

**Title:**

**What factors matter for companies' inclination towards corruption in procurement?**

Abstract  
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by

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### **Self contained summary:**

We want to know why some companies, especially purchasing units, are involved in corrupt business and others are not. What makes companies more prone to corruption than others? Our theory is that there are specific factors which are responsible for an organization's inclination to corruption. It is our central research goal to identify these factors by using a structural equation model and try to find how strong the loads of the single factors are in order to examine strength and direction of these. In a second step we analyse the link between inclination towards corruption and the usage of control and prevention instruments. Assuming there is a systematic bias in our results when asking the corporations directly about corrupt activities in their company, we have to take another way in our pre-test and modify our structural equation model slightly. We focus on corruption in the supply chain for small and medium-sized companies (privately owned), because we assume that large companies are directly influenced by laws and bylaws to establish reasonable instruments, processes and procedures. Management scholars have published about corruption regarding individual (Brass, Butterfield & Skaggs, 1998; Jones & Ryan 1997) and organizational aspects (Baucus & Near, 1991; Brief, Buttram, & Dukerich, 2001). We are concentrating on structural factors, which try to explain why some corporations are more prone to corruption than others

*Key words:* corruption, structural equation model, supply chain management

### **Problem Statement**

Germany has recently been shocked by almost daily upcoming news about the Siemens scandal. But one can notice a change in the way of reporting about corruption and other illegal practices. Formerly, media referred to individual and situational factors which were considered to be responsible for corrupt activities in organizations. In these days the debate about corruption focuses more and more on structural factors and explanations. The "System Siemens" (Financial Times, 2008) is only one of many expressions used to explain that there are structural dysfunctions in an organization.

### **Theory**

When talking about organizational corruption research can relate to different theoretical perspectives like sociology, management, criminology, political sciences or economics. All these perspectives have different theoretical aspects like the principal-agent theory (Tirole, 1996; Pies, 2001), social networks (Nielsen, 2003), normalization of corruption (Ashforth & Anand, 2003), the incentive-contribution theory (March, Simon, 1993) or ethical decision-making frameworks (Jones & Ryan, 1997). The principal-agent theory combined with the incentive-contribution theory are the most appropriate theories to explain the root of corruption for our research idea. In the incentive-contribution theory enterprises are regarded as a cooperative system. Organizations induce individuals by incentives to participate. In the context of their participation individuals have to deliver contributions. Thus an equilibrium between incentives and contributions is to prevail. Organizations are in an equilibrium if the contributions are sufficient to create so many incentives that the individuals are motivated to deliver further sufficient contributions. If individuals think their contributions are bigger than incentives they get, then they try to increase their material or immaterial income in order to achieve this individual equilibrium. One way to get compensation for their missing incentives refers to the potential of external stakeholders like suppliers or customers which can be exploited to the disadvantage of the employer Especially employees with a high degree of

freedom in their work area (e.g. work on the borderline of systems) have the possibility to take advantage of that (Simon, 1976).

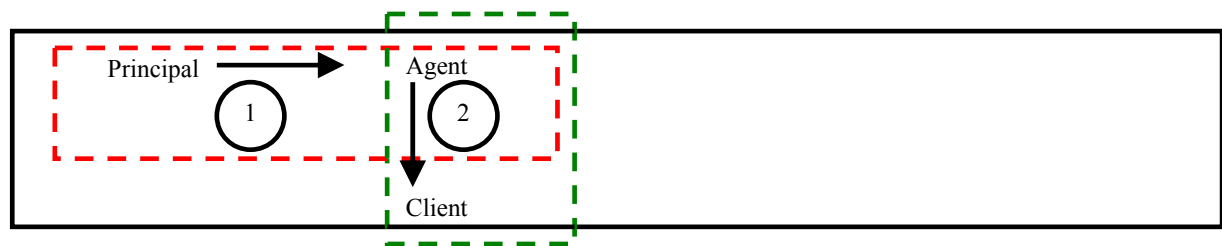


Figure 1: Principal-agent theory

According to the principal-agent theory the principal (1) settles a contract with an agent (2). In our model the purchasing manager is the agent. The agent has to negotiate with different external clients in order to achieve organizational goals like best price and/or best quality. If one client tries to influence the agent in form of “kickbacks” or other individual benefits the chance to get the contract increases although that client does not have the best offer. Consequently, the principal has a financial damage. Therefore he should avoid this situation (Pies, Sass, zu Schwabedissen 2005).

### Research model and method

As method we use the structural equation model with the Partial Least Squares (PLS) approach. This variance based approach enables us to analyse reflective as well as formative causal models. To appraise the quality of the model we use the bootstrapping method. For economic science and procurement research in Germany this method has been seldom used yet. Many of the cause models are falsely specified because they use covariance based methods which are not appropriate for formative constructs.

In the following we present and explain our simplified structure equation model, which shall help to identify and rank structural factors for the inclination towards corruption.

