with the disadvantages of introducing the management tools for the period 2001–2005 indicated that a connection between them *does exist* (table 8).

On the basis of the correlations analysis a conclusion was made that if the number of disadvantages diminishes the first indicator *equity* ( $r = -0.25$ ;  $\alpha < 0.05$ ; Sig. (2-tailed) = 0.03), the second indicator *return on equity* ( $r = -0.23$ ;  $\alpha < 0.05$ ; Sig. (2-tailed) = 0.05) and the trend of the first indicator *equity* ( $r = -0.26$ ;  $\alpha < 0.05$ ; Sig. (2-tailed) = 0.03) would increase. In the reverse direction, by increasing the number of disadvantages, the trend of the fourth indicator, *borrowing rate*, increases

TABLE 7 Descriptive statistics of scores and indicators according to use of method 16

	(1)	(2)	(3)	(4)	(5)
(a)	Yes	20	41,193.95	84,555.24504	18,907.1275
	No	54	30,168.481	264,632.7222	36,011.9521
(b)	Yes	20	0.0679	0.259577	0.058043
	No	54	0.05639	0.249908	0.034008
(c)	Yes	20	0.2865	0.16129	0.03606
	No	54	0.3019	0.18803	0.02559
(d)	Yes	20	4,681.2	4,112.547	919.593
	No	54	4,824.28	2,463.866	335.29
(e)	Yes	20	12,465.7	44,308.90808	9,907.77305
	No	54	-545.037	194,344.2953	26,446.9087
(f)	Yes	20	-0.0478	0.24471	0.054719
	No	54	-0.02357	0.14807	0.02015
(g)	Yes	20	0.026	0.14583	0.03261
	No	54	-0.0254	0.05901	0.00803
(h)	Yes	20	-0.006	0.07687	0.01719
	No	54	-0.1417	0.93511	0.12725
(i)	Yes	20	621.9	1,381.421	308.895
	No	54	415.13	1,071.998	145.88

NOTES (1) use of method, (2) number of units; descriptive statistics: (3) average, (4) standard error, (5) standard error of the average. Scores and indicators: (a) net profit in the business year (in SIT 1,000), (b) return on equity (%), (c) financial (in)dependence (%), (d) added value per employee (in SIT 1,000), (e) net profit in the business year trend (in SIT 1,000), (f) return on equity trend (%), (g) financial (in)dependence trend (%), (h) borrowing rate coefficient trend, (i) added value per employee trend (in SIT 1,000).

TABLE 8 Correlation matrix between the disadvantages upon introduction of management tools and the scores and indicators of companies' financial performance

	Indicators <sup>1</sup>				Trends				
	1	2	3	5	1	2	3	4	5
(a) $r$	-0.249*	-0.232*	0.055	-0.175	-0.257*	-0.105	-0.044	0.332**	-0.149
$\alpha^2$	0.032	0.046	0.643	0.135	0.027	0.375	0.711	0.004	0.207

NOTES Dimensions of indicators: (a) disadvantages upon introduction of the methods. <sup>1</sup> Average accounting scores and indicators of companies in the period 2001–2005. <sup>2</sup> Dual test. \* Correlation is significant at the 0.05 level (2-tailed). \*\* Correlation is significant at the 0.01 level (2-tailed).



( $r = -0.33$ ;  $\alpha < 0.01$ ; Sig. (2-tailed) = 0.004). This can be interpreted by the fact that it is inevitable for the companies to finance the elimination of disadvantages that occurred upon the introduction of individual management tools, which, as a consequence, forces them into additional borrowing.

### Conclusions

For the purposes of the *second* part of the survey which was discussed in this article<sup>4</sup> in detail, data were collected on the five utmost relevant accounting indicators and scores for the construction industry. The analysis of the companies' business performance indicated that in the period 2001–2005, somewhat more than a fifth (21.60%) of the companies had negative average *equity*, which is expected to grow with the size of the company. Almost one fourth (24.30%) of the examined companies has an average *return on equity*, with small companies prevailing (49%). A solid fifth (21.60%) of all companies achieved up to a 0.12 mark of *financial (in)dependence*.

The highest share is once again indicated among small enterprises (33.30%). Medium-sized enterprises have the highest share (26.70%) among the companies with the value of this indicator above 0.47. One fifth (20.30%) of construction companies have a borrowing rate above 1.07; and among these, small enterprises have the highest share (26.70%). *Added value per employee* increases with the size of the company. Almost one third (31.00%) of large companies attain over SIT 6,300 thousand (EUR 26,289.43) *added value per employee*. The share among small enterprises amounts to 6.70%.

While examining the relationship of accounting scores and indicators from the period 2001–2005 with the methods, factors, disadvantages and undesirable consequences of transformation, the quantitative *borrowing rate* indicator proved inappropriate since it should be considered in the context of other indicators, such as *return on equity* (ROE), for example. In simple words, in the case that a company shows a high profitability rate, it can afford a higher borrowing rate in return without jeopardizing its business.

