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THE IMPACT OF ACTIVITY-BASED BUDGETING ON INFORMATION ASYMMETRY, BUDGET SLACK CREATION, AND RELATED DYSFUNCTIONAL BEHAVIORS - RESULTS FROM LAB EXPERIMENTS

by

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FOREWORD

Somewhat more than three years it took me to arrive at this point where my doctoral research is finished and my dissertation is ready. The process of defining the research problem, designing the research method, and analyzing the results has not been easy and there have been many obstacles on the way. But at the same time it has been a very motivating and stimulating process, especially when yet another hurdle had been overcome. Also I have found myself backed with both moral and intellectual support from many people to whom I would like to express my deep respect and gratitude.

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CHAPTER 1: INTRODUCING AND SITUATING THE RESEARCH

1 Introduction

This dissertation begins with an introductory chapter in which I'll set the stage for the literature review, hypotheses formulation, method description, and results and conclusions of the research. The objectives of this chapter are to situate my work in the fields of management accounting and control, to briefly describe the content and the evolution of these fields, and to introduce and motivate the research questions. Also in this chapter I will describe the general research process followed in this study and explain the structure of the dissertation. Many definitions will be introduced in this chapter, but specific variables will be further defined in the literature review. The underlying assumptions about the nature of management accounting, organizations, people in organizations, and conducting research in organizations, will shine through in every chapter, but they will be made explicit in the methodology section where I explain the approach taken to study the research questions.

As will be shown below, one of the innovative aspects of my research is that it merges two streams of literature, namely a reasonably well developed theoretical literature on budgeting and a much less theoretical literature on activity-based costing (ABC) and management (ABM). The idea is to take the general relationships among variables described in the traditional budgeting literature, and to use them to predict what should be observed in the specific situation of budgeting with activity-based information. Such an endeavor will widen the scope of the traditional budgeting literature by extending it to modern management control systems, but also it will bring more theory in the study of new cost management and control practices as ABC and ABM. This will answer a call for more rigorous theory-based research in this area by Young & Selto (1991, p.228): "*In order to have a significant impact on either the academic or practitioner community, cost management research will have to assess the economic, behavioral and social consequences of new manufacturing practices and new cost management methods*".

The first of these two streams of literature, the budgeting literature, developed mainly in the field of management control. The literature on ABC and ABM, on the other hand,

developed primarily in management accounting. By combining both streams of literature, my research is situated on the interface of management accounting and management control, two fields that are very much intertwined. A lot of work has been done in this interface, which is often called "Accounting for Management Control" (Horngren, 1975). This is normal since one of the reasons why accounting information is provided is to use it in all kinds of systems, procedures, and techniques to achieve control in the organization (see below). In the following sections I will first describe the general focus of accounting for management control, then I will explain the evolutions in both segments. This will indicate how the budgeting literature evolved to a higher emphasis on the information-asymmetry variable, and how the management accounting literature evolved to new techniques as ABC and ABM. Also it will show that the merger of the ABC literature and the budgeting literature is indeed novel.

2 Accounting for management control

2.1 Description of the field

According to Horngren (1975, p.3), an effective accounting system provides information for three broad purposes: 1/ internal reporting to managers for use in planning and controlling current operations; 2/ internal reporting to managers for use in strategic planning; 3/ external reporting to stockholders, governments, and other outside parties. Accounting for the first two purposes is generally called "management accounting", while the third purpose is the scope of "financial accounting" (Horngren, 1975, p.4; C.Drury, 1988; Horngren & Foster, 1991)[1]. Management accounting or "modern cost accounting" (Horngren & Foster, 1991) can be defined as "*the process of identifying, measuring, accumulating, analyzing, preparing, interpreting, and communicating information that helps managers fulfill organizational objectives*" (Horngren, Sundem & Selto, 1993, p.3). This definition is virtually identical to one provided by Kaplan & Atkinson (1989) who call management accounting a system that collects, classifies, analyzes, summarizes and reports information to assist managers in their decision making and control activities.

[1] Speaking of "accounting" in general usually includes both management accounting and financial accounting (Dickey, 1967; Arnold & Hope, 1990).