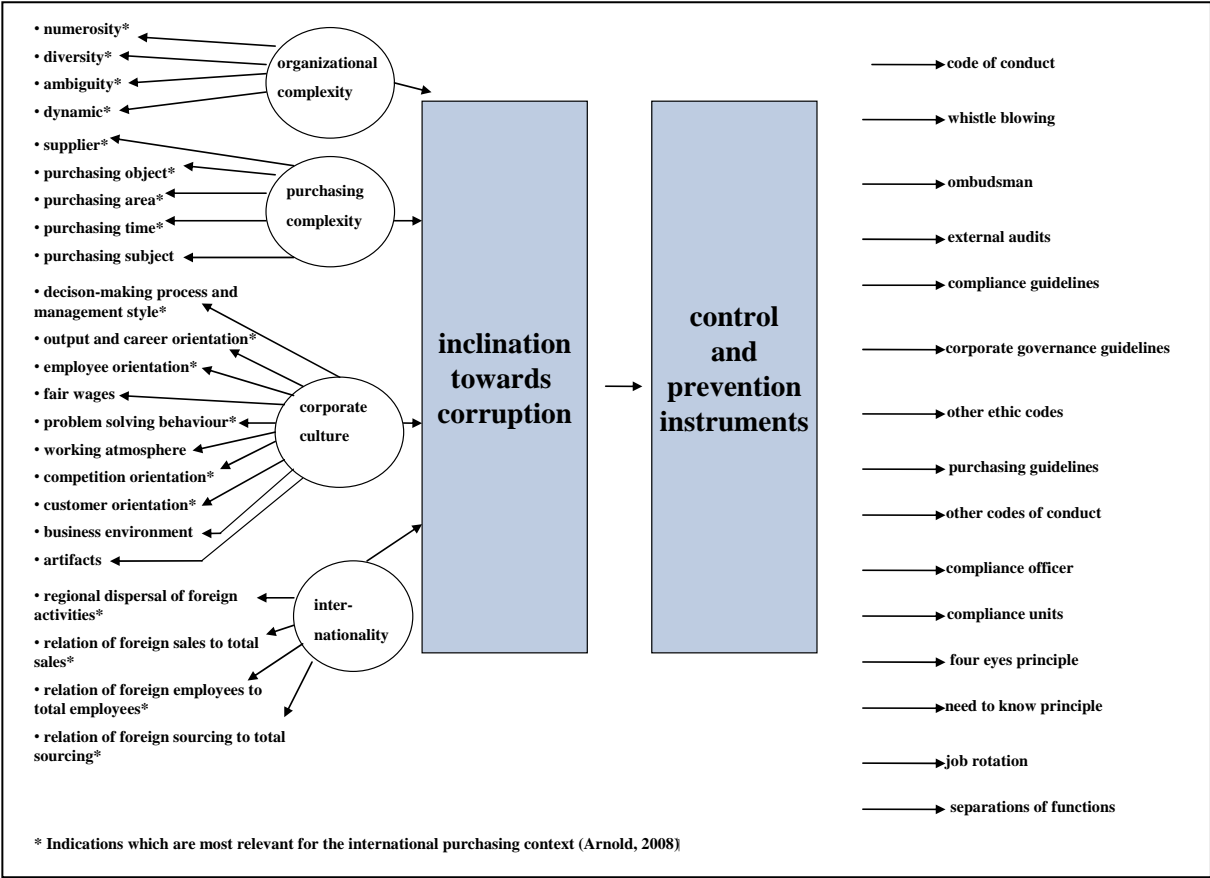


Figure 2: Structural equation model

This structural equation model focuses on the inclination of enterprises regarding corruption. This latent endogenous variable will be operationalized by purchasing complexity, organizational complexity, corporate culture and internationality. Corruption and the inclination towards corruption are two different terms. Not every company which is inclined towards corruption is involved in corrupt business. This simplified model gives a first idea of our theory. Indicators and latent constructs still have to be specified and validated in an upcoming pretest. Indicators which load on the latent exogenous constructs are shown on the left side. Indicators which are most relevant for the international purchasing context are marked by an asterisk. As already mentioned we focus only on relevant indicators for supply management. As we want to work on this model for the next year, we want to bring it in an intercultural context. So we are focusing not only on purchasing relevant factors, but also on indicators which are relevant for the intercultural context.

### *Hypotheses and Operationalization of the Constructs*

The indicators of purchasing complexity are related to the sourcing toolbox of Arnold (Arnold, 1996) which consists of purchasing area, purchasing time, purchasing subject, purchasing object and net product place. We changed this sourcing toolbox slightly to make it fit for our model. This indicator is related positive with our latent construct corruption liability.

H1: The more complex purchasing, the more liable towards corruption the company is.

Reiss (1999) defines network complexity by multi-laterality and boundlessness. Multi-laterality is divided into variety and diversity. Boundlessness is divided into ambiguity and changeability. We follow this definition and transfer his perception to the supply chain sector.

H2: The more complex an organization, the higher the probability of the company towards corruption.

Corporate culture is appropriate to fight corrupt occurrences in companies (LKA Nordrhein-Westfalen, 2007). It is difficult to operationalize this latent construct, especially since there is no consistent definition of corporate culture (Rosseau 1990, p. 153ff.; O'Reilly et al. 1991, p. 487). We refer to a definition from Schein (Prätorius, Tiebler 1993) which is very often cited in literature. Qualitative and quantitative approaches can be used to characterize corporate culture. Qualitative approaches are appropriate to find different and new items, but they are very special and difficult to generalize. The quantitative method makes it possible to compare and to standardize results (Siehl, Martin 1988; Zammuto, Krakower, 1992). In literature definitions vary quite widely (Gordon, di Tomaso, 1992; Detert, 2000), but for quantitative analyses there are core dimension which combine all definitions (Unterreitmeier, 2004). These core dimensions are: decision-making process and management style, output and career orientation, employee orientation, fair wages, problem solving behaviour, working atmosphere, competition orientation, customer orientation, business environment and artefacts.

These core dimensions will be adopted and slightly changed for our purposes. We assume a negative correlation between corporate culture and liability towards corruption.

H3: The worse the corporate culture of a company, the greater the tendency towards corruption.

It is generally known: different countries with different cultures have different habits. Consequently, the corruption index by Transparency International lists countries with different degrees of corruption. Our following hypothesis bases on two aspects. Firstly, if somebody acts in many different countries with many different holdings, the monitoring effort increases. Secondly, if involved in business with countries having a higher corruption index (for example: Middle East Area) compared with the home country, the chance of getting involved in corrupt activities is higher than doing business only within the home country or countries which have a lower index. For the latent construct internationalization we focus on the economic dimension and not on the financial one. The first indicator refers to Sullivan (1994) and is "relation of foreign sales to total sales", which is probably the best known. The relation of foreign employees to total employees is the second one. The third indicator refers to the work of Ietto-Gillies (1998) and is defined as the regional dispersal of foreign activities. The fourth indicator refers very strongly to the supply chain activities and describes the relation of foreign sourcing to total sourcing.