Since this indicator only partially reflects the economic independence of a company, it was eliminated in the further stages of the survey, and only the trend of the indicator *borrowing rate* was maintained. The analysis of the association of quantitative indicators with the dimensions of the factors for choosing management tools showed *no* strong connection

among those addressed. The analysis shows that there is essentially *no* connection between the dimensions of unwanted consequences of transformation and the financial performance of the companies. The relation of the redundancy dimension with the added value per employee trend should be mentioned, where the fact exists that by discharging (redundant) workers, the added value trend improves. Based on verification as to whether the difference between financial scores and indicators and their trends differs according to the usage of the chosen method of transformation, the difference *cannot* be confirmed for fourteen methods. This case, namely, is about methods, the introduction effect of which is shown in the long-term accounting period as well as in other fields of business. The other two methods of transformation, the 'optimization of costs by activities of a business process' and the 'balance scorecard' are of explicitly financial nature. The latter two proved to be directly related to the financial performance of construction companies.

Studying the association of arithmetic means of the accounting indicators and scores with the disadvantages of introducing the management tools for the period 2001–2005 indicated that a connection between them *does exist*. The survey results indicated that with the increasing number of disadvantages, the first indicator, *equity*, the second indicator, *return on equity*, and the trend of the first indicator, *equity*, tend to decrease. In the reverse direction, by increasing the number of disadvantages, the trend of the fourth indicator, *borrowing rate*, increases. The reason for this lies in the fact that it is inevitable for the companies to finance the elimination of disadvantages that occur upon introduction of individual management tools, which, in consequence, forces them into additional borrowing.

### Notes

- 1 According to the Slovenian Accounting Standard no. 29 (Slovenski računovodski standard 29 2002) a score is an absolute number predicting or indicating the situation, or pointing out the development of something; it is, normally, a piece of accounting data and differs from the indicator.
- 2 An indicator is a relative number, acquired by the comparison of two magnitudes; it holds a cognitive power which enables the creation of an opinion about business operation. Considering the nature of the compared magnitudes, it can be an index, a coefficient or a rate of participation (Slovenski računovodski standard 29 2002).
- 3 Considering the selected number of construction companies in the survey, the construction companies in the 2001–2005 period on average

posted net profit for the financial year of 148,837.09 EUR, net return on equity of 0.073%, financial independence of 0.299%, borrowing rate coefficient of 0.947, and added value per employee of 19,898.01 EUR. The non-participating companies (4) in the survey have fewer employees on average (125.25) than the participating companies (233.53).

- 4 The survey studies only: (1) the existence and strength of influences caused by the size of companies, in accordance with the criterion referred to in Article 55 of the Companies Act (ZGD-1), on their financial performance; (2) the existence of influence and strength of connection (correlation) of the transformation process (methods factors, deficiencies and unwanted consequences) with quantitative financial indicators – substantial consequences and results of these influences are therefore not a subject of the study.

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# *Justifying Environmental Cost Allocation in a Multiple Product Firm: A Case Study*

Collins C. Ngwakwe

This case study examines the effect of environmental cost allocation on production cost and the outcome for environmental management decisions. Using a revised cost allocation – referred to in this paper as environmental cost allocation – the paper contrasts overhead allocation between traditional cost allocation and environmental cost allocation. In addition, production cost derived from the traditional allocation of waste cost is compared with the revised environmental cost allocation. Findings indicate that a revised environmental cost allocation discloses more accurate overhead cost and hence production cost; and that management is motivated to make informed environmental management decisions if a product related environmental cost is made to reflect in the production cost of the polluting product. The paper highlights the practical significance of objective environmental cost allocation on corporate waste management, which thus creates a valuable awareness on the part of the management and accountants of firms in developing countries for the need to fine-tune the dominant traditional costing system. It also suggests avenues for further research to examine the impact of costing systems on environmental investments.

*Key Words:* management decision, environmental management, environmental cost allocation, waste cost allocation

*JEL Classification:* M11, M41.

## **Introduction**

This paper examines the effect of environmental cost allocation on production costs, and its implication for environmental management decisions. Trends in globalisation have brought evolving challenges to accounting, and management accounting has a crucial role as the corporate cost information provider. There must be accurate cost information to meet growing demands for corporate environmental responsibility such as in waste management. This may not be possible without a good cost allocation system in place. However, there is still noticeable apathy and complacency on the part of some accountants and man-

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agers, mostly in developing countries, regarding environmental cost allocation. Hence, most companies in developing countries (such as the cosmetic industry used in this case study) have continued to apportion their waste costs from the traditional overhead basis, with the tendency that product-specific environmental costs are obscured. This obscurity thus stifles managerial decision and possible innovation toward more environmentally friendly manufacturing with potential cost savings (see e. g. US EPA 1995; Roberts 1995; Rogers and Kristof 2003; Burnett, Hansen, and Quintane 2007; Burnett and Hansen 2008).