Although these definitions describe the purposes of management accounting, they do not really clarify the content and the delineation of the field. The field relies heavily on economics, decision sciences, and behavioral sciences (Horngren, Sundem & Selto, 1993, p.4), and generally it is concerned with quantitative (cost) information (Emmanuel, Otley & Merchant, 1990)[2]. Specifically, most management accounting textbooks cover topics as standard costing, direct costing, full absorption costing, job order costing, cost behavior patterns, volume-profit relationships, budgeting, investment analyses, etc. (see review by American Accounting Association, 1972; and Belkaoui, 1992). Most of the information dealt with in management accounting is internal to the firm, and thus it usually does not include cost information of competitors, assessments of customer needs and market evolutions, and other information external to the firm (Bromwich, 1990; Bhimani & Bromwich, 1993, p.23).[3] Also activity-based costing is basically an accounting system with an internal focus (Bhimani & Bromwich, 1993, p.24), but I will explain more about ABC later in this chapter.

The definition of management accounting stresses the use of management accounting information to achieve "control" in the organization. Cost information, for instance, can be used in budgets, variance reports, and performance measurement systems in a way to achieve organization control. Organization control means "*guiding a set of variables (machines, people, equipment) toward a preconceived goal*" (Anthony, Dearden & Bedford, 1989, p.5). Control in general is "*the application of policies and procedures for directing, regulating and coordinating production, administration and other business activities in a way to achieve the objectives of the enterprise*" (Emmanuel, Otley & Merchant, 1990). Anthony distinguished between three types of control within an organization (in DeCoster et al, 1978; Anthony, Dearden & Bedford, 1989):

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[2] Financial accounting on the other hand is more sharply defined and regulated by law, and makes lighter use of related disciplines (Horngren, Sundem & Selto, 1993, p.4).

[3] A recent development in management accounting is concerned with broadening the scope of the field to information external to the firm, as a way to increase the relevance of management accounting information in strategic decision making. This evolution is called "Strategic Management Accounting", which is "the provision and analysis of financial information on the firm's product markets and competitors' costs and cost structures and the monitoring of the enterprise's strategies and those of its competitors in these markets over a number of periods" (Bromwich, 1990, p.28). More externally oriented management accounting approaches such as "Strategic Cost Management" (e.g. Shank, 1989; Shank & Govindarajan, 1992a, 1992b; Shank & Govindarajan, 1993) and "Target Costing" (e.g. Sakurai, 1989; Kato, 1993; Tanaka, 1993) are examples of advances in the field of Strategic Management Accounting.

1/ Strategic Planning & Control is the process of deciding and evaluating the goals of the organization, and the formulation of strategies to attain these goals. Characteristics of strategic planning & control are: it is nonroutine, nonsystematic and ad hoc, it covers strategic issues, its focus is long term, and its process is mainly unstructured[4]. An example of a process of strategic planning & control is an investment decision process in flexible manufacturing systems, or the process of strategic reorientation.

2/ Management Control is the process by which management ensures that the organization strategies are carried out. Characteristics of management control are: it is more routine and systematic, it is mainly quantitative, its process can be both structured and unstructured, and its focus is short and medium term. Examples of processes of management control are budgeting, measuring divisional performance, cost reporting, and transfer price determination.

3/ Operational Control or Task Control is the process of ensuring that specific tasks are carried out effectively and efficiently. It refers to the detailed control of individual work and procedures. Characteristics of operational control are: it is routine, systematic, and operational, it is mainly structured, and its focus is short term. Examples are processes of quality control, production control, inventory control, etc.

Management accounting systems are especially appropriate for management control, more than for strategic control & task control, because they collect quantitative information on all parts of the organization on a standard or routine manner (Emmanuel, Otley & Merchant, 1990, p.97). Using accounting information for management control purposes, thus, is the focus of the field of "accounting for management control".[5] In the next section I will

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[4] The dimension of "structured versus unstructured" is added by Gorry & Morton (1982). A control process is structured if it can be completely modelled and/or automated; it is unstructured if it can not be systematically modelled. Simon (1966) called it "programmed" versus "nonprogrammed" control.

[5] There is discussion about whether or not management accounting can be used for something else than management control, for example decision making. In their definition of management accounting, Kaplan & Atkinson (1989) pointed to this alternative use of management accounting information. Using management accounting information for product costing for example, would be a pure calculative process to sustain the product mix decision, but is it control? Control, of course, comes in when the decision criterium is chosen, for example profit maximization. Can we distinguish the decision process from the control process? Dopuch & Birnberg (1969, p.241) argue that the purposes of decision making and control are so closely related that they can hardly be separated. Waterhouse & Tiessen (1978, p.65) went so far to say that as an information system for management control, management accounting is considered an integral part of management control systems. In my dissertation, though, I would like to maintain the distinction because I do not focus on the use of activity-based cost information for specific decisions such as the make-or-buy decision, product mix decision, customer mix decision, plant location decision, and on the calculative processes involved in these decisions. Instead I

point to the behavioral emphasis in this field, because my research problem is also a behavioral one. In fact, it will be shown that management control is very much involved with influencing people's behavior.

