



Institute of Technology Management

University of St.Gallen



Price Risks in Manufacturing Companies

A Study of the ITEM-HSG

Prof. Dr. Thomas Friedli
Institute of Technology
Management (ITEM-HSG)



Risk Management – A Future Success Factor?

PREFACE

Volatile markets, the increasing demand for natural resources, natural disasters, political and financial instability – manufacturing companies are threatened by a wide range of supply chain and supply risks. Due to the worldwide developments and the increasing global interconnectedness of supply chains, it is likely that particularly price risks of industrial consumption factors will intensify. The enormous increase of commodity prices and price volatility during the last 10 years reflect this trend. Considering that the demand for resources will double during the next 40 years, it is obvious that manufacturing companies must act. A systematic and holistic risk management approach that ensures the long-term access to strategic resources and stable prices will be inevitable for most manufacturing companies to hold their ground in global competition. The following study confirms the relevance of this topic and provides an overview on affected resources and countermeasures taken by manufacturing companies.

A handwritten signature in blue ink, which appears to read 'Friedli', written in a cursive style.

Prof. Dr. Thomas Friedli

01

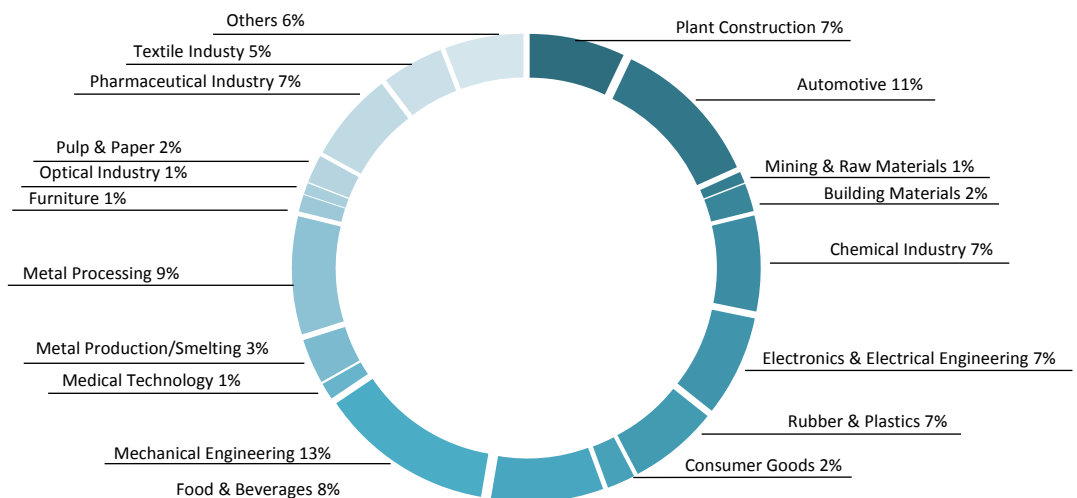
Structural Data

DESIGN OF THE STUDY

Method: Online survey
Time frame: 25th February - 30th April 2013
Executing institute: ITEM-HSG
Main region: Central Europe

SAMPLE

Participating Branches of Industry



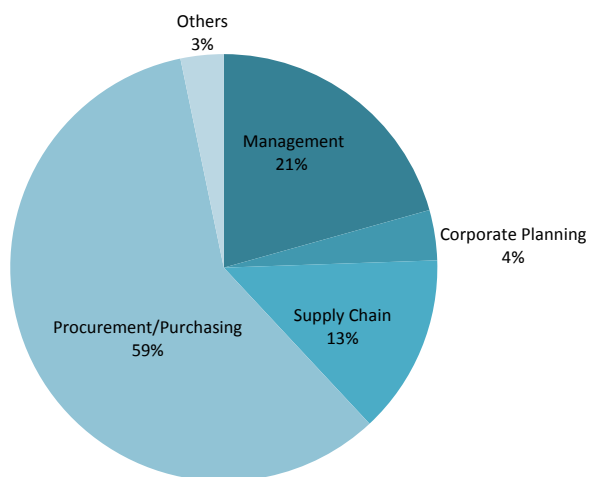
N = 184

184 companies, operating in more than 18 different branches, took part in the online survey. The respondents were mainly executives and employees in the area of purchasing and supply chain management as well as members of the executive board.