Hence the paper tries to answer two major questions:

- Could environmental cost allocation affect production cost?
- What is the potential effect of environmental cost allocation on environmental management decision?

Whilst renowned authorities such as Crowther (2004), IFAC (2005) and Bebbington et al. (2001) have commonly theorised that environmental cost allocation affects product costs based on research conducted in the Western world and other developed nations, little is known about the implication of environmental cost allocation in companies located in a developing country such as Nigeria. Hence, to investigate the applicability of this theory in a developing country, the hypothesis is stated as follows:

H<sub>1</sub> *Environmental cost allocation results in differential product costs.*

H<sub>0</sub> *Environmental cost allocation does not impact a difference in product costs.*

The objective of this paper, therefore, is to show the effect of environmental cost allocation on production cost and the latent implication for environmental management decisions. The scope of the study is limited to Wonder Beauty Care (WBC) – a multiple product cosmetic firm in Nigeria where the case study was done; it is further limited to proper allocation of direct waste cost from the overhead costs of Wonder Beauty Care Company. This paper is significant, given the growing pressure for corporate sustainability in which accounting has come under intense criticism for not playing a satisfactory role as the information house of the firm (see e. g. FSN 2006; Chwastiak 2001; Catchpole, Cooper, and Wright 2004). This paper is also significant considering that accounting research from developing countries focuses more on financial accounting (see Hopper et al. 2008). Little attention has been given to management accounting research in countries in Africa, resulting in a

dearth of environmental management accounting research in the sub-Saharan African countries such as Nigeria. While contemporary concepts such as environmental cost allocation may seem ubiquitous in the Western World, in Africa the environmental costing phenomenon is still nascent, and sounds absurd and unimportant to managers and accountants in Nigeria. Hence, the paper applies this concept, which has already gained impetus in the West, to create awareness for companies in Nigeria to appreciate the strategic implication embedded in environmental cost allocation, which is still unknown to them and about which they appear apathetic.

The paper is organised as follows: section two discusses the justification for environmental cost allocation. Section three presents the case study and methodology; section four discusses the data analysis, while section five outlines the findings, and section six draws conclusions.

### **Justifying Environmental Cost Allocation**

Environmental costs are the many different types of costs which organisations incur to manage pollution or maintain cleaner production; they also include costs to comply with environmental standards, including voluntary costs expended to enhance corporate health and safety, community relations and general corporate social responsibility. Some authors have attempted to classify environmental costs, for instance, the Institute of Chartered Accountants in Australia (ICAA) (2003) classifies environmental costs as: hidden, contingent, image/relationship and internal/external. Furthermore, the United Nations Division for Sustainable Development (UNSD) (2001) classifies environmental costs as: waste and emission treatment, prevention and environmental management, material purchase value of non-product output, and processing of non-product output. Other generic classifications come from IFAC (2005), which follows closely the UNSD classification above. However, environmental costs differ between firms according to how each firm intends to classify and use them. Nevertheless, the crux of the matter is the ability of management to recognise the existence of such costs and to apply them appropriately in decision making, but it is difficult to recognise and apply environmental costs if the cost allocation system does not make them visible.

Environmental cost allocation is therefore significant considering that corporate environmental sustainability is no longer driven by regulation and compliance; it is now a matter of risks and opportunities such that

proactive corporations should re-strategise their business operations to minimize risk and take advantage of the opportunities. Such strategy should start from the accounting department to provide relevant environmental cost information for informed management decisions for reducing corporate environmental impacts – a sub-goal in the millennium development goals (MDGs).

Proper allocation of environmental costs would supply pertinent information needed to make decisions in compliance with evolving environmental regulations. Emerging environmental regulatory schemes such as corporate sustainability OECD (2000), extended producer responsibility OECD (1996), the International Standard Organisation's (ISO) sustainability certifications (ISO 14000s), the Kyoto Protocol and green house gas (GHG) trading schemes add green responsibility to the cost and management accounting system to supply pertinent cost information to aid corporate environmental management decisions. This increase in environmental concern has spurred the International Federation of Accountants' comments (IFAC 2005, 3):

Environmental issues – along with the related costs, revenues and benefits – are of increasing concern to many countries around the world. But there is a growing consensus that conventional accounting practices simply do not provide adequate information for environmental management purposes.

The traditional overhead costing system pays less attention to the identity of cost items in overhead, Myerson (1995), hence a major portion of environmental-related costs are found hidden in the traditional overhead accounts (White and Savage 1995; White, Becker, and Savage 1993; Joshi, Krishnan, and Lave 2001). If, therefore, such environmental costs are allocated incorrectly, products would not get their due share, US EPA (1995). Many companies in the developed nations understand this more; for instance, according to Jean (1995), East Peoria, Illinois Plant – a famous US company – no longer dumps waste disposal cost into an overhead account. Such recognition of environmental costs results not only in pollution prevention, but could add revenue to the polluting department (Rogers and Kristof 2003; Burnett, Hansen, and Quintana 2007; Burnett and Hansen 2008). Furthermore, the traditional manufacturing system was direct cost prone, but modern manufacturing technology is dominated by overhead costs occupying a significant portion of manufacturing costs (Cooper 1989; Booth and Giacobbe 1997). A substantial amount of environmental costs are hidden within these new forms of



overhead costs, neglect of which would result in cost information distortion (see e. g. Joshi, Krishnan, and Lave 2001).