2.2 Behavioral focus of accounting for management control

Anthony's (1978) definition of management control - ensuring that organization strategies are carried out - implies a behavior influencing focus. Most definitions of management control implicitly or explicitly state the influencing of people's behavior as an important characteristic of control. According to Birnberg & Snodgrass (1988, p.447) a management control system is a "*mechanism designed to limit the decision space of individuals within an organization so as to increase the probability of achieving the organization's goals. A control system performs its function by controlling the flow of information, establishing criteria for evaluation and designing appropriate rewards and punishments.*" The behavior influencing dimensions is also very clear in Ouchi's (1977) classification of types of control. He distinguishes between Output controls and Behavior controls[6]: output controls focus on specific outcomes of processes, and are compared with budgets or expected values, with corrective actions taken if necessary. Behavior controls can be divided in three groups (see also Emmanuel, Otley & Merchant, 1990):

1/ Behavior constraints: e.g. locks and keys to limit people's access to certain areas and places;

2/ Pre-Action reviews: e.g. direct supervision to command people what to do;

3/ Action-Accountability controls: this includes defining limits to acceptable behavior, tracking the behavior, and penalizing deviations.

Since management accounting systems provide information for management control, it follows that management accounting can be used to design control systems that influence people's behavior in a way to achieve the organization's goals. For example, departmental cost information can be used to design a budget system that sets objectives and evaluates

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focus on one of the most frequently used control mechanisms, namely budgeting. In this context, I believe, it is useful to keep distinguishing between decision making and control.

[6] Merchant (1985a) called it Result controls and Personel controls; Hopwood (1974) called the latter Social controls.

performance. But sometimes it may be that the management accounting and control systems elicit behavior that does not contribute to achieving the organization's goals and objectives. The term "dysfunctional behavior" was first used in an accounting context by Ridgway (1956), to indicate the effect of performance measurement on directing attention away from the over-all goal of the company. In the fifties, behavioral research in accounting became very popular, especially after the publication of Argyris' book "The impact of budgets on people" (1952). Since then, more and more accounting researchers have tried to apply the insights of the behavioral sciences on accounting and control. They based their theories on the findings of motivation theory (Maslow, 1954; Atkinson, 1957; McGregor, 1960), early organization theory studies (March & Simon, 1958; Cyert & March, 1963; Golembiewski, 1964), social psychology (Katz & Kahn, 1966; Likert, 1967), and different subfields of psychological research. A good overview of the sources of the behavioral accounting researcher is provided by Birnberg & Nath (1967) and Hofstedt & Kinard (1970). Behavioral accounting research can be seen as a focus of research in the field of accounting for management control. In the following section I will describe how behavioral research in accounting has evolved in budgeting, and how the research problem in my study followed from this literature. The sections thereafter will look at the evolution in the other major input to my research, namely management accounting information systems, and will show the second route to the research problem.

3 Behavioral accounting research in budgeting

Central in behavioral accounting research is the believe that "*the management information system of any firm is not solely a technical communication system, one designed to permit data to flow from one point in the system to another. Rather, it is intended that the data selected and transmitted both serve as inputs to managers' and workers' decision processes and affect their behavior*" (Birnberg & Nath, 1967, p.468). One of the first interests of behavioral accounting researchers has been the behavioral effects of different types of budget systems. In the next chapter I will explain the findings of the budgeting literature in detail, because they constitute a major part of the theory on which I will base my hypotheses. At this point, however, I want to introduce some of the variables that have been

of interest in this literature. For example, research has focused on the effect of participation in the budget setting on attitudes toward the budget (e.g. Bass & Leavitt, 1963; Milani, 1975; Searfoss, 1976), or on the effect of participation in the budget setting on performance (e.g. Stedry, 1960; Kenis, 1979). Other studies focused on the effect of budget pressure on outcome variables as job tension, job satisfaction, dysfunctional behaviors, and performance (Hopwood, 1972; 1973).