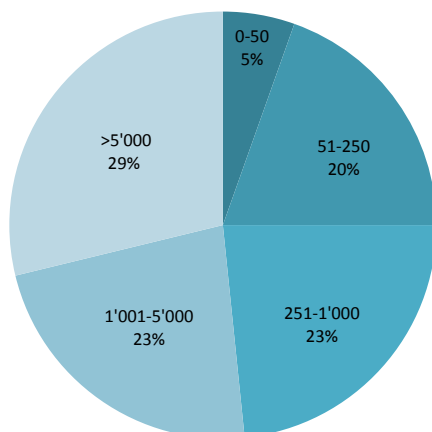
01

Structural Data

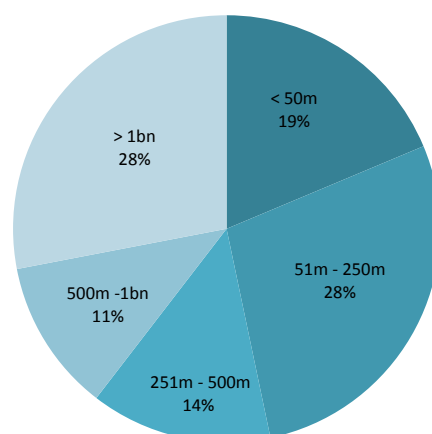
Participating Divisions



Employees



Company Turnover in Euro

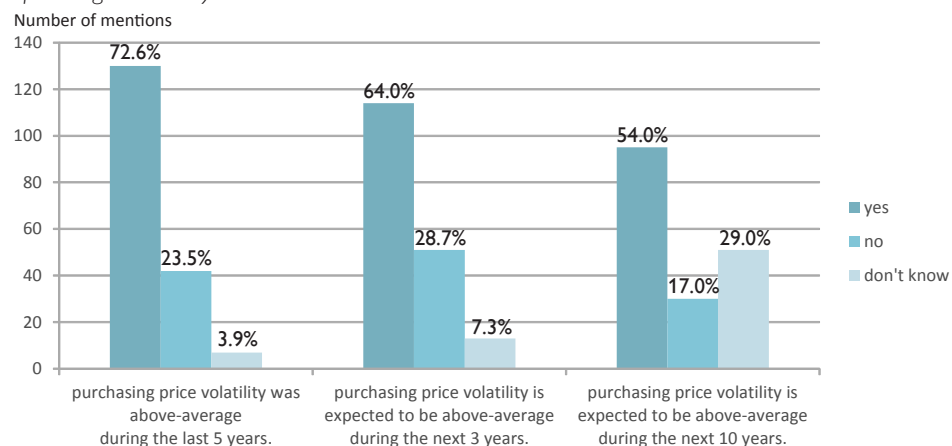


02

Use of Risky Resources

I. How would you assess the current and future use of resources that are characterized by high price volatility in your company?

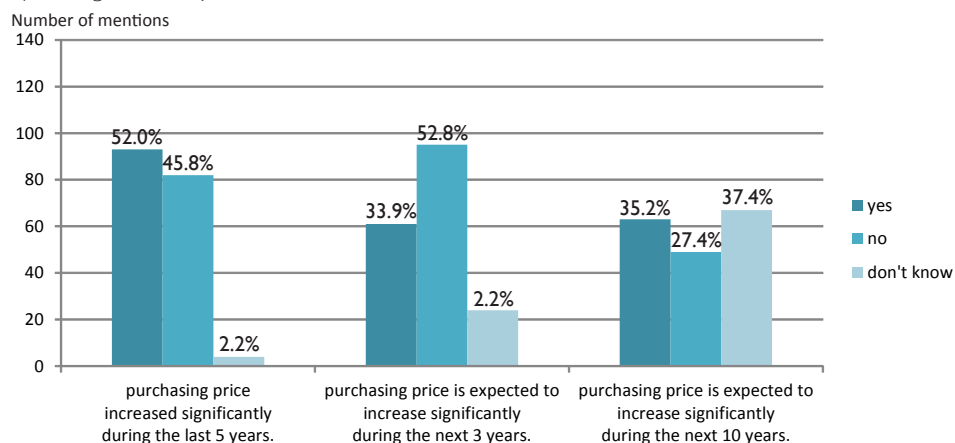
To produce our products we require resources (raw materials, semi-finished/finished goods, auxiliary materials, operating materials) whose...



n = 176

II. How would you assess the current and future use of resources that are characterized by strongly increasing prices in your company?

To produce our products we require resources (raw materials, semi-finished/finished products, auxiliary materials, operating materials) whose...



n = 179

02

Use of Risky Resources

PURCHASING PORTFOLIO - THE BASIC INDICATOR FOR PRICE RISK

Determination of risk level in early stages

The purchasing portfolio determines a manufacturing company's vulnerability to price risks on the supply side. Thus, it can be seen as a basic indicator for vulnerability to this specific supply risk type. Although the purchasing function is in most manufacturing companies responsible for and has to deal with price risks, purchasing has hardly any direct influence on its purchasing portfolio and the underlying bill of materials. The decisions what resources or consumption factors (raw materials, semi-finished/finished goods, auxiliary materials, operating materials) are used to manufacture a product are made much earlier in the product or process design phase. By detailing specifications, constructions, and designs, the company's engineering teams generally decide on type and amount of resources used in production. These technical teams, however, are often unaware of the upcoming risk consequences and therefore determine often unknowing the path towards a higher or lower level of price risk.