Furthermore, environmental costs deserve proper attention because many internal and external stakeholders are showing increasing interest in the environmental performance of organizations, particularly private sector companies (ICAEW 2004). Internal stakeholders include employees affected by pollution in the work environment. External stakeholders include local communities affected by corporate wastes and emissions, environmental activist groups, government regulators, shareholders, investors, customers, suppliers and others (IFAC 2005). In addition, there are growing supply chain pressures from large companies requiring their suppliers to be compliant with environmental management systems (EMS) standard of the International Standard Organization (ISO 1996). But an effective environmental management system cannot be achieved without recognising the relevant environmental costs attached to firm products. This is important since proper environmental cost allocation engenders cleaner manufacturing innovation, which, in addition to pollution reduction, also results in cost savings (see e. g. Rogers and Kristof 2003; Burnett, Hansen, and Quintana 2007). The need for modernizing the traditional costing also arises due to increasing regulations which have caused the internalisation of environmental costs that were previously regarded as externalities; this is also highlighted by (IFAC 2005, 11):

For example, in countries with strong environmental regulatory regimes, new regulations have led to the internalization of a wide variety of additional environment-related costs. Organizations have seen costs of environmental compliance rise, including costs for required pollution and control equipment, pollution monitoring and emission fees and regulatory paperwork and reporting.

Internalisation of some previous external costs due to environmental pressure means that the costing system should track, classify and allocate these costs equitably for accountability and possible innovation. IFAC (2005, 26) further highlights that:

Several limitations of conventional management accounting systems and practices can make it difficult to effectively collect and evaluate environment-related data. These limitations can lead to management decision making being based on missing, inaccurate or misinterpreted information. As a result, managers may well misunderstand the negative financial conse-

quences of poor environmental performance and the potential costs and benefits of improved environmental performance.

A common method that hides environmental costs is to combine them with the overhead pool rather than use direct allocation to the product that is solely responsible for it. The inclusion of most environmental costs such as waste cost in overhead therefore stifles possible efforts to reduce such costs through preventive environmental management, because traditional overhead accounts shield the polluting products. In considering this IFAC (2005, 27) comments:

The use of overhead accounts for environment-related costs can also be problematic when overhead costs are later allocated back to cost centres for pricing and other purposes. An example would be hazardous waste disposal costs, which might be quite high for a product line that uses hazardous materials and quite low for another that does not. In this case, the allocation of hazardous waste disposal costs on the basis of production volume would be inaccurate, as would be product pricing and other decisions based on that information.

The plant-wide method of allocating some product-specific environmental costs in a multiple product firm, such as presented in this study, distorts the real cost of production in all the products, and the polluting product is protected under this traditional scheme because its pollution cost is apportioned to other products. There is, therefore, no incentive for the management of the polluting department to embark on cost reduction through pollution reduction, because it lacks the pertinent cost information. In line with this, FSN (2006, 1) adds:

Conventional management accounting has been criticised for ignoring the separate identification, classification, measurement and reporting of environmental information, especially direct and indirect environmental costs. Here, environmental costs such as energy, water and waste disposal are often not traced to specific production processes and are 'lumped in' with general business overheads and allocated to cost objects.

Activity based costing (ABC) has been introduced to remedy the asymmetry in overhead cost allocation of some environmental costs; this is a method that uses cost drivers to allocate indirect environmental costs (Cooper and Kaplan 1992). However, where some environmental costs – such as the waste water cost (the focus of this case study) – are directly

traceable to a product, such waste costs should be treated outside the traditional overhead by direct allocation. The treatment of waste costs outside of overhead conforms to the polluter pays principle of OECD (1972). Thus, with the direct environmental cost allocation approach, product-specific environmental costs previously concealed in overhead accounts are singled out and allocated to products that cause them (Rebecca 1992).

In addition to the preceding discussions, this case study is also anchored on three principles: the polluter pays principle OECD (1972), Extended Producer Responsibility (EPR) OECD (1996), and the responsibility accounting theory. The Polluter Pays Principle (PPP) is an OECD environmental policy guide which requires that the costs of pollution should be wholly born by those who cause it (OECD 1972). Adherence to this has also been seen as a tool to promote efficiency, justice and harmony (Bugge 1996). 'EPR is an emerging strategy being used to promote the integration of environmental costs associated with products throughout their life cycles into the market price of the products ...' (OECD 1996, 8). PPP and EPR are similar, in that they seek to promote efficiency, equity, and justice toward economic, social and environmental sustainability, and accounting is widely viewed as the epitome of these characteristics, hence the present stage in the interface between accounting and environment (see e. g. OECD 1999; IFAC 2005).