Many behavioral studies in management accounting for control have dealt with the problem of slack creation in budgets (e.g. Becker & Green, 1962; Schiff & Lewin, 1968; Lowe & Shaw, 1968; Onsi, 1973). Budget slack has been defined as the intentionally or unintentionally introduced difference between minimum necessary costs and the actual costs of the firm (Schiff & Lewin, 1968, p.51). Schiff & Lewin (1968) stressed that managers consciously and intentionally create and bargain for organizational slack. In a budget negotiation, slack would be the difference between minimum necessary costs and budgeted (negotiated) costs.

From the late seventies and early eighties on, the budgeting literature was strongly influenced by the insights from Agency Theory (Demski & Feltham, 1978; Baiman & Evans, 1983). The application of this theory on budgeting was especially interesting because it gave an economic explanation for employee behavior in a budget setting, and it gave an economic rational for the benefits of participative budgeting (Christensen, 1982). The agency theory describes a situation in which a risk neutral principal contracts a risk averse agent to perform a particular task. The principal's problem is to decide on a pay scheme (incentive scheme) that is just enough to provide an incentive to the agent to show effort and perform the task. The agent's problem is to maximize his utility by choosing between performing the task and getting paid for it, versus not performing the task and enjoying his leisure time or go and work somewhere else (Baiman, 1982). A budgeting situation can be modeled in just the same way, the superior being the risk neutral principal, and the subordinate being the risk averse agent (Demski & Feltham, 1978). Agency literature is concerned with determining Pareto-optimal contracts which are preferred by both the principal and the agent to the second best alternative (Ross, 1973; Baiman, 1982). For example, situations were described where participative budgeting was Pareto-optimal to non-participative budgeting by mitigating information

asymmetry between principal and agent (Holmstrom, 1979; Magee, 1980; Christensen, 1982; 1982; Penno, 1984).

A whole stream of literature emerged from the combination of the rigorous analytical framework of agency theory with the earlier behavioral research; that literature is often referred to as the "incentive contracting" literature (Young & Lewis, 1995). The combination of the agency model with the early behavioral research produced "*hybrid theories that incorporate behavioral and economic variables into models that (can) be experimentally tested*" (Young & Lewis, 1995, p.27). The objective of this literature is not to test the assumptions underlying the agency model, but "*to merge agency and behavioral variables into descriptive, testable models without imposing any of its restrictive behavioral assumptions*" (Young & Lewis, 1995, p.6). The focus of research has been on the nature of the incentive schemes (contracts) between principal and agent, and their effect on behavior and performance (e.g. Chow, 1983; Waller & Chow, 1985; Baiman & Lewis, 1989), or on the behavioral effects of participative control systems, the role of information asymmetry, and the role of risk preferences (e.g. Young, 1985; Waller, 1988; Jaworski & Young, 1992; Dunk, 1993). The interest in information asymmetry, its role in the slack creation process, and the ways in which information asymmetry can be overcome is relatively new. Several researchers have argued that constructing better (more detailed) information systems and thereby reducing information asymmetry would lead to less budget slack (Merchant, 1985b; Kren & Liao, 1988). Merchant (1985b) stated that "*slack may be reduced by improving abilities to detect it, perhaps by investing in more and better information systems, by providing closer supervision, and/or by using more frequent and more thorough operational audits*" (1985b, p.209). Nobody, however, has ever tested whether the recently developed technique of activity-based costing could provide an information system capable of reducing information asymmetry and budgetary slack creation. Although some success stories of activity-based costing implementations have been described in the literature (see below), very limited theory-based research has been conducted on the effectiveness of the technique. This is exactly the gap that my study wants to fill.

The above paragraphs have described one route that led me to the research problem, namely the route through the budgeting literature. As I have mentioned before, there is

another route that goes through the cost accounting information literature in management accounting. That is the route that led me to question the potential of activity-based cost information to mitigate the information asymmetry between a principal and an agent in an activity-based budget setting. In the following section I will describe that route by showing the evolution in the practice and literature on cost accounting information systems in management accounting.