H4: The more international a company, the greater the tendency towards corruption.

If a company knows that it has a significant raise in liability to corruption, it makes an increased effort to install different control and preventions instruments to inhibit such drifts. The German attorney Wolfgang Schaupensteiner, who is very active fighting corruption and who was recently appointed Chief Compliance Officer (CCO) of Deutsche Bahn AG, emphasizes that a bundle of instruments are useful to detect and prevent corruptive activities. The higher the tendency towards corruption, the higher the necessity to use more and different control and prevention instruments. This latent endogen construct can be measured reflectively by different instruments. The most cited in literature are whistle blowing, code of conduct, external audits, compliance units, rotation principle and four-eyes principle, compliance officer, other ethic codes, purchasing guidelines, ombudsman, need-to-know principle, separation of functions, compliance guidelines and corporate-governance guidelines.

H5: If a company has an increased liability to corruption, it uses more control and prevention instruments

### **Design of the pre-test**

The study tries to find the main drivers of the inclination towards corruption and analyses the load and the direction of the influencing factors. In a first step we interviewed four experts regarding corruption to guarantee content validity of the model. We explained them our structural equation model and discussed the main drivers of tendency towards corruption, which shall be modified, which shall be dropped and which shall be added. Furthermore we assume that employees are not very honest when talking about corruption (Lambsdorff, 1998). So first of all we want to check if there is a systematic bias. Our approach is to check our model without the construct inclination towards corruption and will not mention corruption in our questionnaire explicitly. In a pre-test we analyse the influence of organizational complexity, purchasing complexity, corporate culture and internationality on the usage of control and prevention systems.

There are four hypotheses for our pre-test:

H1: The more complex an organization, the more control and prevention instruments will be used.

H2: The more complex purchasing, the more control and prevention instruments will be used.

H3: The worse the corporate culture of a company, the more control and prevention instruments will be used.

H4: The more international a company, the more control and prevention instruments will be used.

The latent constructs have been operationalized as already described. Figure 3 shows the simplified structural equation model of the pre-test.

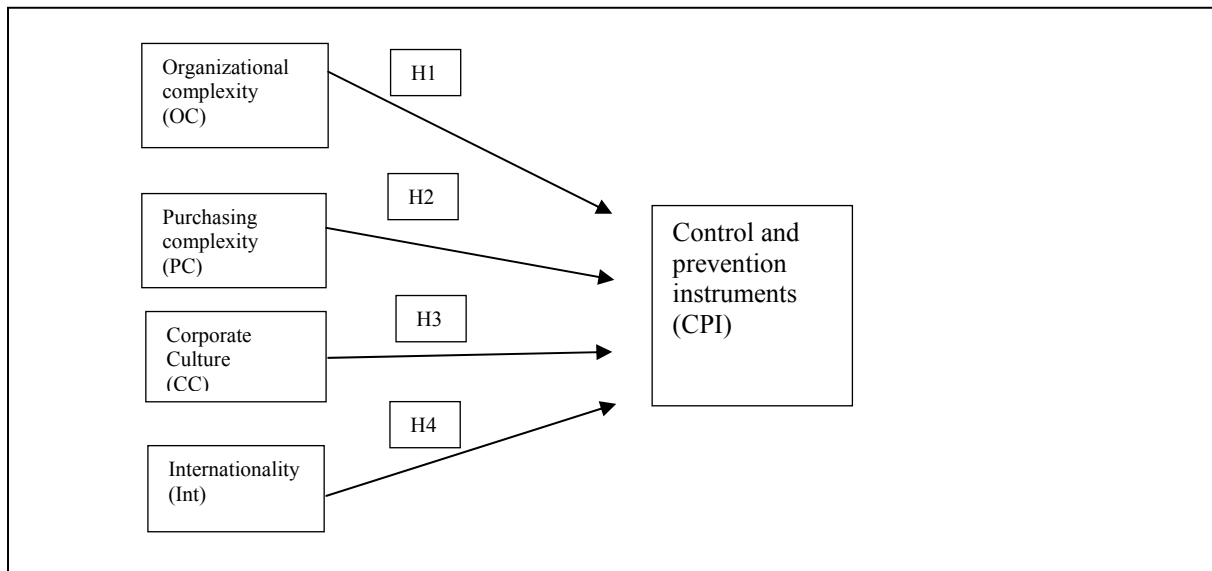


Figure 3: Structural equation model (Pre-test)

In the main study which will follow afterwards we include the construct inclination towards corruption. The hypotheses of the main study have already been described. In a third step we compare the results of the pre-test and the main study and analyse differences and communalities.

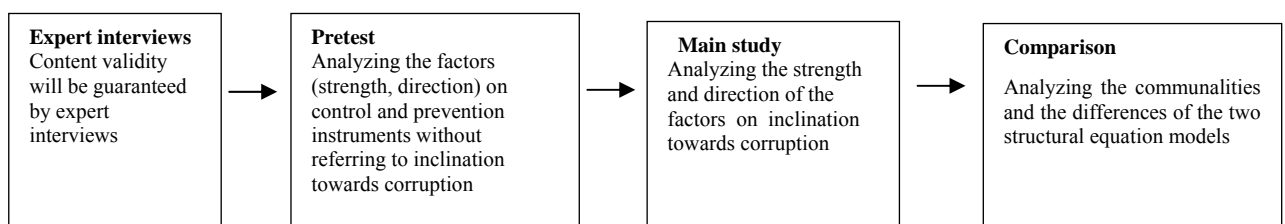


Figure 4: Process of the study

### Data analysis

For the pre-test we sent 120 questionnaires to small- and medium sized companies in Germany. We asked purchasing managers to answer the questionnaire and send it back to the University of Stuttgart. 30 questionnaires were sent back, which is a response rate of 25 percent. We used SmartPLS 2.0M3 software to validate the structural equation model (Ringle, 2005). This variance based approach has the advantage to analyse formative as well as reflective constructs (Huber, 2007, Diamantopoulos, 2001). Furthermore, this method is appropriate for explorative studies and can contribute significantly to the development of theories (Götz, 2004). Finally, it is appropriate for small samples, because the size of the survey does not improve the goodness of the model (Fornell, 1982). A detailed comparison

between Structural Equation Modelling with Partial Least Squares and Covariance-Based Structural Equation Modelling is shown in figure 5 (Chin, 1999).