The preceding discussion is encapsulated in the responsibility accounting theory which is simply put as: managers should not be judged based on costs and revenues outside their control, but should be answerable to costs and revenues within their control (Horngren and Sundem 1995; Kaplan and Atkinson 1990). If managers are aware of the pollution costs inherent in their products through the costing system, such managers are motivated to take preventive measures to control pollution. For instance waste cost in this study is discovered to be subject to the influence of the Weavon product, the manager of the Weavon Department should therefore be held accountable to it. The following section discusses the case study.

### **The Case Study and Methodology**

Data for this research are drawn from a case study conducted in Wonder Beauty Care Limited in Nigeria. The data were collected over a twelve month period – between January 2007 and December 2007. The company has four major products under separate departments that report performance separately: Soap, Cream, Weavon, and Perfect Finish. The

existing cost accounting system in the company uses the volume of production to allocate all overhead costs to different products. Major attention was given to the effect of volume based allocation of waste water disposal cost on the four products' production cost with particular attention on the Weavon department. The Weavon department produces assorted artificial hair for women. The department uses silk and cotton for its production. The production of Weavon requires several steps in washing the raw cotton and silky materials. Hence, it uses large quantities of water and the waste water is allowed to escape to a nearby river via the public drainage system. The other three departments have a central pit that collects their waste water which is bought weekly by a chemical company. Hence, it was discovered that the Weavon department was responsible for the heavy discharge of waste water. The company pays the local council a standard fee of ₦150,000 (Nigerian Naira) monthly for discharge of waste water into the river in addition to fines accruing from regular drainage blockage caused by fragments of cotton and silk.

The traditional overhead allocation system includes the waste water cost, and apportions it along with other overheads on the basis of volume of production. This method inflates the production cost of other products, while the Weavon department is heavily shielded because it produces the least number of products. This misallocation may have affected the performance of the other products for several years.

The methodological approach is a comparative design and analysis between the traditional overhead allocation (which included waste water cost) and a revised overhead allocation which separates the waste water cost from other overheads. Using a revised cost allocation, the waste water cost is thus separated from the overhead pool for the twelve month period and the other overhead is reallocated, with the waste water cost assigned wholly to the Weavon department outside of overhead allocation. This resulted in reduced production costs for the other three departments while the production cost of Weavon increased commensurate with its real operation costs.

Furthermore a paired sample *t*-test of difference is applied to check for possible difference in means between the overhead costs arising from the two waste cost allocation approaches for the Weavon department. A separate test for mean difference is conducted for the Weavon product, and another test is conducted for all the products put together. The separate test for Weavon is important for gauging the likely impact on its product cost, considering that it is solely responsible for the waste cost. Hence the cost comparison on the Weavon product is imperative for ascertain-

ing the degree of impact on its product cost. It is on this basis that the research hypothesis which is supported by Crowther (2004), IFAC (2005) and Bebbington et al. (2001) is tested and is restated here as:

- H1 *Environmental cost allocation results in differential product costs,*  
H0 *Environmental cost allocation does not impact a difference in product costs,*

and tested at a Hypothesized mean difference as:  $H_0: P = 0$  (see table 8).

### **Analysis of Data**

The overhead cost data were collected over a twelve month period, and for clearer information, waste water cost was kept separately within overhead. Table 1 presents the total monthly overhead from January to December 2007 (which includes waste water cost traceable to the Weavon product) and the monthly allocation of overhead costs to products under the traditional overhead allocation. According to the accountant the allocation is based on volume of production per month. On average the Weavon department has a lower volume of production; this accounts for it having the lowest share of total overhead costs. Table 2 presents a separate picture of overhead and waste water costs, with waste water cost separated from the overhead account. With this separation table 3 reapportions the other overhead costs (excluding the waste water cost) to the four products based on the existing volume based allocation. In table 4, the total waste cost of N 2,270,000 (from table 2) is added to its share of other overheads N 760,000 (from table 3); thus a comparison is made between the overheads of the Weavon product before and after the revised allocation, showing a difference of N1,937,000 (see table 4).