Use of volatile resources

The sample examined by ITEM-HSG reveals that risky resources are used in a vast number of manufacturing companies. During the last five years, 72.6% of the companies responding used price volatile raw materials, semi-finished/finished goods, auxiliary materials, or operating materials to manufacture their products. Although the value decreases for the next three years, still a considerable amount of companies (64.0%)

have risky resources in place. More than half of the respondents (54.0%) are sure that they still will use price volatile resources in the next ten years. Considering the persistent economic slowdown during the last few years, which has also led to a price relief on many resource markets, the decrease in the usage of volatile resources might be partially explained. However, also the uncertainty factor has to be considered. The value for "don't know" (3.9% for the last five years), increases to 7.3% for the next three years and to 29.0% for the next ten years. This shows clearly that manufacturing companies simply do not know how markets and prices will develop over time. Consequently, volatile consumption factors might still be used in a vast number of companies, although the awareness on price risks might not necessarily be given.

Use of resources with strongly increasing prices

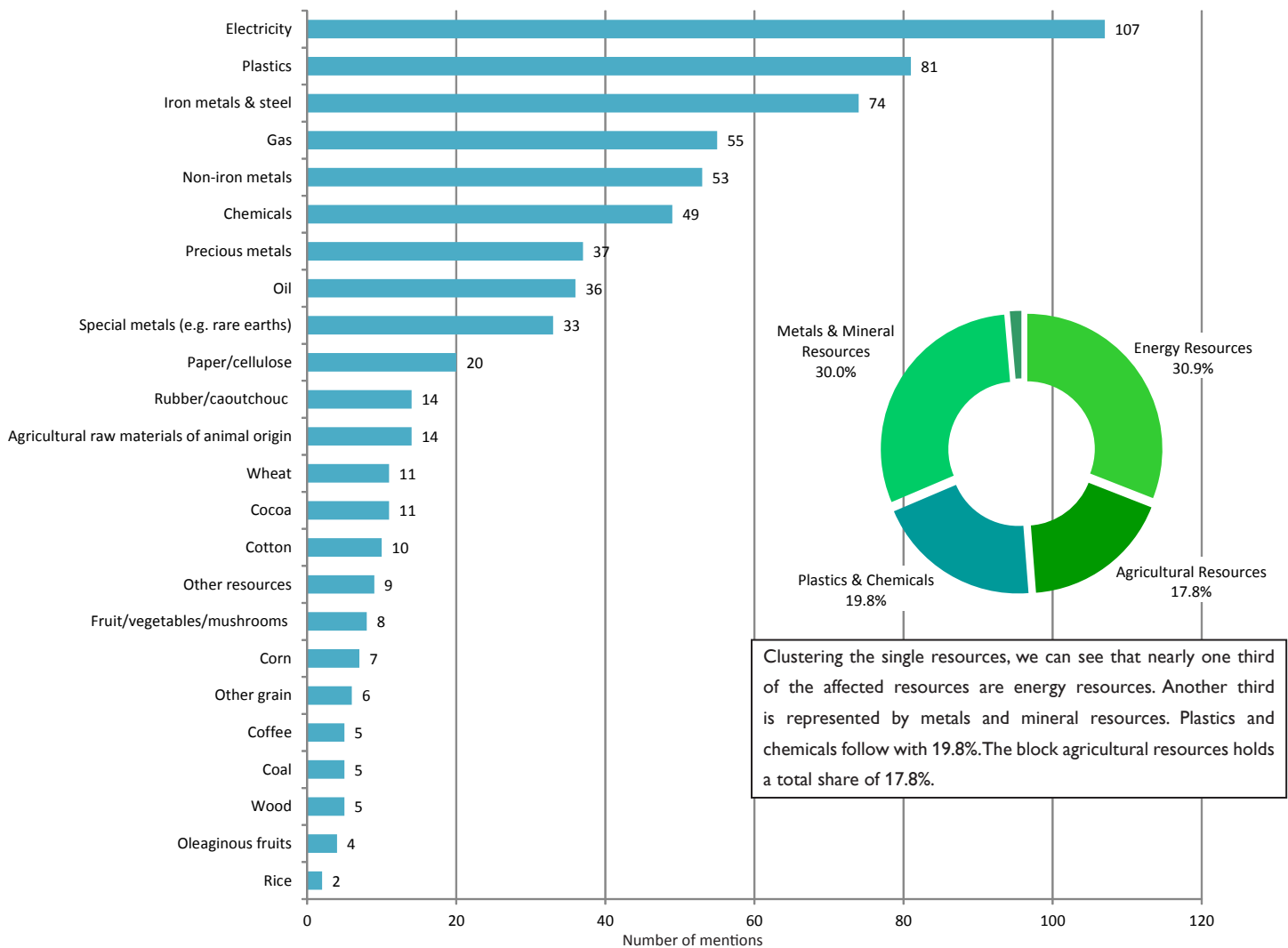
The results for resources with strongly increasing prices show a slightly different pattern. Their use falls from 52.0% during the last five years to 33.9% during the next three years. At the same time, the number of companies that do not use price risky resources increases from 45.8% to 52.8%. In the long run, we can see a reversal of this trend. The share of companies who expect using resources with strongly increasing prices raises again and reaches 35.2%. Consequently, resource price increases represent a long-term market issue for more than a third of the companies.