<b>Criterion</b>	<b>Structural Equation Modelling with Partial Least Squares</b>	<b>Covariance-Based Structural Equation Modelling</b>
Objective	Prediction oriented	Parameter oriented
Approach	Variance based	Covariance based
Assumptions	Predictor specification (nonparametric)	Typically multivariate normal distribution and independent observations (parametric)
Parameter estimates	Consistent as indicators and sample size increase (i.e. consistency at large)	Consistent
Implications	Optimal for prediction accuracy	Optimal for parameter accuracy
Model complexity	Large complexity (e.g., 100 constructs and 1,000 indicators)	Small to moderate complexity (e.g., less than 100 indicators)
Sample size	Power analysis based on the portion of the model with the largest number of predictors. Minimal recommendation range from 30 to 100 cases.	Ideally based on power analysis of specific model – minimal recommendations range from 200 to 800.
Latent variable scores	Explicitly estimated	Indeterminate
Epistemic relationship between a latent variable and its measures:	Can be modelled in either formative or reflective mode	Typically only with reflective indicators

Figure 5: Comparison between variance based and covariance based approaches (Chin, 1999)

Organizational complexity, purchasing complexity, corporate culture and internationality include a five point bipolar rating-scale (anchor point: “this is absolutely true” and “this is absolutely not true”). Additionally the respondents had the chance to mark with a cross the item (“I can not evaluate this item”). Control and prevention instruments include a dichotomy item, which means that there was only the possibility to mark yes or no. A five point bipolar rating-scale does not make sense because there is no way to evaluate certain nuances of for example whistle blowing. Either a company has it implemented or not.

### *Results of the Pre-test*

Branches are our first aspect we take a closer look on. We sent the questionnaire to small and medium sized-companies. Figure 6 shows which branches are included in the survey.

The most relevant branch is the industry sector with 23 %, followed by the energy and trade sector with 13 % and technology and pharmaceuticals sector with 10%. The automobile and the logistics range on one of the last positions with 7% and others with ca. 3%.

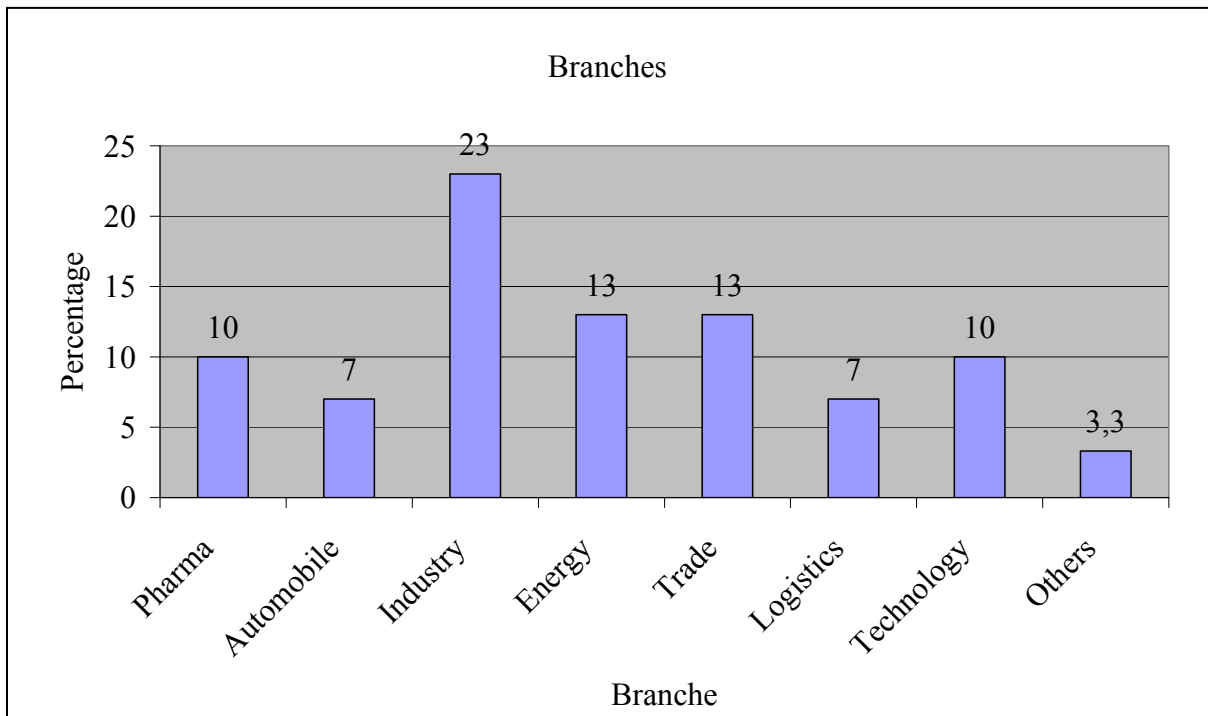


Figure 6: branches in percentage

Our next focus is the number of employees who work in purchasing (fig. 7). More than 50% of our survey have more than 250 purchasing employees. 20% of all companies have 51 – 249 employees, 23% work with 10 – 49 employees and none of our corporations has less than 10 employees in procurement.