4 Research on the evolution of cost information systems

4.1 Relevance lost for managerial decision-making and control

Research on cost accounting information has always been a search for relevant cost information for decision making and control. In the beginning of the 19th century there was no real need for cost accounting information because most business transactions were purchases between the company and the external markets of materials and labor. The market prices were the measures to determine value. Only after the development of the "managed hierarchical organization" in the early 1800's came the need for an internal measure of price, when many business transactions started to take place between different units within the organization (Kaplan & Johnson, 1987, p.6). Originally most interest was in the identification of the so-called 'prime cost' (direct labor and material) (Epstein, 1978). Later, the scientific management movement at the end of 19th and the beginning of the 20th century was an important stimuli for product costing, since bills of materials were developed with standards for material usage and standard times were measured for operations (Kaplan & Johnson, 1987).

An increase in overhead costs relative to prime costs as a result of the increasing scale of industry in the beginning of the 20th century, fastened the need of a monetary measure to link the local efficiencies with the company profitability (Solomons, 1968, p.18). Also the problem of determining bid prices in the engineering industry of that period, was a practical reason for business men to quicken their interest in cost accounting (Solomons, 1968, p.19). Overhead cost allocation evolved from simple allocation rules such as "percentage on

materials", or "percentage on wage", or "percentage on direct labor hours", to more complex allocation schemes (e.g. by A. Church in Solomons, 1968, pp.25-26).

Although cost accounting literature continued its search for more relevant information for decision making and control (see for example in historical textbook reviews as Holzer & Norreklit, 1991), accounting practices after the 1920's tended to move toward quick allocation methods suitable for both financial (e.g. inventory valuation) and management accounting (e.g. pricing decisions and control). According to Kaplan & Johnson (1987), the growing importance and regulation of financial accounting gradually led to a supplementation of management accounting information by financial accounting data that was more aggregate and less relevant for internal decision making and control.[7]

Because of the inappropriateness of financial accounting information in managerial decision making and control, many business accountants and controllers developed management accounting tools and analyses outside the "official" accounting system, such as break-even analysis, cost-volume profit analysis, differential cost analysis, etc. (Dickey, 1967, p.9.63). Also, in the 1950's "direct costing" emerged as a new approach to provide more relevant cost information to management (Turney & Montgomery, 1978). In direct costing, only truly variable costs are included in the product cost, specifically the prime costs (materials and direct labor), the variable factory overhead, the variable distribution overhead, and other costs that vary directly with production volume (Dickey, 1967, p.9.54).

Nowadays, critics argue that direct costing was not a solution for more relevant cost information for decision making and control (Kaplan & Cooper, 1988, p.25). They refer to the fact that product decisions involve a long-term commitment of the firm to produce,

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[7] Kaplan & Johnson (1987) blame the academic accounting researchers for not having sufficiently stressed the differences between financial and managerial accounting in their textbooks, but not everybody agrees with this view. Noreen (1987) remarks that several accounting texbooks in the 1960's and most managerial accounting teachers did distinguish between financial and managerial accounting information, and that they emphasized identification of relevant differential accounting information on decision alternatives. Holzer & Norreklit (1991) analyzed accounting textbooks from the 1920's to the 1960's and found no support for Kaplan & Johnson's claim about a dominance of financial accounting principles in management accounting. On the subject of cost allocation these textbooks usually recommended to select allocation bases that directly reflected the real cost behavior. A more plausible explanation for the use of simplified financial accounting data in managerial decision making may be that many companies did not consider the benefits of separate sophisticated management accounting information systems sufficient to overweigh their additional costs (Hopper, Kirkham, Scapens, & Turley, 1992; Drury, 1993).

market, and distribute a product, and that this commitment triggers overhead costs in the long run. Kaplan & Cooper (1988, p.22) argued that "*the traditional academic recommendation for marginal costing may have made sense when variable costs (labor, material, and some overhead) were a relatively high proportion of total manufacturing costs and when product diversity was sufficiently small that there was no wide variation in the demands made by different products on the firm's production and marketing resources*". They continued that in today's organizations these conditions are no longer valid, because overhead is taking a larger share of total manufacturing costs, and product variety is increasing rapidly.

So, in the mid-eighties cost accounting information systems in management accounting had two problems contributing to their lost relevance:

1/ an overreliance on financial accounting system in management accounting, with non-relevant, oversimplified and arbitrary overhead allocations; and

2/ a lack of a valid alternative in a rapidly changing business environment.

4.2 Cost accounting information in management: in search for increased relevance

In the last decade, two factors have contributed to the growing awareness of management accounting practitioners of the obsolescence of their cost accounting systems:

1/ increased competition which makes decision errors due to poor cost information more probable and more costly; and

2/ the arrival of computers which made the cost of more sophisticated accounting systems decrease (Cooper, 1988a).