03

Affected Resources

III. Which resources are affected by these price risks?²

Please choose. Multiple answers possible.



² Question was only asked to companies who use or expect to use price risky resources; n = 155

03

Affected Resources

TOP 3 RISKY RESOURCES

No. 1: Electricity

Electricity is by far the most commonly used resource that is fraught with price risk. It was selected as number one by 69.0% of the companies. This is not surprising if one regards the electricity price development during the last few years. Industrial consumers in Germany for instance had to accept a price increase of 34% on average during 2001 (6.69 ct/kWh) and 2012 (8.95 ct/kWh)¹. Moreover, there is the debate on the energy turnaround and the EEG (German Renewable Energy Act). But also in other countries manufacturing companies are affected by significant price increases. Between 2001 and 2012 the electricity prices in France (+45%), UK (+66%), and Sweden (+156%) also rose sharply¹. Nearly all other European countries show similar electricity price developments.

No. 2: Plastics

The second most widely used resource type that is fraught with risk is plastics. Plastic is closely related to the price development of oil and its follow-up product naphtha. During the last few years, increased and volatile oil prices were observed all over the globe. They certainly were a main driver

for rising price risks of plastic products. Another aspect to consider is an increasing demand. Due to the growing standard of living, more and more plastic products (e.g., food packaging, semi-finished plastics components in consumer products) have to be provided. In addition, many oil-producing companies have started an aggressive forward integration during the last few years. This led to a strong market consolidation putting additional pressure on plastics market.

No. 3: Iron metals and steel

The third most commonly used risk resource group is iron metals and steel. In March 2013 steel prices were on a record low. However, this state can be deceptive. Along with economic recovery, steel prices can suddenly rise and be back again to a record high. During the economic upswing in 2007/2008, the swelling demand for iron metals and steel has shown impressively that the hunger for resources in emerging markets has and will increasingly have a considerable effect on the pricing of resources. Companies are generally aware of this and therefore ranked this resource group on position three.

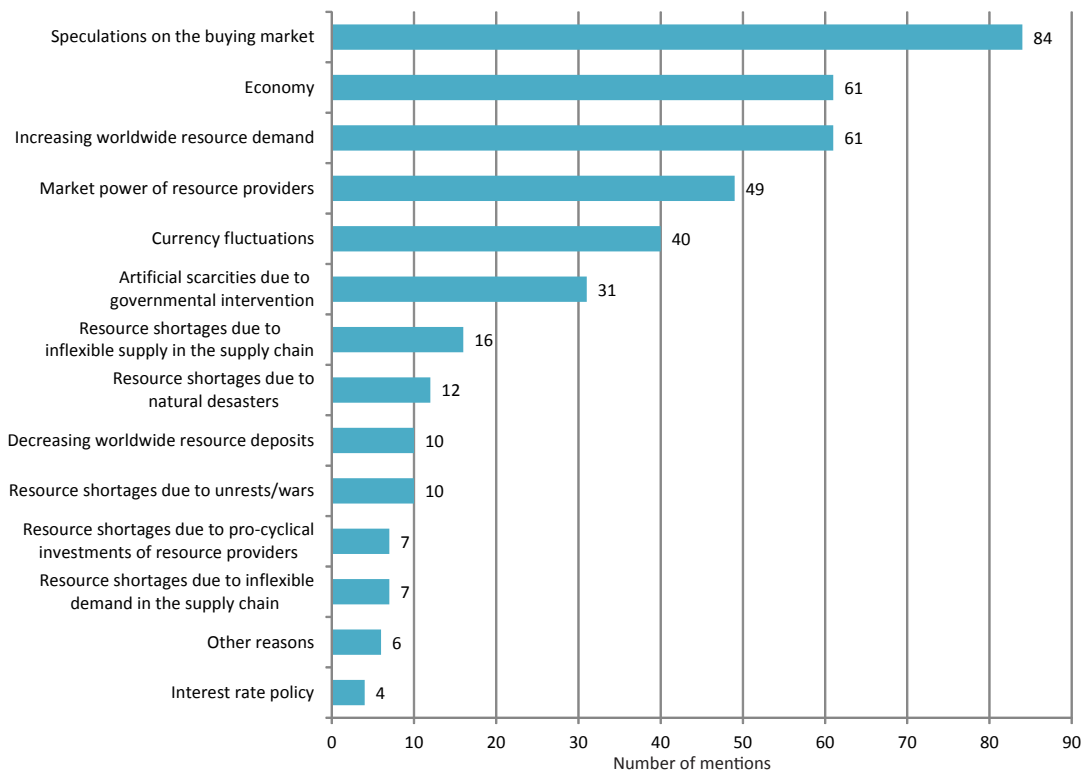
¹ Electricity prices for industrial consumers of average size excl. taxes (Eurostat, 2013)

04

Drivers of Price Risks

IV. What are the most important drivers for the volatility of these resources according to your opinion?³

Please enter up to 3 main drivers.



