

# Factors of Business Growth: A Decomposition of Sales Growth into Multiple Factors

ONDŘEJ MACHEK, MARTIN MACHEK

Department of Business Economics, Department of Marketing

University of Economics, Prague

W. Churchill Sq. 4, 130 67 Prague 3

CZECH REPUBLIC

ondrej.machek@vse.cz <http://kpe.fph.vse.cz>

*Abstract:* -The growth is an important stage of lifecycle for all for-profit organizations. The sources of business growth have been subject to a considerable academic attention. At the same time, growth of sales is a normal aspect of the phenomenal growth of a company. In this paper, we extend a previously created model of business growth which has been based on the analysis of two terms: the average bill and the frequency of visits, and their impact on the overall sales growth. We identified four key factors affecting growth of sales over time: labor productivity (sales-per-worker), labor intensity (workers-per-assets), capital intensity (assets-per-customer) and frequency of visits (customers per time unit). Since these factors are in a multiplicative form, we also proposed a logarithmic decomposition of business growth into a sum of partial factors in order to examine the contribution of the individual factors to the total sales growth. We also illustrated the use of the model on a case study of a company operating in the field of electricity sales in the Czech Republic. The model is straightforward and suitable for management of small and medium sized companies and can be used in the education of entrepreneurs as well.

*Key-Words:* Business Growth Factors, Average Bill, Frequency of Visits.

## 1 Introduction

Growth is an important stage of lifecycle for all for-profit organizations. The sources of business growth have been subject to a considerable academic attention.

The overwhelming majority of companies belong to the class of small and medium enterprises and, at the same time, such companies play a substantial role in the world economics [15]. The importance of small and medium sized companies (SMEs) relies in the creation of job opportunities, innovation and stimulation of private entrepreneurship. Moreover, small enterprises are more flexible and they are better able to adapt to a variable environment, thus playing an important role in the time of economic slowdown. The education and training of entrepreneurs, as well as other ways of supporting SMEs, are becoming increasingly important (see [6] or [3]).

The definition of small businesses varies across countries and industries. In Europe, small businesses are usually specified as firms with less than 50 employees, while medium sized companies usually have less than 250 employees. In the US, a small business is defined as company having less than 250

employees and a medium business has less than 500 employees.

Small and medium enterprises are characterized, inter alia, by a chaotic and simple management and the omnipresence of the proprietor at all business processes [2]. Due to various factors, they also differ from large enterprises in terms of accounting rules, inaccuracies and the associated issues [18].

In this article, we further develop the model presented by [9] and [10] which has been based on the analysis of two terms: the average bill and the frequency of visits, and their impact on the overall sales growth. We will identify other factors affecting growth of sales over time.

### 1.1 Business Growth and its Measurement

Some economic theorists attempted to model the evolution of businesses using corporate lifecycles. The stage model or corporate life cycle theory originated from economic literature [14] or [16]. The stage model describes the progression of a company through multiple growth phases over time. Miller and Friesen [12] described five common stages of firm development: birth, growth, maturity, revival, and decline. However, the number of stages

in corporate life cycle models is not standardized [8]. However, from the point of view of corporate life cycle theories, the growth represents only one of the stages in the business life. Much attention has been devoted to this stage since a permanent growth is desirable and important for all for-profit organizations.

At this point, we can mention the work of Greiner [7] who presumed that business growth consists of five phases: growth through creativity, growth through direction, growth through delegation, growth through coordination, and growth through collaboration. However, it would be out of scope of this paper to deal with these theories more in detail.

Sometimes, economic theorists distinguish two modes of growth: organic growth and inorganic growth (growth through mergers and acquisitions). However, in the case of small and medium sized firms, almost all growth can be classified as organic [4].

Growth is a process function which happens over multiple time periods. The growth of firm can be represented by the change of some variable over time. The most frequently used measures of growth are probably profit, physical output in natural units, sales in monetary units or market share (see e.g. [5] or [19]).

It is presumable that such measures of growth are interrelated. However, this mutual dependence is not clear-cut and the empirical findings on this topic are inconsistent. For example, evolutionary models suppose that profitability is the main factor of firm growth [1] or [13]. Other researchers found that profitability has a positive impact on the growth rate, but growth rates have a negative impact on the current year's profitability [17]. Sometimes, profitability is even considered to be in an adverse relationship with a firm's growth, since profitability is concentrated on short-term results and postpones investments which belong to the sources of long-term growth [11].