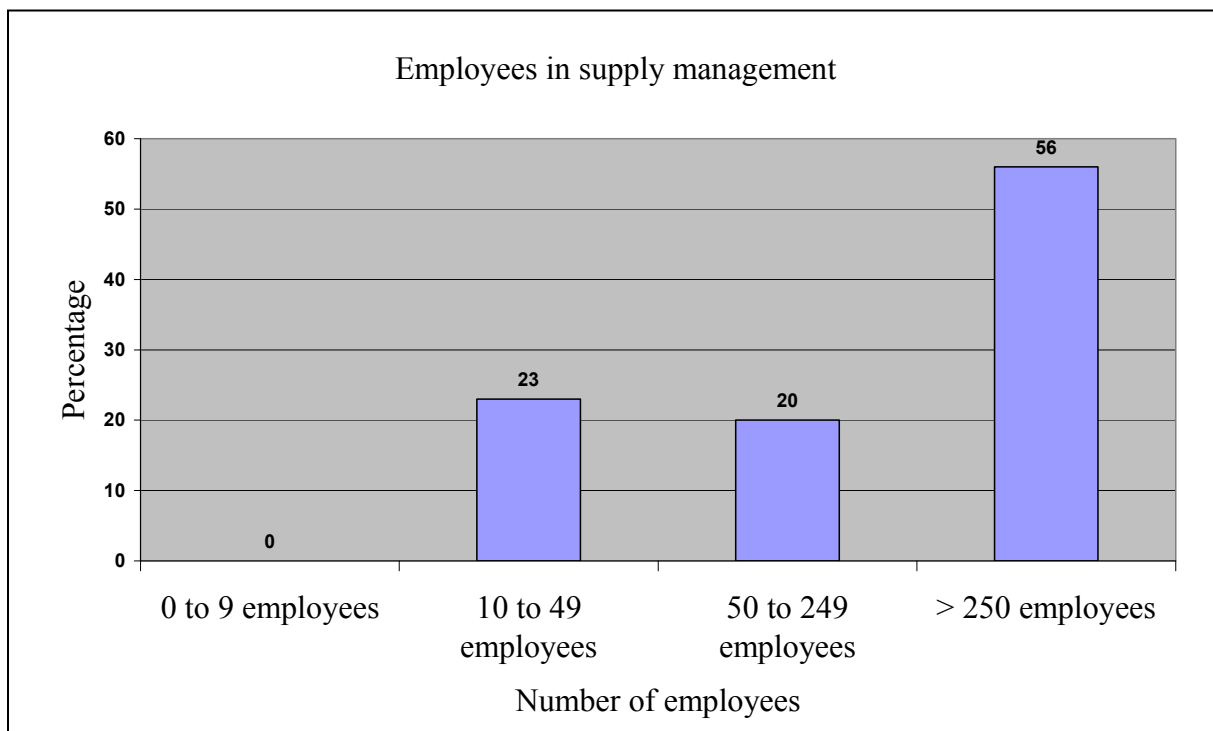


Figure 7: number of employees in supply management

In figure 8 we illustrate the procurement sales in million€. Almost 50% have a purchasing volume of 0-99 million€. 23% have a procurement volume of 100 to 499 million€ and 26% of all companies more than 1 billion€. 7% of all corporations have between 500 and 999 million€.

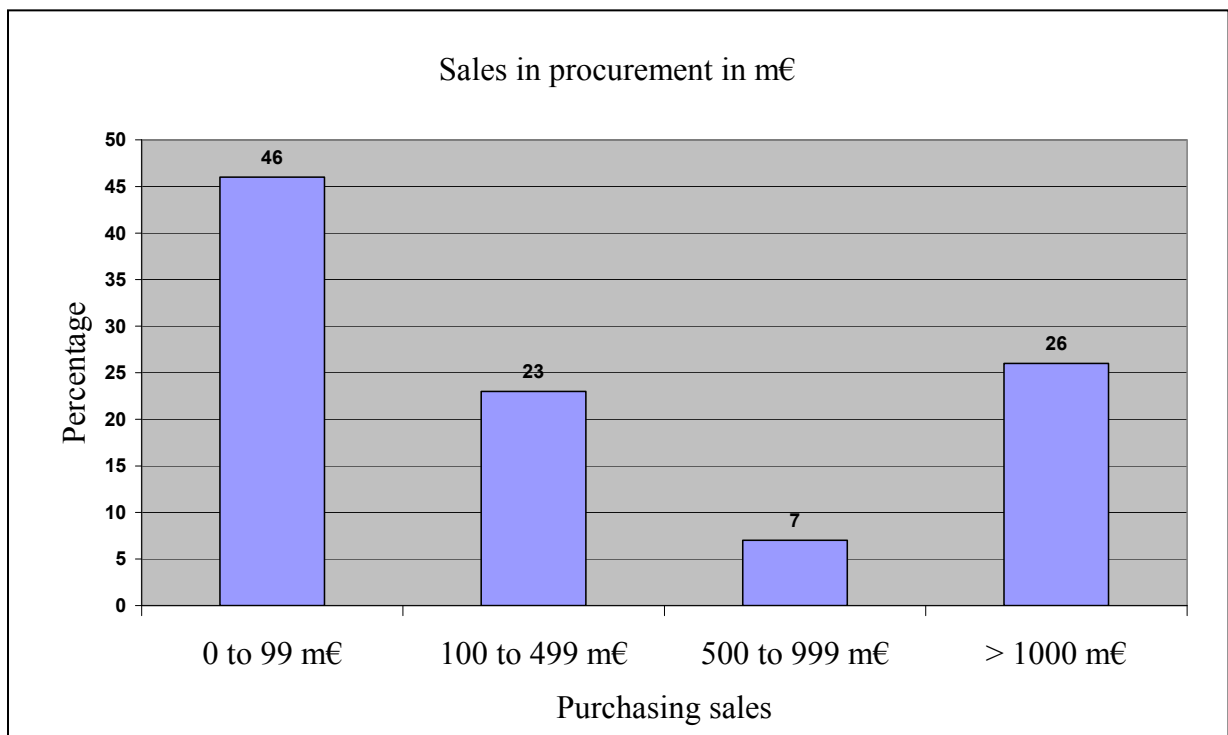


Figure 8: procurement sales in m€

### The PLS-Path model

Structural equation models can be illustrated in two different parts. The structural model describes the relation between the latent constructs (Diamantopoulos, Siguaw 2000, Jöreskog 1982). In our study we differentiate between purchasing complexity, organizational complexity, corporate culture, internationality and control and prevention instruments. On the other side there is the measurement model which shows and evaluates the indicators and allocates the indicators to the latent constructs. Exogenous latent constructs (purchasing complexity, organizational complexity and corporate culture, internationality) are independent and the reason for causalities. Endogenous latent constructs (control and prevention instruments) are dependent and influenced by other latent constructs. Figure 9 shows the structural equation model of the pre-test.