³ Question was only asked to companies who use or expect to use volatile resources; n = 141

Drivers of volatility

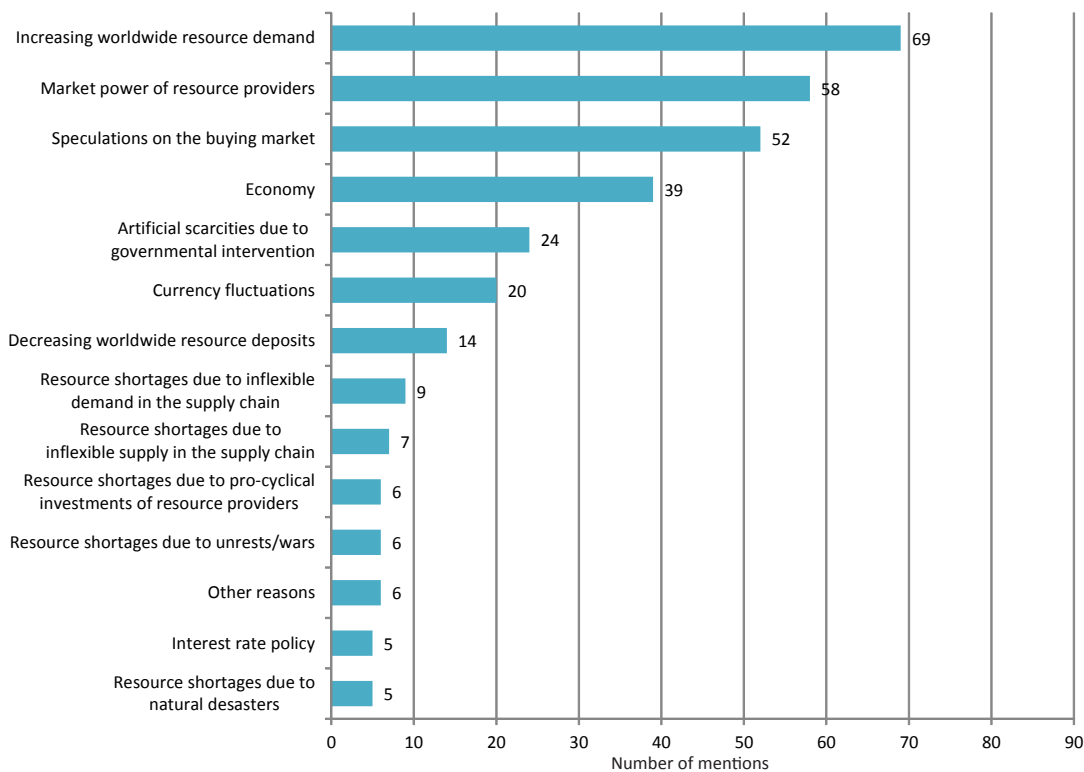
To identify the main drivers of volatility, the companies were asked for the three most important volatility drivers of their resources. First place is taken by speculations on the buying market (59.6%), followed by economy (43.3%) and the increasing worldwide demand for resources (43.3%).

04

Drivers of Price Risks

V. What are the most important drivers for the price increase of these resources according to your opinion?⁴

Please enter up to 3 main drivers.



⁴ Question was only asked to companies who use or expect to use resources with strongly increasing prices; n = 120

Drivers of price increase

For price increase the results show a slightly different picture. Main driver for price increase seems to be the growing worldwide demand for resources (57.5%). Besides this, the market power of resource providers (48.3%) and speculations on the buying market (43.3%) seem to play a major role.

04

Drivers of Price Risks

RELEVANT INFLUENCES ON PRICE FORMATION

Resource markets and price formation

The causes of price volatility and extreme price increases are manifold. According to theory, prices are the result of market equilibrium. That means supply and demand determine the price. However, this does not always apply for practice. Disturbing factors (speculation on commodity exchanges, political unrests, exchange rate fluctuations, etc.) lead to a distorted perception of the actual supply and demand and affect the theoretical price.

Non-renewables and future price developments

According to the Hotelling-Rule, prices of non-renewable resources will increase along with increasing scarcities. This effect, however, could not yet be observed in reality. Scientists assume that this might change in the future. The markets' lack of knowledge on the actual size of available resource

deposits currently leads to a biased picture of the available resource offering. Markets generally rate new resource findings as positive signals. As a consequence prices decrease; irrespective of whether or not the total global resource offering is close to exhaustion. Real scarcity is presumably not visible until the resource is rather close to total exhaustion. However, once total exhaustion is noticed, this may result in a sudden and sharp price increase or price shock. Taking the doubling of resource demand during the next 40 years into account, this scenario is not utopian. Consequently, manufacturing companies with a high demand of non-renewable, critical resources should prepare in time for such an extreme event, while exploiting the increasing scarcity as competitive factor in the meantime.