In line with the existing research, we will consider that the growth of a firm can be approximated by the growth of sales expressed in monetary units.

## 2 Sales Growth Estimation

In this section, we will start from the description of the sales growth model for small firms developed in [9] which is based on the product of average bill and frequency of visits and extend it in order to identify more sources of sales growth.

### 2.1 Model Description

A small firm may be defined as an economic subject transforming a set of inputs (input factors) into a set of outputs: products, goods and services. In the model presented in [9], we explicitly distinguished these three classes of outputs; for simplicity, we will consider only one class of outputs in this article.

In the following text,  $M$  will denote the total number of outputs produced within a firm. Further,  $\mathbf{p}=(p_1, p_2, \dots, p_M)$  will denote the product prices and  $\mathbf{q}=(q_1, q_2, \dots, q_M)$  will denote the quantities of outputs sold. Then the value of the production, i.e. total sales volume  $S$  at a certain instance of time can be represented by the scalar product

$$S = \mathbf{p}\mathbf{q} = \sum_{i=1}^M p_i q_i \quad (1)$$

The firm growth rate  $g$  can be represented by the change in sales volume  $S$ , where  $\Delta t$  represents the amount of time.

$$g = \frac{\Delta S}{\Delta t} = \frac{\Delta \sum_{i=1}^M p_i q_i}{\Delta t} \quad (2)$$

The equation can be further decomposed into two terms. Let  $C$  denote the number of customers of the firm. Then

$$g = \frac{\Delta \sum_{i=1}^M p_i q_i}{\Delta t} = \frac{\Delta \sum_{i=1}^M p_i q_i}{\Delta C} \times \frac{\Delta C}{\Delta t} = B \times f \quad (3)$$

The first term is called average bill ( $B$ ) and the second term is called frequency of visits ( $f$ ). In [9], we described the possible ways of increasing these two components in order to increase the sales growth of a small company.

However, in order to explore the sources of growth development more in depth, the average bill will be further decomposed into three terms. It can be rewritten as

$$\begin{aligned} B &= \frac{\Delta \sum_{i=1}^M p_i q_i}{\Delta C} = \frac{\Delta \sum_{i=1}^M p_i q_i}{\Delta A} \times \frac{\Delta A}{\Delta C} = \\ &= AT \times APC = \frac{\Delta \sum_{i=1}^M p_i q_i}{\Delta L} \times \frac{\Delta L}{\Delta A} \times \frac{\Delta A}{\Delta C} = \\ &= SPW \times WPA \times APC \end{aligned} \quad (4)$$

$AT$  is actually the asset turnover which measures the ability to generate sales using the existing level of assets, while  $APC$  denotes assets per customer (capital intensity) which is at the same time a measure of the company's individualization. The asset turnover can be further decomposed into the labor productivity  $SPW$  (measured in sales-per-worker) and labor intensity  $WPA$  (measured in worker-per-assets).

The number of customers  $C$  can be represented by the sum of existing customers  $E$  and new customers  $N$ . So the frequency of visits can be further rewritten as

$$f = \frac{\Delta C}{\Delta t} = \frac{\Delta(E + N)}{\Delta t} = \frac{\Delta E}{\Delta t} + \frac{\Delta N}{\Delta t} \quad (5)$$

And finally, the whole sales growth can be specified as

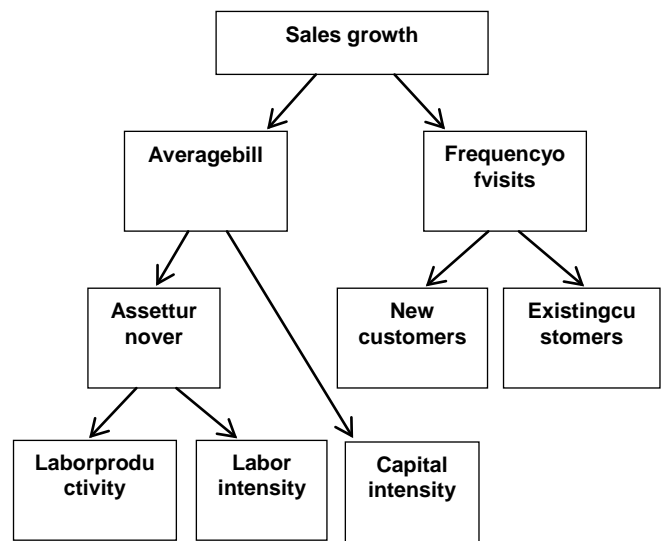
$$g = \left( \frac{\Delta \sum_{i=1}^M p_i q_i}{\Delta L} \right) \times \frac{\Delta L}{\Delta A} \times \frac{\Delta A}{\Delta C} \times \left( \frac{\Delta E}{\Delta t} + \frac{\Delta N}{\Delta t} \right) \quad (6)$$