With the data collected on the direct material and direct labour cost of the four products, an attempt is made to estimate the impact of the above overhead reallocation on the production cost of the products. Table 5 shows production costs under the traditional overhead costs; it shows that the Weavon department has the lowest cost of production despite its responsibility for waste disposal cost – an indication that Weavon's production cost is grossly understated. This case exemplifies the danger inherent in placing environmental costs in the overhead. It also shows that other products unduly receive a portion of waste costs that should not ordinarily have formed part of their production cost. Further to this, table 6 presents a different production cost using the overhead cost derived from the revised overhead cost allocation. Apart from the Perfect Finish product which has had high costs, the Weavon department's cost

TABLE 1 Total overhead allocated to divisions on traditional cost allocations, based on % volume of units produced (percentages indicate the proportion of units produced monthly)

Month	Soap		Cream		Weavon		Perfect Finish		Total*
	(1)	(2)	(1)	(2)	(1)	(2)	(1)	(2)	
January	96	16	162	27	102	17	240	40	600
February	130	20	156	24	117	18	247	38	650
March	124	20	124	20	62	10	310	50	620
April	120	20	120	20	90	15	270	45	600
May	130	20	143	22	130	20	247	38	650
June	120	20	144	24	108	18	228	38	600
July	145	25	116	20	87	15	232	40	580
August	126	18	175	25	105	15	294	42	700
September	154	25	123	20	92	15	246	40	615
October	170	25	170	25	68	10	272	40	680
November	121	20	139	23	73	12	272	45	605
December	130	22	165	28	59	10	236	40	590
Total	1566		1737		1093		3094		7490

NOTES Column headings are as follows: (1) allocated overhead based on % volume production, (2) % volume of production. \* Total overheads including waste costs. Data from WBC, January to December 2007.

TABLE 2 Separation of waste water disposal cost from overhead account

	J	F	M	A	M	J	J	A	S	O	N	D	Total
(1)	180	200	210	190	220	180	160	180	180	200	210	160	2270
(2)	420	450	410	410	430	420	420	520	435	480	395	430	5220

NOTES Row headings are as follows: (1) waste water disposal costs (in N'000), (2) other overheads (in N'000). Data from WBC, January to December 2007.

of production increased more than the Soap and Cream products. Table 6 shows the real cost of production if an objective allocation is used, while table 7 presents a comparative table with percentages computed to show the degree of difference in total production cost between the two methods. The Weavon department shows a huge difference of 46 percent. This informs the degree of distortion which traditional overhead allocation could cause if used for certain environmental costs.

In order to substantiate the difference in costs arising from reallocation, a *t*-test of paired two samples for means is presented in table 8. The

TABLE 3 Revised overhead allocation: Other overheads reallocated based on % volume of production

Month	Soap		Cream		Weavon		Perfect Finish		Total*
	(1)	(2)	(1)	(2)	(1)	(2)	(1)	(2)	
January	67	16	114	27	71	17	168	40	420
February	90	20	108	24	81	18	171	38	450
March	82	20	82	20	41	10	205	50	410
April	82	20	82	20	62	15	184	45	410
May	86	20	95	22	86	20	163	38	430
June	84	20	101	24	75	18	160	38	420
July	105	25	84	20	63	15	168	40	420
August	94	18	130	25	78	15	218	42	520
September	109	25	87	20	65	15	174	40	435
October	120	25	120	25	48	10	192	40	480
November	79	20	91	23	47	12	178	45	395
December	95	22	120	28	43	10	172	40	430
Total	1093		1214		760		2153		5220

NOTES Column headings are as follows: (1) allocated overhead based on % volume production, (1) % volume of production. \* Total overheads including waste costs. Computed from tables 1 and 2.

test sought for a possible difference between the means of the separate results. The case study hypothesis which is stated as: *environmental cost allocation does not impact a difference in product costs*, is thus tested at a hypothesised mean difference of zero:  $H_0: P = 0$  (see table 8).

Table 8 (left column) tests the mean difference for all the products. The result shows that traditional overhead cost has a mean of 624, while the revised overhead cost has a mean of 435, and therefore is significant at a *t*-critical of 2.07, which is greater than the hypothesised mean difference of zero ( $H_0: P = 0$ ). Lastly, table 8 (right column) presents a separate test of difference for means for the Weavon product. Overhead costs from traditional allocation show a mean of 91, whereas the overhead costs from the revised allocation show a mean of 252. This is also significant at a *t*-value of 2, which is greater than the hypothesised mean difference of zero ( $H_0: P = 0$ ). Thus the hypothesis that *environmental cost allocation results in differential product costs* is accepted and confirms earlier assertions by Crowther (2004); IFAC (2005) and Bebbington et al. (2001).

TABLE 4 Comparative table of weavon product: Overhead under the traditional allocation less overhead after revised cost allocation (allocated overhead + waste water cost)

Month	Overhead under traditional allocation	Overhead after revised allocation (AO + wwc = Total)	Difference
January	102	71 + 180 = 251	149
February	117	81 + 200 = 281	164
March	62	41 + 210 = 251	189
April	90	62 + 190 = 252	162
May	130	86 + 220 = 306	176
June	108	75 + 180 = 255	147
July	87	63 + 160 = 223	136
August	105	78 + 180 = 258	153
September	92	65 + 180 = 245	153
October	68	48 + 200 = 248	180
November	73	47 + 210 = 257	184
December	59	43 + 160 = 203	144
Totals	1093	760 + 2270 = 3030	1937

NOTES Calculated from tables 1, 2 and 3, where: AO – allocated overhead (from table 3), wwc – waste water cost (from table 2), difference = (total overhead after allocation) – (overhead under traditional allocation).