Hotelling-Rule

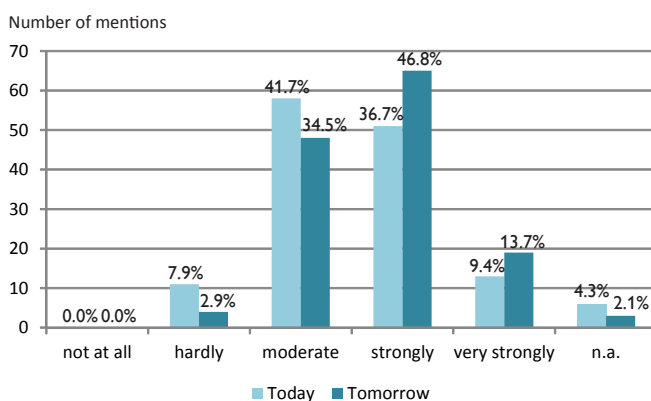
The Hotelling-Rule was first published in 1931 by the American mathematician and economist Harold Hotelling (1895-1973). The rule describes price development of non-renewable natural resources in the long run. Given the total amount of a non-renewable resource, it assumes that consumption leads to a decrease of reserves. The resource is getting scarcer. As a consequence, higher prices can be obtained on the market. The price of a non-renewable resource does not reflect the marginal costs for extraction. The total price contains extraction costs as well as a surcharge for the consumption of the resource deposit, a so called resource annuity. For this balance the amount of revenues (price minus extraction costs) grows over time by a rate that reflects the interest rate.

05

Economic Strain

VI. Do these price volatilities affect your business today and tomorrow?⁵

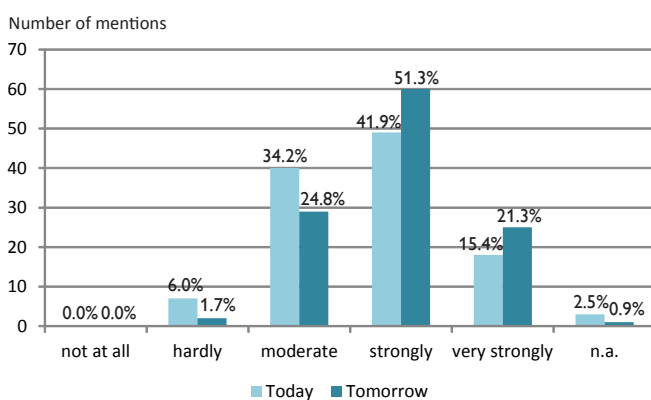
Please indicate your estimate.



⁵ Question was only asked to companies who use or expect to use volatile resources; n = 139

VII. Do these price increases affect your business today and tomorrow?⁶

Please indicate your estimate.



⁶ Question was only asked to companies who use or expect to use resources with strongly increasing prices; n = 117

05

Economic Strain

INCREASING FINANCIAL EFFECTS AND VULNERABILITY

Price risks: an ongoing issue

The negative economic effects by price risks seem to be an ongoing issue for manufacturing companies. Despite the current economic slowdown, many producers are moderately to very strongly affected by price risks. 46.1% perceive a strong to very strong economic strain by volatilities. 41.7% of the companies state a moderate economic strain. Concerning price increase, 57.3% of the companies struggle with strong to very strong negative effects on their business. 34.2% are affected moderately.

Further intensification in the future

The results of the study show that the economic pressures that are caused by price risks will intensify in the future. 60.5% of the companies expect strong to very strong negative effects on their business due to volatilities. The same applies for negative effects of price increase. 72.6% of the companies indicate a strong to very strong impairment by price increase. Moderate economic

strains that are caused by volatilities are expected by 34.5% of the respondents. 24.8% expect moderate negative influences by price increase.