The above-derived expression allows for the identification of five ways to increase the above-defined sales growth. The growth can be increased by:

- increasing the asset turnover which involves
  - increasing the labor productivity;
  - increasing the labor intensity,
- increasing the capital intensity (assets per customer);
- increasing the frequency of visits by
  - making existing customers purchase more frequently,
  - acquiring new customers.

The whole decomposition can be illustrated using the following figure.

**Fig. 1**– Components of sales growth



### 2.2 Logarithmic Decomposition of Sales Growth Rate

We obtained a formula which is a multiplicative expression containing four terms. In economic analysis, an aggregate multiplicative indicator may be transformed into an additive expression using logarithmic transformation to see the individual components' contribution to the development of the aggregate indicator.

In this section, we will be interested in examining the *development* of growth. The impact of year-to-year change of these four individual indicators upon the total year-to-year *change of growth* can be determined as follows. We will denote the index (year-on-year change) of indicator  $X$  by  $I_X = I_2 / I_1$ . The growth in period  $t$  is given by

$$g_t = SPW_t \times WPA_t \times APC_t \times f_t \quad (7)$$

The change in growth (growth rate) can be specified as

$$I_g = \frac{g_2}{g_1} = \frac{SPW_2 \times WPA_2 \times APC_2 \times f_2}{SPW_1 \times WPA_1 \times APC_1 \times f_1} = I_{SPW} \times I_{WPA} \times I_{APC} \times I_f \quad (8)$$

By applying natural logarithms on both sides of the equation, it can be rewritten as

$$\ln I_g = \ln I_{SPW} + \ln I_{WPA} + \ln I_{APC} + \ln I_f \quad (9)$$

And by dividing both sides of the equation by the left-hand side, we obtain

$$1 = \frac{\ln I_{SPW}}{\ln I_g} + \frac{\ln I_{WPA}}{\ln I_g} + \frac{\ln I_{APC}}{\ln I_g} + \frac{\ln I_f}{\ln I_g} \quad (10)$$

We obtained an additive expression which characterizes the impact of individual components on the aggregate indicator. By multiplying both sides of the equation by the absolute change in growth  $\Delta g = g_2 - g_1$ , we have decomposed the increase of sales growth into four additive components.

$$\Delta g = \frac{\ln I_{SPW}}{\ln I_g} \Delta g + \frac{\ln I_{WPA}}{\ln I_g} \Delta g + \frac{\ln I_{APC}}{\ln I_g} \Delta g + \frac{\ln I_f}{\ln I_g} \Delta g \quad (11)$$

We will demonstrate the use in practice of this decomposition in the next section.

### 3 Illustration: A Case Study

To illustrate the use of the sales growth decomposition, we have chosen a medium-sized company operating in the field of electricity sales in the Czech Republic. From the annual reports of the company, we were able to get all information we needed: total sales, headcount, total assets, and the number of customers. They are summarized in the following table (CZK denotes the Czech currency, Czech crowns).

Table 1 Basic data on the company

	Customers	Revenue (CZK)	Total assets (CZK)	Headcount
2012	302	888 310	1 402 009	168
2011	274	842 844	1 421 726	172
2010	225	988 100	1 587 078	172
2009	212	1 168 850	1 669 887	214
2008	199	1 047 294	1 654 230	205
2007	189	1 024 832	1 613 408	209
2006	184	978 230	1 528 375	209

Using this information, we can analyze the sources of sales growth or decline quantitatively.

Firstly, we may decompose the sales growth into two terms: the average bill growth and the growth of frequency of visits. The year-to-year indexes (chain indexes) are in the following table.