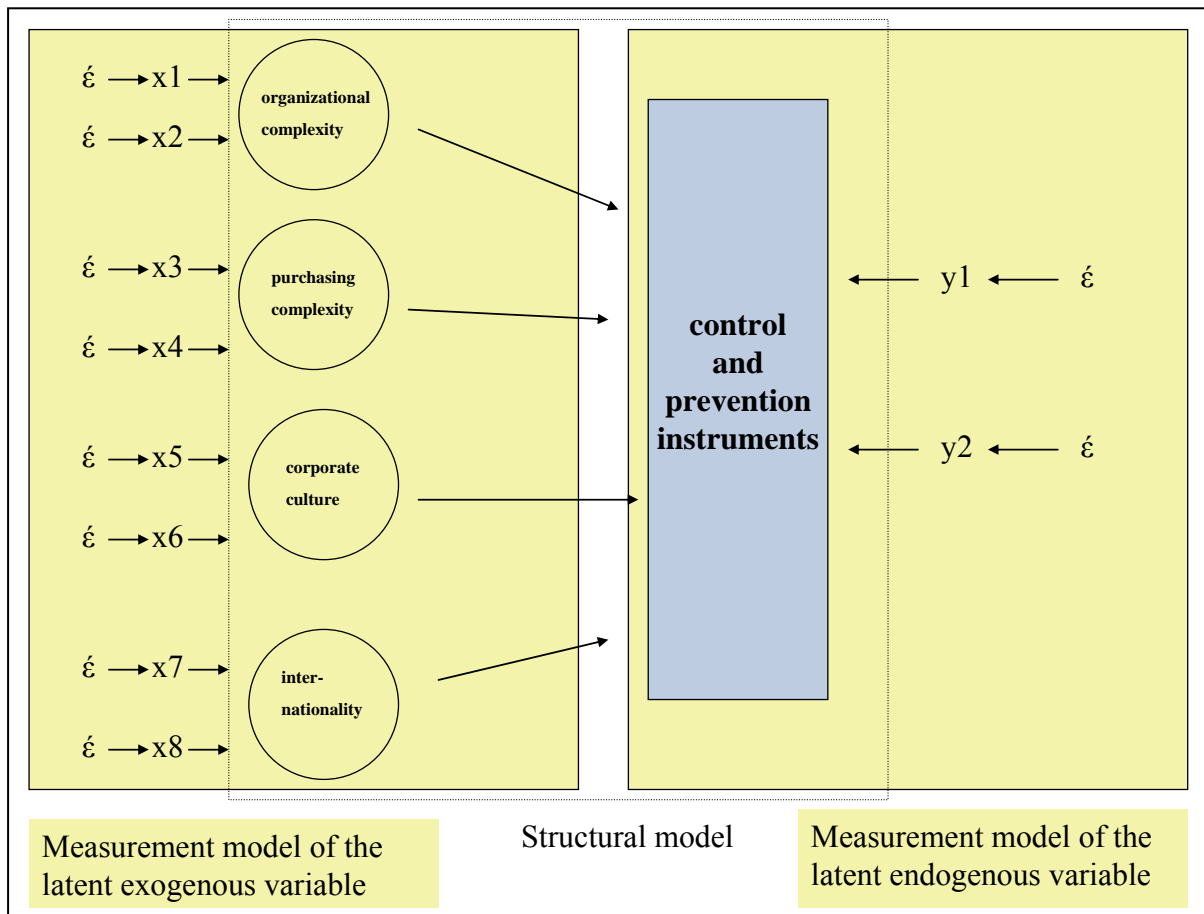


Figure 9: PLS-Path model

### *Goodness of the measurement model*

The first step of the analysis is to test the path model based on the disclosure of the participants.

After that it is necessary to evaluate the latent constructs which can be formatively or reflectively specified. For each of these constructs there are different goodness criteria considered. Our latent constructs are all reflectively specified.

Content validity has already been testified by several expert interviews. Indicator reliability checks that each manifest variable is more correlated to its own latent variable than to the other latent variables. Factor reliability is constituted by a value of 0.6 and the average variance extracted (AVE) should be over the threshold of 0.5, which means that all latent variables are represented by their indicators quite well. Convergent validity, the values of the average variance extracted (AVE) were observed, as proposed by Fornell and Larcker

(Fornell, Larcker 1981). The right column of the table shows whether the Fornell Larcker-criterion is fulfilled. Table 1 gives an overview for all reflective measurement models.

Latent constructs	Cronbach's Alpha	Composite Reliability	AVE	Square root of the AVE	PC	CC	INT	Fornell-Lacker-criterion
CPI	0.82	0.85	0.30					√
OC	0.64	0.76	0.46	0.30				√
PC	0.38	0.74	0.60	0.24	0.25			√
CC	0.78	0.81	0.44	0.136	0.0016	0.06		√
INT	0.95	0.96	0.87	0.28	0.115	0.04	0.15	√

Table 1: Overview of statistical database

For the measurement model, individual item loadings, construct reliability (internal consistency), convergent validity and discriminant validity were investigated. Regarding individual item loadings, 32 out of 37 overall items exceeded 0.4, thus considered reliable for an explorative study (Götz, 2004). Only five items produced values far below 0.4 and were removed.