Many researchers have studied and documented the recent changes in the competitive environment which led to the obsolescence of traditional management accounting systems. For more than 60 years the focus of competitive strategy had been the achievement of low costs as the primary determinant of profitability (Johnson, 1988). The last decade, however, was characterized by a changing strategic situation with short product life cycles and increased overhead due to automation and increased product design costs (Berliner & Brimson, 1988)[8]. Falling trade barriers, reduction of tariff- and non-tariff barriers, and

[8] In the electronics industry, the relative proportion of overhead costs has increased significantly, while the proportion of direct labor in some cases has fallen to under five per cent of production costs (Innes & Mitchell, 1993).

growing similarity of countries in what their citizens want to buy, had lifted competition to a world-wide level in global markets (Yip, 1992). The importance of quality had shifted from acceptable scrap levels to zero defects, and changing machine technology and logistic systems increasingly emphasized flexibility (Goldratt & Fox, 1986). Customers had become better informed and more demanding, making customer satisfaction a major factor in the competitive race (Johnson, 1992). In the manufacturing area, strategies (e.g. JIT) and technologies (e.g. CIM) moved into the same direction, and responded to the needs of the changing competitive world, but management accounting as a language to communicate and to sustain decision making lagged behind (Bakke & Hellberg, 1991). Among the management accounting problems described in the literature are:

1/ a distortion of product costs because of using volume-based overhead allocation bases (Cooper & Kaplan, 1988);

2/ accounting systems blocking the implementation of new manufacturing methods because of irrelevant cost estimation procedures (McNair, Mosconi, & Norris, 1989);

3/ accounting systems leading to wrong strategic decision making (Cooper & Kaplan, 1988b);

4/ accounting systems not sustaining or stimulating efforts of continuous improvement (Turney, 1992);

5/ cost accounting overstressing the cost world, and neglecting the bottom line profit objectives of the global organization (Goldratt, 1990);

6/ cost information leading to wrong insights in product and customer profitability (Galloway & Waldron, 1988a,b);

7/ cost accounting encouraging questionable operational tactics (Schmenner, 1988).

In response to these problems several techniques have been developed recently, such as Activity-Based Costing (e.g. Kaplan & Cooper, 1988), Throughput Accounting (e.g. Goldratt & Fox, 1986), Cashflow Accounting (Theeuwes, 1991; van der Veeken, 1988), Strategic Cost Management (Govindarajan & Shank, 1989), Life Cycle Costing (Shields & Young, 1991; Susman, 1989), and Target Costing (Sakurai, 1989; Monden & Hamada, 1991). Some authors argue that even the traditional accounting techniques such as full absorption costing and direct costing haven't lost their relevance in particular situations for particular purposes (Boër, 1990).

4.3 Activity-based information

The focus of my research is on activity-based cost information systems, since its characteristics as a "comprehensive economic map of the firm" (Kaplan, 1992) are most promising in terms of information asymmetry and slack creation. The other evolutions in management accounting, e.g. throughput accounting or target costing, are not in the first place comprehensive information systems. They have not as an objective to analyze and to model the firm's activities, and/or they do not present a methodology for doing so. In the literature review I will further explain the technique of ABC and its application in budgeting, but right here I already give an overview of the use of ABC.

Activity-based cost information systems have gone through a number of stages during the years. The early ABC implementations were primarily systems for more accurate costs of products and customers. Although this is still an important application of the ABC information, nowadays more and more ABC analyses are conducted to provide insight in the organization's activities and resource consumption. Insight in activities and cost drivers is used for "activity-based management" (ABM). ABM is what puts ABC information to work; "*ABC supplies the information, and ABM uses this information in various analyses designed to yield continuous improvement*" (Turney, 1992, p.20). ABC directs attention towards where in the organization opportunities can be found for process improvement and/or cost reduction. ABC sets priorities by indicating where the organization should focus attention first, in order to get most benefits. "*It lets them see where most of the dollars are being spent, what the fundamental drivers of those processes are, and where, if you can make changes, they can get big payoffs*" (King, 1991, p.22).