Size does not matter

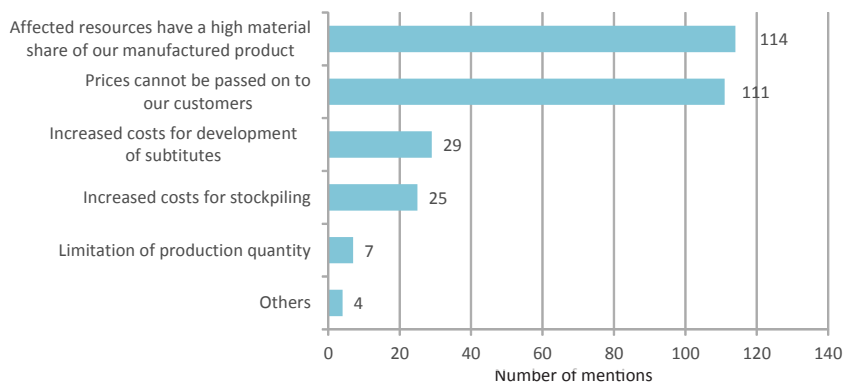
The detailed data analysis shows that companies of all branches and sizes are similarly affected by price risks. We found no proof for the hypotheses that small and medium companies are more affected by price risks than big industry players. The same applies for the different branches of industry. We also tested the different supply chain positions (a) extraction of natural resources/mining company, (b) treatment of natural resources/supplier of raw materials and basic products, (c) xth-Tier supplier of semi-finished products and/or finished products, (d) 1st-Tier supplier of semi-finished products and/or finished products, and (e) OEMs. However, we found no noteworthy influence concerning the different supply chain positions and the vulnerability to price risks.

06

Causes of Economic Strain

VIII. Why do these price volatilities/increases affect your business?⁷

Multiple answers possible.



⁷ Question was only asked to companies who are at least moderately affected by price risks; n = 146

Factors that lead to a latent threat by price risks

Based on the study results, we can assume the following interrelation: Companies that use risky resources and at the same time negate the criteria (a) small share of risk resources on product and (b) possibility to pass on price increases have a latent risk for moderate to very strong negative economic effects caused by price risks. In this case, we recommended analyzing the potential economic effects of price risk in more detail and introducing a systematic price risk management.

06

Causes of Economic Strain

PRICE RISK ISSUES IN THE COMPANY

Companies affected by price risks

Companies that are moderately to very strongly affected by price risks name the high material share of resources on the produced product (78.1%) and the fact that price changes cannot be passed on to customers (76.0%) as main issues causing economic strain in the company. About one fifth of the companies (19.9%) indicate increased costs for the development of substitutes as an effect of price risks and a cause for impaired operating results. Additional 17.1% state that they have higher costs due to increased stock piling, while 4.8% of the companies even have to deal with a limitation of production quantity. As further aspects an increased risk of substitution by other companies, decreased competitiveness, and

the danger of margin reductions due to long term agreements with the customer were named by the participants of the study.

Companies not affected by price risks

The companies that are not that much affected by price risks state that either the risky resources used do not have a relevant share on the produced product or prices can be passed on to customers. Further alternatives were not mentioned. As a result of these statements, we come to the conclusion that (a) the share of risky resources on product and (b) the possibility to pass on price increases are essential factors for the level of the corporate strain caused by price risks.

07 Taken Measures

MANY INITIATIVES, LITTLE HOLISTIC APPROACHES

Responses to price risks - current state

About two thirds of the companies (62%) have already started initiatives for price risk management. 18% plan to do so in the near future. 20% of the affected companies did not yet implement preventive price risk measures.

Lack of a holistic view

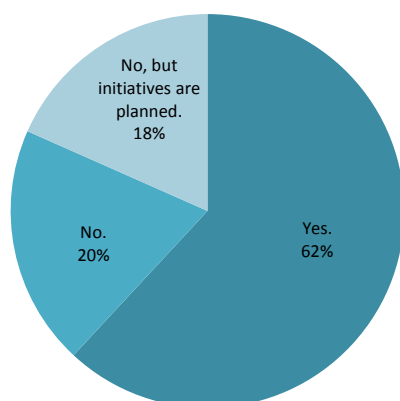
Looking closer at the initiatives, many companies do not pursue a holistic approach. Only seven companies (6.7%) stated that they have implemented a systematic risk management. The vast majority of the companies, however, pursues a series of individual risk management measures. The use of financial and contractual hedging methods, such as forwards or futures, is particularly widespread. Long-term contracts with customers and passing on of price increases to customers follow second and third. Only a few companies use energy and material efficiency of products and processes to reduce the general consumption of critical resources. But also approaches, such as design-to-cost or an increased diversification, yet

seem not to be used much as instruments. The reason for this might be the power position and the interconnectedness of the purchasing function in the manufacturing company. Moreover, price risks are preliminary perceivable in the purchasing function. The most often used risk management instruments can nearly all be implemented by the purchasing department on its own. Approaches which intervene for example at early stages (e.g., in the product or process design phase) in order to minimize or avoid price risks are very effective. However, they require collaboration with other departments (e.g., product development, process development) that are typically not aware of the threat and the consequences of price risks. For the implementation of a holistic risk management approach, it is therefore essential to generate a fundamental understanding for this topic among all stakeholders in the company. Moreover, managers need to have good political skills to enforce a holistic risk management approach against all internal struggles for power and against diverging interests.

07 Taken Measures

IX. Are there any initiatives for price risk management in your company?⁸

Please choose.