TABLE 5 Production costs from traditional overhead allocation, in Nigerian Naira (N'000)

Costs	Soap	Cream	Weavon	Perfect Finish	Total
Direct material	2800	2500	2000	3000	10300
Direct labour	1000	1100	800	1150	4050
Overhead	1566	1737	1093	3094	7490
Total	5366	5337	3893	7244	21840

NOTES Data from WBC, January to December 2007.

## Findings

### PRODUCTION COST

Findings from this study show a heavy distortion in production cost if waste disposal cost is allocated using the traditional overhead allocation method. This distortion arises due to the fact that waste cost, which should have been allocated entirely to the Weavon Department, is rather



TABLE 6 Production costs from Revised overhead, in Nigerian Naira (N'000)

Costs	Soap	Cream	Weavon	Perfect Finish	Total
Direct material	2800	2500	2000	3000	10300
Direct labour	1000	1100	800	1150	4050
Overhead	1093	1214	760	2153	5220
Waste water cost	—	—	2270	—	2270
Total	4893	4814	5830	6303	21840

NOTES Data from WBC, January to December 2007.

TABLE 7 Comparative production costs under traditional and revised overhead allocations

Product	Traditional	Revised	Difference
Soap	5366	4893	473 (8.8%)
Cream	5337	4814	523 (9.8%)
Weavon	3983	5830	1847(46%)
Perfect fit	7244	6304	940 (13%)

NOTES Computed from tables 6 and 7.

apportioned to all the products using a volume based system, hence the production cost of the other three departments – Soap, Cream, and Perfect Finish – is inflated above normal. On the other hand the production cost of the Weavon department is grossly underestimated because other products have shared the waste cost due to it. The revised cost allocation discloses the true cost of production through the allocation of waste cost to the Weavon Department. The allocation of waste cost to the Weavon Department and subsequent reallocation of other overheads caused the production cost of the Weavon Department to increase while the production cost of other departments decreased equitably. The *t*-test for means between the two overhead results in the Weavon Department disclosed a reasonable difference.

MANAGEMENT DECISION

The result of this case study which was presented to the management of Wonder Beauty Care Limited stimulated interesting environmental management decisions. The first important decision was the creation of a separate account out of overhead accounts for waste water costs relating to the Weavon department. This is a vital step since any environmental management decision must start with accurate tracking of the rel-

TABLE 8 Test of hypothesis

H1 Environmental cost allocation results in a difference in product costs, H1:  $P \neq 0$ .  
 H0 Environmental cost allocation does not affect product cost, H0:  $P = 0$ .

This is a two – tailed test. From the table below, the  $t$ -critical is significant at above 2.0 which is greater than the hypothesized mean difference of zero: H0:  $P = 0$ ; hence H1:  $P \neq 0$  is correct and accepted. This substantiates the percentage analysis above, showing that environmental cost allocation of waste cost causes a difference in the overhead costs which impact a difference in product costs.

	$t$ -test of difference between the means of traditional overhead costs and revised overhead costs for all the products (data from tables 1 and 3)		$t$ -test of difference between the means of traditional overhead costs and revised overhead costs for Weavon only (data from table 4)	
	Trad. OHC	Rev. OHC	Trad. OHC	Rev. OHC
Mean	624.1666667	435.0833333	91.08333333	252.5
Variance	1412.878788	1181.901515	503.5378788	648.4545455
Observations	12	12	12	12
Pooled variance	1297.390152		575.9962121	
Hyp. mean diff.	0		0	
$df$	22		22	
$t$ stat.	12.85859674		-16.47457372	
$P(T \leq t)$ one-tail	$5.21359e^{-12}$		$3.66973e^{-14}$	
$t$ critical one-tail	1.717144335		1.717144335	
$P(T \leq t)$ two-tail	$1.04272e^{-11}$		$7.33945e^{-14}$	
$t$ critical two-tail	2.073873058		2.073873058	

NOTES Trad. OHC – traditional overhead costs; Rev. OHC – revised overhead costs.

evant costs. Management also decided to separate all environmental related costs from the overhead to enhance more objective and transparent costing. In addition, management decided to decentralise all investments and/or expenses relating to the environment to encourage accountability and improved environmental performance evaluation, while at the same time spurring departmental environmental initiatives and innovation. Hence additional managerial autonomy, effort, and goal congruence was put in place. These decisions contributed to stimulating efforts by the manager of the Weavon department to acquire a water treatment plant with potential for cost savings and improved revenue; including a marketing synergy between the company and a nearby construction company for the purchase of treated waste water.

This case suggests that proper environmental cost allocation results in relevant environmental cost information which engenders environmental management decisions. In addition, it points to potential benefits in environmental investment. The resulting waste management decisions also imply that the company would have a more friendly relationship with its local community and the government, due to the pollution control implicit in these innovative decisions. Hence the justification for proper environmental cost allocation.