Internal consistence reliability was based on Cronbach's alpha and composite reliability. All values were considered reliable (0.7 for Cronbach's alpha and composite reliability) (Chin, 1998), except the value of Cronbach's alpha for purchasing complexity (0.38), but still over the threshold of 0.7, if compared with composite reliability. Obviously all values exceed 0.7, which is regarded enough in early stages of research. (Nunally, Bernstein 1994).

In the case of discriminant validity, the values of the average variance extracted (AVE) were observed, as proposed by Fornell and Larcker (Fornell, Larcker 1981). Only two constructs corporate culture and control and prevention instruments are below 0.5, which may be explained by the very complex constructs like corporate culture and consequently lead to further research in the main study. At last, for the assessment of discriminant validity, all constructs produced satisfactory results for the square root of the AVE (Fornell, Larcker 1981).

### *Goodness of the structural model*

Regarding the structural model, a re-sampling technique was used, based on bootstrapping (200 re-samples) (Gefen, 2000).  $R^2$  is the coefficient of determination for the inner model. Corporate culture has a value of 0.59, which is almost substantial (Chin, 1998).

Forecasting relevance is constituted by communality and redundancy. "One would use the cross-validated redundancy measure to examine the predictive relevance of one's theoretical/structural model." (Chin, 1998). Blindfolding helps to see if the values are above or below one. The effect size  $f^2$  is a relevant key figure regarding forecasting relevance. Values of 0.02, 0.15 and 0.35 can be viewed as a gauge for whether a predictor latent variable has a weak, medium, or large effect at the structural level. Purchasing complexity (0.12), organizational complexity (0.14) and corporate culture (0.152) have values above zero, which

means they all have effect at the structural level. Internationality has a medium effect with 0.250.

The examination of the t-values was based on a two-tail test with statistically significant levels of  $p < 0.05$  (\*). The results are shown in Figure 10.

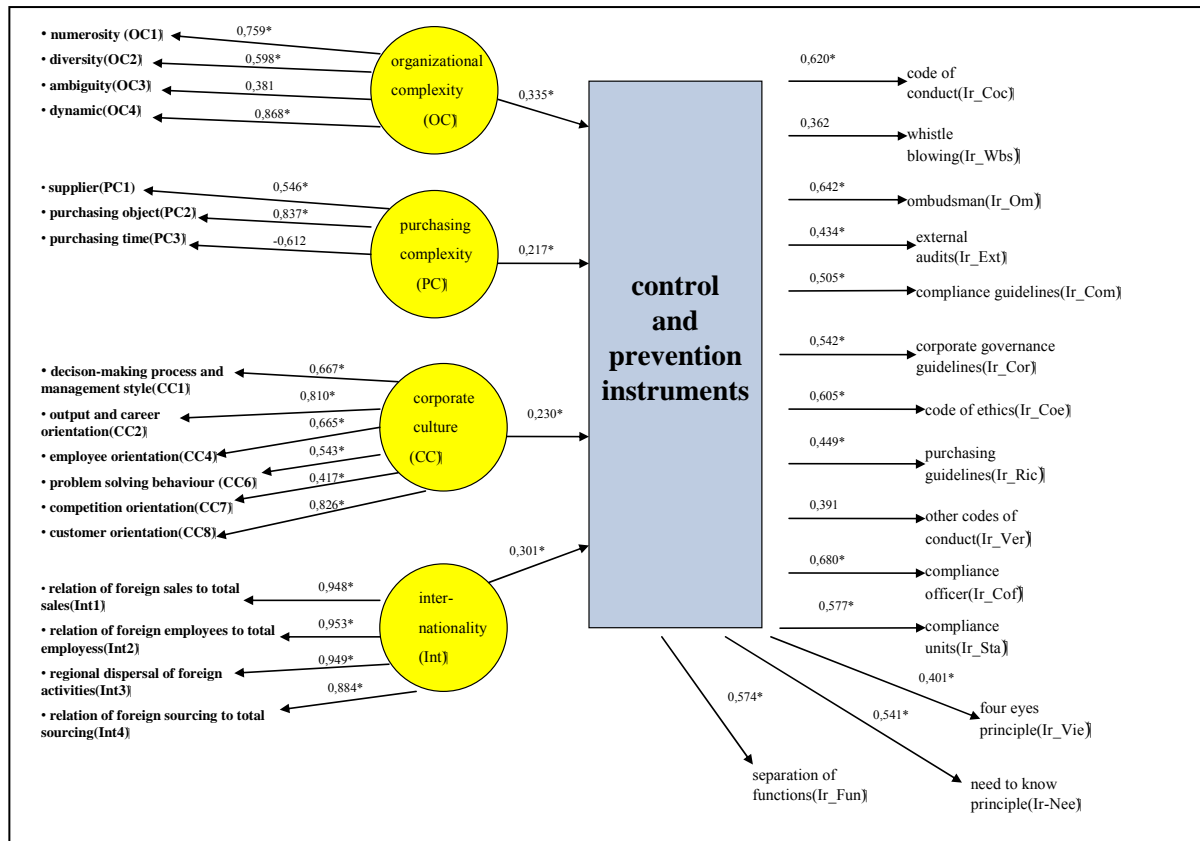


Figure 10: Structural equation model (pre-test)

## Discussion

Looking at the latent constructs it is obvious that they are quite well operationalized by their indicators. For PC, CC and CPI we had to remove indicators, as we have already mentioned above. For example the indicator purchasing area does not have any influence on purchasing complexity. For purchasing managers it does not have much impact on their work load or their complexity if they receive their goods not only from local suppliers. This seems interesting especially if we take into account that sourcing in emerging markets is very costly in terms of time. One explanation is that most purchasing processes are already standardized and do not have much influence on the nationality of the supplier. Further we had to remove the indicator ambiguity regarding organisational complexity. It does not make any difference for OC if employees work on different projects at the same time.