One of the activity-based management tools helpful in setting objectives for continuous improvement and in keeping track of the improvements is activity-based budgeting (ABB) - see for example cases of activity-based budgeting described by McNair (1991). I will describe the process of activity-based budgeting in more detail in the literature review since it is the specific focus of this study; but here I already want to indicate the general nature of ABB. Basically, an activity-based budget is one in which the predictions of expected

business for next budget period are translated in terms of workload for specific activities (Brimson & Fraser, 1991). There are several ways in which this translation can be done (see further), but right here it is important to see that the end result is a budget goal of (e.g.) total allowable resource consumption based on a detailed breakdown of expected resource consumption per activity. Obviously, activity-based budgeting can only be done if a detailed activity and cost driver analysis has been conducted, so that standard resource usage information exists per activity and per cost driver. Once this information is available, it can be used to set performance goals in terms of activities, in a way to achieve the organization's objectives of continuous improvement. As such the activity-based budget process contributes to achieving organization control.

Now, this is the second route towards the research question (the first went through the traditional budgeting literature). The above paragraphs presented activity-based cost information systems as a new system for more relevance of management accounting information. In recent literature, the use of that information in budgeting has been described as an activity-based management tool for setting performance objectives and monitoring improvements. This literature, however, is very practically oriented, and lacks theoretical rigor. There has been no theory-based research on the behavioral effects of activity-based budgeting. Therefore, in response to a call for more theory-based research in this area by Young & Selto (1991), I thought it relevant to apply the findings of traditional budgeting research to budgeting with activity-based cost information. In this way, the thesis can contribute to both streams of literature. Now that the evolutions in these literatures have been described, and the relevance of the research indicated, I will present the general research questions in the following section.

5 Problem statement and research questions

In the previous sections I have pointed to some researchers arguing that constructing better (more detailed) information systems and thereby reducing information asymmetry would lead to less budget slack (Merchant, 1985b; Kren & Liao, 1988). Merchant (1985b) stated that "*slack may be reduced by improving abilities to detect it, perhaps by investing in*

more and better information systems, by providing closer supervision, and/or by using more frequent or more thorough operational audits" (1985b, p.209). The general description in the previous sections of activity-based information systems as a comprehensive economic map of the firm (Kaplan, 1992) suggests that these systems may be very detailed. This will be further illustrated when the technique of ABC is more fully explained in the literature review. All these elements led me to question whether an activity-based system could be a better information system in terms of slack creation in a budgeting context. Specifically, it will be investigated whether activity-based information systems reduce information asymmetry between subordinate and superior, and thus increase the latter's ability to detect slack in the budget, and ultimately decrease the subordinate's aptitude to create slack.

The research question can be formulated as follows:

Research Question 1: Will subordinates perceive information asymmetry to be lower in a budgeting context with activity-based information than in one with unit-based information?

Research Question 2: Will budget slack be lower in an activity-based budget than in a unit-based budget?

Additionally I will include a research question that deals with the behavioral consequences for the subordinate of not being able to introduce slack in an activity-based budget (because of the superior's increased ability to detect it). Building slack in the budget was found to have a function for the risk averse budgetee because it allowed him/her to buffer against uncertainty, especially when the reward system was based on budget performance (see e.g. Hirst, 1981). Schiff & Lewin (1974, p.9) argued that "*the creation and the controlling of slack resources become the means for insuring that the manager* (read: subordinate) *achieves the organizational goals and his personal goals*". Therefore it is plausible that people who are deprived from the ability to buffer against uncertainty by creating budget slack in an activity-based budget situation will try to find other response alternatives. Some of these response alternatives may be dysfunctional to the organization. The third research question can be formulated as follows:

Research Question 3: If subordinates are unable to build slack into the budget because of reduced information asymmetry, will job tension increase and/or will they engage in other types of dysfunctional behavior (e.g. reducing quality) as a way to regain control over their rewards in an environment characterized by uncertainty?

These are the research questions of interest in this study. They represent the real-world problem, broadly formulated, with which my dissertation will be concerned. Studying this problem is relevant in the light of Young & Selto's (1991) call for more research on the behavioral effects of new cost management methods like ABC. At the same time, this study will widen the scope of the traditional budgeting literature by extending it to modern management accounting information and control systems. Also it will be a direct test of Merchant's (1985b) suggestion about the ability of better information systems to decrease budget slack. Other motivations for the study are:

1/ The problem is real. Slack creation exists, as is shown in old as well as in recent literature (see literature review). Also the potential for social countereffects after elimination of slack is real; some recent strikes against an excessive work rhythm and job pressure in automobile and other manufacturing plants, may be seen as coming from slack elimination in production goals.