Table 2 Decomposition of sales growth in two terms

	Sales growth	Average bill (B)	Frequency of visits (f)
2012	1.054	0.956	1.102
2011	0.853	0.702	1.215
2010	0.845	0.797	1.061
2009	1.116	1.046	1.067
2008	1.022	0.968	1.055
2007	1.048	1.024	1.023

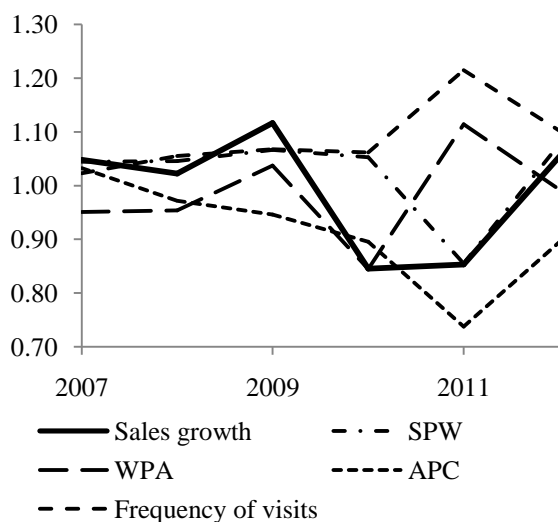
This table gives us a rough overview on the development of two key components of sales growth; for instance, it is clear that the frequency of visits has been constantly increasing while the development of the average bill has been fluctuating. The entrepreneur should focus on the possible ways of increasing the average bill; for instance, by introducing new products or complementary services. However, we may go more in depth. We will decompose the sales growth into four terms: labor productivity *SPW*, labor intensity *WPA* and assets-per-customer (*APC*), thus obtaining the following indexes.

Table 3 Decomposition of sales growth in four terms

	Sales growth	SPW	WPA	APC	Frequency of visits (f)
2012	1.054	1.077	0.992	0.895	1.102
2011	0.853	0.855	1.114	0.737	1.215
2010	0.845	1.053	0.845	0.896	1.061
2009	1.116	1.066	1.037	0.946	1.067
2008	1.022	1.045	0.953	0.972	1.055
2007	1.048	1.044	0.950	1.032	1.023

Again, we can observe which sources of growth increase or decline, respectively, in the individual years. However, we see only the directional trends (growth or decline) and their magnitude, not the *absolute effect* of these individual factors to the overall growth development.

Fig.2– Decomposition of sales growth in four terms



In order to analyze quantitatively the sources of sales growth, we determined the logarithmic decomposition using formula (11). The difference of sales growth rates (first column) has been decomposed to four partial factors whose sum equals the whole change of sales.

Table 4 Logarithmic decomposition of sales growth rate in four terms

	Sales growth rate	SPW	WPA	APC	Frequency of visits (f)
2012	20.09%	28.43%	-2.99%	42.55%	37.21%
2011	0.76%	0.75%	-0.52%	1.46%	-0.93%
2010	27.07%	8.27%	27.14%	17.77%	9.58%
2009	9.41%	5.49%	3.12%	-4.78%	5.59%
2008	-2.57%	-5.27%	5.66%	3.41%	-6.37%
2007	-	-	-	-	-

Now we are able to analyze the sources of sales development in the course of the years. For example, the slight decline in sales growth in 2007/2008 was due to decreasing labor productivity and frequency of visits; so although the worker-per-assets and assets-per-customer indicators increased, the whole sales growth went down by 2.57 %.

It would be more practical to focus on the years with the greatest year-to-year changes; for example, in the period 2009/2010, the sales growth rate decreased by 27 %. Why so? We can observe that the labor intensity (WPA) was the main source of this decline. Holding all other things equal, the growth could have been improved by hiring more

employees. The second main source of the sales growth decline has been the assets-per-customer indicator; the company's asset base relative to the number of customers decreased thus reducing the growth of the firm.

Another interesting period is 2011/2012 when the sales growth went up by 20 %. As we can see, the main sources of this growth were a higher frequency of visits (which means the company has been successful in acquiring new customers), followed by a better labor productivity (SPW).

## 4 Conclusion

The complexity of business growth can be dealt with by decomposition of growth into multiple factors. In this article, we extended a previously created model of business growth based on average bill and frequency of visits. We have shown that the growth of sales can be decomposed into four factors: the labor productivity (measured in sales-per-worker), the labor intensity (measured in worker-per-assets), capital intensity (measured in assets-per-customer) and frequency of visits (customers per time unit). Because all factors are in a multiplicative relationship, it is possible to use an additive logarithmic expression in order to evaluate the contribution of the individual factors to the whole growth of sales. We demonstrated this analysis on a case study of a medium-sized company dealing with sales of electricity in the Czech Republic.