### **Conclusion**

This paper examined the effect of environmental cost allocation on production cost and the outcome for environmental management decisions. The paper draws from a case study conducted in the Wonder Beauty Care Company in Nigeria. Using a revised overhead cost allocation, a contrast in overhead allocation between the traditional cost allocation method and environmental cost allocation is established. This difference is achieved by separating the waste water disposal cost and allocating it directly to the Weavon department which is identified to be solely responsible for waste water cost. After this separation, the other products are released from the waste water cost. This release of unrelated costs caused a reduction in their allocated overheads. In contrast, the overhead cost of the Weavon department increased. The paper evaluated the effect of this difference on production cost, and findings show that the production cost of the Weavon department is better reflected in the revised waste cost allocation, whereas the production cost is grossly understated in the traditional method. A paired sample *t*-test of difference is used to ascertain if the difference in the overhead cost of the Weavon department resulting from the two methods is reasonable. Findings show a reasonable difference in overhead costs under the traditional and revised cost allocation. This implies that the traditional overhead allocation of direct environmental costs is inappropriate and therefore demands attention. This also points to the extent of cost information distortion inherent in the traditional overhead allocation method. The management of WBC took vital environmental management decisions. It decided to make a change in the costing system in order to enhance accurate tracking of environmental costs by keeping waste water costs separate from overhead, and to account for all environmental related costs separately. Management also decided to decentralise all environmental investments and expenses in order to encourage environmental initiatives and inno-

vation. This finding indicates that environmental cost allocation would enhance the supply of pertinent cost information needed for environmental management decisions. The practical implication is that management is motivated to make environmental related decisions if the relevant environmental cost is made to reflect in the production cost of the polluting product; but wrong environmental cost allocation obscures relevant cost information and stifles environmental management decisions needed for corporate sustainability. There is therefore the need for firms to fine-tune their environmental cost allocation system. The paper opens an avenue for further research to examine the impact of costing systems on environmental investment and corporate sustainability.

### **Acknowledgments**

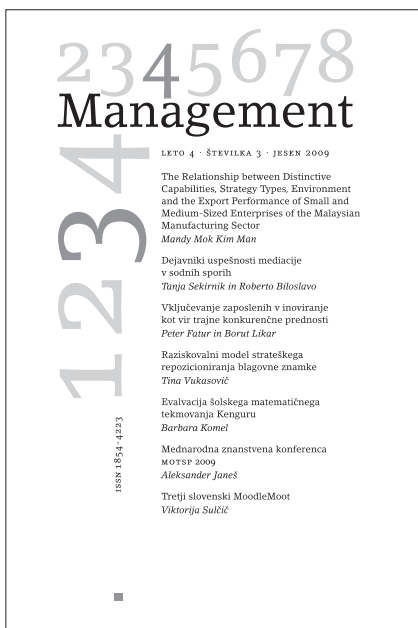
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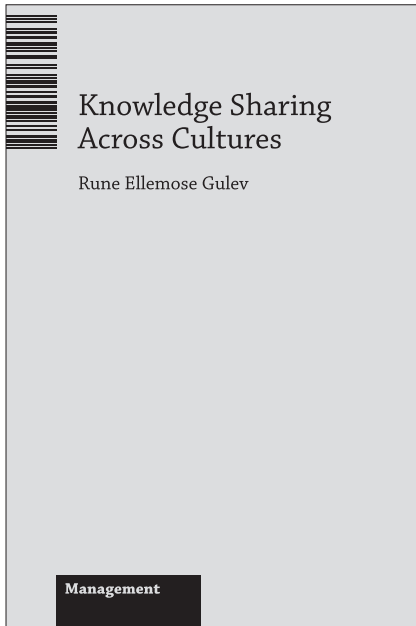
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- Jackson, R. 1979. Running down the up-escalator: Regional inequality in Papua New Guinea. *Australian Geographer* 14 (5): 175–84.
- Lynd, R., and H. Lynd. 1929. *Middletown: A study in American culture*. New York: Harcourt, Brace and World.
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# *Managing Global Transitions*

## *International Research Journal*

VOLUME 7 · NUMBER 4 · WINTER 2009 · ISSN 1581-6311

333 Empirical Analysis of the Severance Pay  
Non-Performance in Slovenia

*Milan Vodopivec*

*Lilijana Madjar*

*Primož Dolenc*

349 Diagnostic Process of Company Productivity

*Mária Ďurišová*

*Emese Tokarčíková*

367 Does Dividend Policy Follow the Capital Structure Theory?

*Justyna Franc-Dąbrowska*

383 Association of Management Tools with the Financial  
Performance of Companies: The Example  
of the Slovenian Construction Sector

*Peter Friedl*

*Roberto Biloslavo*

403 Justifying Environmental Cost Allocation in  
a Multiple Product Firm: A Case Study

*Collins C. Ngwakwe*



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