For interpretation of the results, we have to take a look at the t-values, which we produced via bootstrapping. As you can see in figure 10 all items marked with an asterisk are significant. First of all we are starting with the latent construct organizational complexity. The biggest influence on organizational complexity has dynamic (0.868) and the lowest influence on OC has ambiguity (0.381). It makes sense that the dynamic of a company and many restructuring measures do have a greater impact on organizational complexity than the fact that employees

work on different projects at the same time. Surprisingly is that ambiguity does not have any significance relevance on organizational complexity. Diversity - the number of different organisational structures (project organisation, matrix organisation etc.) - has a value of 0.598. Numerosity (the number of purchasing units in a company) has more impact on organizational complexity (0.759) than diversity (0.598) and ambiguity (0.381), but less than dynamic (0.868). Regarding PC we have to say that the place (international vs. local), where products are supplied and the time (just-in time) do not have a significant impact on purchasing complexity and consequently had been removed. For purchasing managers the biggest impact on the complexity of their work has the kind of product they purchase (simple parts vs. components). The more complex the product, the more complex procurement is. The quantity of suppliers has also an influence on purchasing complexity (0.546), but not that strong as the purchasing object (0.837).

Our next concern is corporate culture and its indicators. Obviously customer orientation (0.862) has the biggest influence on corporate culture followed by output and career orientation (0.810) and employee orientation (0.665). This result is comprehensible, because customer and employee orientation are linked with each other. It is generally known that employees can only do a good job and can act in a customer-oriented way if they are treated well by their principals. If firms do not rely on their employees and develop their potentials, how can they achieve customer-orientation and satisfaction? In addition problem solving behaviour has a relatively low value (0.543). This means that managers do not give their employees enough support when they are in trouble. The lowest value has competition orientation (0.417). This makes sense, because a good corporate culture is not dependent on how competition oriented a company acts.

Regarding internationality the most significant aspect is the relation of foreign employees to total employees (0.953) and the lowest influence on internationality has the relation of foreign to total sourcing (0.884). This is reasonable, because most of the employees perceive their corporation as being international if they have many colleagues from different countries all over the world. This matters more than global sourcing. The indicators regarding internationality are very strong.

The last aspect of the measurement model refers to the latent construct control and prevention instruments. The compliance officer (0.680) and the ombudsman (0.642) have the greatest significance of all instruments. All other control and prevention instruments have values between 0.401 (four-eyes principle) and 0.605 (code of ethics). Interestingly, we had to remove the indicator job rotation because of its low significance (0.178). This means in reverse that this instrument is the most inappropriate for purchasing managers and the least used. An explanation is that it is very costly in terms of time and money to substitute an employee after a certain period because he is trustworthy and familiar with all circumstances. In addition to that he has to establish a relation with customers which can only be established over a certain period of time. Further it is possible that employees feel not respected if they have to do another job. So there are pros and cons in theory, but in practice it is mostly not implemented. A further remarkable result is the low significance of external audits (0.434) and the so-called "four eyes principle" (0.401) although it is indicated that these are very strong tools to avoid corruption. If one looks at these results then one can come to the conclusion that corporations do a lot for their CPI, but only if it is not very expensive in terms of time and money. For corporations it is not very difficult to have a code of conduct or code of ethics, but it is more complicated for them to install instruments like "four eyes principle", job rotation or external audits. On the other side, compliance officer and ombudsman have the highest influence on CPI – as already mentioned. But there is still a difference if corporations have these people on their payroll like an ombudsman or if these people are employed by an external and independent association and can be called on demand. There are also two

possibilities how to employ a compliance officer. Either he is compliance officer full-time or he has to do this job in addition to his other functions. So it is necessary to differentiate this aspect, but these results are not finalized and will require further research in our main study. Additionally we had to remove whistle blowing (0.362), which favours this statement. A possible reason for that negative attitude towards denunciators may be our German history. Our next step is to analyse the influence of the exogenous latent constructs on the latent endogenous construct. All latent exogenous constructs do have a significant impact on the usage of control and prevention instruments. Organizational complexity has the biggest influence on the control and prevention instruments (0.335) and corporate culture the lowest (0.230). This means if corporations have a high organizational complexity, they use more control and prevention instruments. Purchasing complexity has a value of 0.217 and internationality of 0.301. Organizational complexity does have an impact on the usage of control and prevention instruments. Hypotheses two and four can be verified also. Purchasing complexity and corporate culture have an impact on control and prevention instruments. Although these correlations are not too strong, we have to keep in mind that structural equation models are more appropriate for explorative studies and can contribute significantly to the development of theories (Götz, 2004). The only hypothesis which can not be confirmed is hypothesis three. CC has an impact on CPI, but in our hypotheses we assumed a negative correlation. The worse corporate culture, the more control and prevention will be used. This hypothesis can not be maintained. Regarding our results there is also a positive correlation. Consequently we have to say the better the corporate culture, the more control and prevention instruments will be used. This outcome is very surprising. Usually one would assume that if there is a good corporate culture the managers have trust in their employees and therefore abstain from control and prevention instruments. Obviously most of the managers set a high value on good corporate culture, but follow the motto of Ronald Reagan: "Trust, but Verify."

## **Conclusions**

The main finding of the pre-test is that with increasing complexity the necessity of using control and prevention instruments increases. This complexity is divided into four latent constructs and consequently transferred in four hypotheses. Three out of four hypotheses can be confirmed after our pre-test. Only hypothesis three has to be rejected because of its positive correlation.

It was necessary to prove whether companies which have a high degree of complexity do use prevention and control instruments. This proposition is true and we found key factors on the usage of control and prevention instruments. Furthermore we have looked on strength and direction of the single factors and their loadings on the latent constructs. Purchasing complexity has the greatest impact on the usage of control and prevention instruments and the other latent constructs in almost equal shares. It will be interesting to examine in our main study whether the strength and the loadings of the single factors on the control and prevention instruments increase if purchasing managers become aware that the main focus of this study is on corruption. We do not focus on individual and situational factors. We have to underline that this is the pre-test and the main study is still in progress. We think we have already gained some interesting insights.

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