## Acknowledgment

The authors would like to express their gratitude for the financial support of the University of Economics, Prague - the paper is one of the outcomes of the research project VŠE IP300040 The role of customers in Czech companies.

## References:

- [1] A. A. Alchian, Uncertainty, Evolution and Economic Theory, *Journal of Political Economy*, Vol.58, 1950, pp. 211-222.
- [2] D. Carson, S. Cromie, Marketing Planning in Small Enterprises: A Model and Some Empirical Evidence, *Journal of Marketing Management*, Vol.5, No.1, 1989, pp. 33-49.
- [3] P. Dasan, Small & Medium Enterprise Assessment in Czech Republic & Russia Using Marketing Analytics Methodology, *Central*

- European Business Review*, Vol.2, No. 4, pp. 39-49.
- [4] P. Davidsson, F. Delmar, Some Important Observations Concerning Job Creation by Firm Size and Age, in *Rencontres St. Gall*, September 1998, Gallen, Switzerland, 1998.
- [5] F. Delmar, Measuring growth: Methodological considerations and empirical results, in R. Donckels R., A. Miettinen (ed.): *Entrepreneurship and SME Research: On its Way to the Next Millennium*. Aldershot a Brookfield: Ashgate, 1997, pp. 190-216.
- [6] A. Dodescu, A. Badulescu, Entrepreneurship Education and Training. Study-case: the AntrES programme on Women Entrepreneurship in Western Romania, in *Proc. of the 5th WSEAS International Conference on Economy and Management Transformation*, 2010, WSEAS Press, pp. 470-476.
- [7] L. E. Greiner, Evolution and Revolution as Organizations Grow, *Harvard Business Review*, Vol.50, No.4, 1972, pp. 37-46.
- [8] D. L. Lester, J. A. Parnell, W Crandall, M. L. Menefee, Organizational Lifecycle and Performance among SMEs: Generic Strategies for High and Low Performers, *International Journal of Commerce and Management*, Vol.18, No.4, 2008, pp. 313-330.
- [9] M. Machek, O. Machek, A Model of Small Business Growth, *International Journal of Economics and Statistics*, Vol.1, No.4, 2013, pp. 89-96.
- [10] M. Machek, O. Machek, A Sales Growth Model for Small Enterprises, in *1st International Conference on Management, Marketing, Tourism, Retail, Finance and Computer Applications (MATREFC '13)*, 2013, WSEAS press, pp. 91-96.
- [11] G. V. Milano, Postmodern Corporate Finance, *Journal of Applied Corporate Finance*, Vol.22, No.2, 2010, pp. 48-59.
- [12] D. Miller, P. H. Friesen, A Longitudinal Study of the Corporate Life Cycle, *Management Science*, Vol.30, No.10, 1984, pp. 1161-1183.
- [13] R. R. Nelson, S. G. Winter, *An Evolutionary Theory of Economic Change*, Cambridge: Belknap Press of Harvard University Press, 1982.
- [14] E. T. Penrose, Biological Analogies in the Theory of the Firm, *American Economic Review*, Vol.42, No.5, 1952, pp. 804-819.
- [15] D. Popescu, O. Tomoiu, C. Andreea, Trends in Small and Business - Sized Enterprises Management, in *Proc. of the 1st International Conference on Tourism and Economic Development (TED '11)*, 2012, WSEAS Press, pp. 408-412.
- [16] W. W. Rostow, *The Stages of Economic Growth*, Cambridge: Cambridge University Press, 1960.
- [17] J. SooCheong, P. Kwangmin, Inter-relationship between Firm Growth and Profitability, *International Journal of Hospitality Management*, Vol.30, No.4, 2011, pp. 1027-1035.
- [18] J. Strouhal, M. Paseková, D. Dvořáková, European Harmonization of SMEs' Financial Reporting, in *Harmonization of SME's Financial Reporting in Emerging CEE Countries*, Wisconsin : WSEAS, 2011, pp. 1-33.
- [19] J. Wiklund, *Small Firm Growth and Performance: Entrepreneurship and Beyond*, Doctoral dissertation, Jönköping: Jönköping International Business School, 1998.