⁸ Questions was only asked to companies who are at least moderately affected by price risks; n = 104

Measures for risk management in detail

- Hedging (22 mentions)
- Long-term contracts (16 mentions)
- Passing on of price increases to customers/price escalation clauses (10 mentions)
- Multiple supplier strategy (8 mentions)
- Substitution (8 mentions)
- Stock piling (incl. consignment) (7 mentions)
- Systematic risk management (7 mentions)
- Forecasting & cost models (6 mentions)
- Natural hedging (5 mentions)
- Index price based procurement (4 mentions)
- Global sourcing (4 mentions)
- Increase of efficiency (4 mentions)
- Strategic supplier management/development (3 mentions)
- Design-to-cost (2 mentions)
- Own raw material trade (2 mentions)
- Raw material exchange projects/provisioning of material for suppliers (2 mentions)
- Use of recycling material (1 mention)
- Global coordination of procurement (1 mention)
- Diversification (1 mention)
- Optimized planning (1 mention)
- Reinforcement of the purchasing teams (1 mention)

08

Bargaining Power in the Supply Chain

SUPPLY CHAINS ARE CUSTOMER DRIVEN

Pressure on all fronts

The detailed analysis of the companies' bargaining power in their supply chains reveals that the majority of the companies are located in the upper right corner of the dominance matrix (see p. 19). The firms are dominated by customers as well as suppliers. Several branches of industries (e.g., rubber & plastics, metal processing) take here consistently poor positions. They are strongly dominated by suppliers and customers.

Regarding the average values of the branches of industry in the following chart, a tendency for customer dominance in the supply chain is obvious. Solely the chemical industry records slightly stronger supplier dominance (visible by the relative position to the angle bisector). Noticeable is also the average industry value of the pharmaceutical industry. It is the only industry that takes a balanced power position in the dominance matrix.

Design and brand: a relevant advantage?

Examining the single companies in detail, we found that all companies – except one – are either

located in the two matrix fields "Dominance Customer" and "Dominance Supplier & Customer" or on the balanced lines in between the four fields. Solely one company manages to qualify for the "Dominance Company" field. The successful practice company is a well-known OEM manufacturer in the automotive sector. The OEM can surely benefit from its company size and order volume and therefore generate a relevant advantage concerning power on the supply side. On customer side, however, these attributes do hardly generate a dominant power position, as similar structured companies of the sample show. The question that arises is: What is the relevant difference between the other companies and the well positioned OEM?

We suppose that there is a significant relationship between design/brand and the bargaining power of the company on customer side. This aspect might also be decisive for the ability to pass on price increases to the customer and therefore the defense against price risks. Since this hypothesis cannot be verified by a single case, we have to test it in further studies.

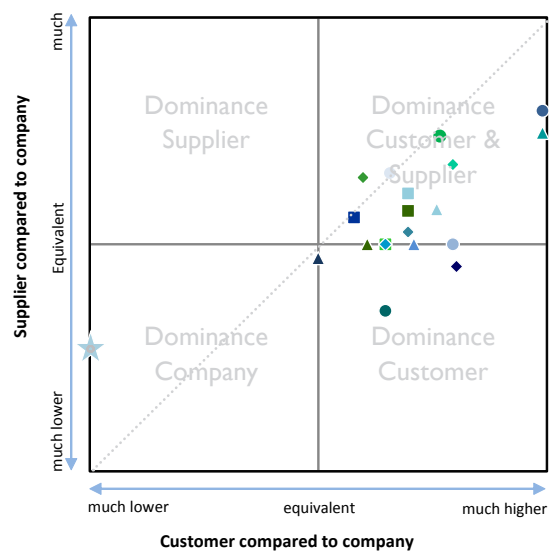
08

Bargaining Power in the Supply Chain

X. How do you rate the power relations in the supply chain of your core product?⁹

- Plant Construction
- ▲ Automotive
- Mining & Raw Materials
- Building Materials
- Chemical Industry
- ▲ Electronics & Electrical Engineering
- Rubber & Plastics
- Consumer Goods
- Food & Beverages
- ▲ Mechanical Engineering
- Medical Technology
- Metal Production/Smelting
- Metal Processing
- ▲ Furniture
- Optical Industry
- Pulp & Paper
- ▲ Pharmaceutical Industry
- Textile Industry
- Others

★ Successful Practice: Automotive OEM



⁹ Average values of industries; n = 96

Details of data analysis

To map the bargaining power in the supply chain, we asked for the power relations between (i) supplier and company and (ii) customer and company. Their answers aggregated by industry are displayed in the dominance matrix above.



CONTACT



Prof. Dr. Thomas Friedli
Chair for Production Management
Phone: +41 (0)71 224 73 10
E-mail: thomas.friedli@unisg.ch



Maria Fischl
Research Associate
Phone: +41 (0)71 224 72 64
E-mail: maria.fischl@unisg.ch



Axel Faix
Research Associate
Phone: +41 (0)71 224 72 67
E-mail: axel.faix@unisg.ch



University of St. Gallen

Institute of Technology Management
Chair for Production Management
Dufourstrasse 40a
CH-9000 St. Gallen
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