2/ The questions are unanswered. Four years after Young & Selto's (1991) call there has still been very little (or no) theory building and testing about behavioral effects of activity-based information in budgeting.

3/ The research approach is novel. The mechanism of information asymmetry reduction by installing more informative information systems has never been experimentally tested with a real information system, let alone an activity-based one.

In the next section I will describe the research process used to answer these research questions.

6 The Research Process

The objectives of the research are to develop and test a theory about some behavioral effects of budgeting with activity-based information. A 'theory' can be defined as "*a set of systematically interrelated concepts, definitions, and propositions that are advanced to explain and predict phenomena (facts)*" (Emory & Cooper, 1991, p.62). This definition uses words that need to be defined themselves. A 'concept' is a "*bundle of meanings or characteristics associated with certain events, objects, conditions, situations, and the like*" (ibid, p.49). For example, 'ABC' can be seen as a concept with which people associate all kinds of meanings and ideas; these meanings and ideas may differ from one person to another. Therefore we need definitions to clearly describe what the concept's meaning will be in the context of the research. A 'proposition' is "*a statement about concepts which may be judged as true or false if it refers to observable phenomena*" (ibid, p.58). When propositions are formulated for empirical testing, they are called 'hypotheses' (ibid, p.58). Hypotheses can describe a relationship between two variables with respect to some case (the entity or thing the hypothesis talks about) (ibid, p.59).

The theory will be developed in a way similar to the process described by Kinney (1986) or Simon (1978). First a real-world problem or question is considered, in this case the problem about the behavioral effects of budgeting with activity-based information, as formulated in the research questions. Second, based on existing theory, relationships among facts are explained. The theories used in my research, as I have already indicated, are Agency Theory as well as more psychological-, social-, and organization-based theories of human behavior in budgeting. An example of the relationship that will be explained based on these theories is the relationship between information asymmetry and budget slack creation. Third, based on these general relationships among facts, hypotheses are derived about what should be observed in a particular situation. For example, a hypothesis will be derived about the effect of activity-based budgeting on budget slack creation. Finally, a study is designed to test the hypotheses. This is the phase of method selection and methodology description, about which I will talk later.

The first step in this process has already been undertaken in this chapter. The real-world problem has been described, and the research questions have been formulated. In this step,

the questions are nothing more than broad indications of the direction of the research (Emory & Cooper, 1991). More specific hypotheses will be developed, based on general relationships known in existing theory as described in the literature review. The general relationships about budgeting and budget behavior will be described in the following chapter (Chapter 2). That chapter will be a review of the traditional budgeting literature and the incentive contracting literature. This review will lead to a model[9] that gives a representation of the relationships that are more or less established. In Chapter 3, then, these general relationships will be used to predict specific outcomes of budgeting in an activity-based context. The characteristics of the activity-based budgeting context will be described, and hypotheses will be developed that can be tested in the next step of the research process. Chapter 4 will motivate the method selection, and describe the methodology. In the chapters thereafter I will describe the tests and the procedures that were designed to study the research questions. In a separate section the Appendices are added in which more detailed information about the tests can be found.

[9] According to Emory & Cooper (1991, p.63) a model "is a representation of a system which is constructed for the purpose of studying some aspect of that system or the system as a whole. Models differ from theories in that a theory's role is explanation whereas a model's role is representation".

CHAPTER 2: LITERATURE REVIEW - THE CURRENT STATE OF BUDGETING THEORY

In this chapter I will describe the current state of the budgeting theory, in order to identify general relationships among variables. These general relationships will be used to develop hypotheses about these variables in the specific context of activity-based budgeting (see next chapter). This chapter will begin with a short technical description of the budgeting process, in order to identify the major steps in the determination of a traditional budget. Then, the budgeting literature will be reviewed partly in chronological order of its development, and partly based on the major variables of interest: budget slack, budget pressure, budget participation, leadership style, and information asymmetry. Also contingency research in budgeting will be considered, because this stream of research has focused on other variables such as organizational structure, and degree of automation.

1 The budgeting process

The budgeting process described here, is typical for so-called "engineered expense centers"; these are responsibility centers in which engineered costs predominate (Anthony et al., 1989). Engineered costs are costs for which some standard amount can be determined, so that a monetary measure of output can be calculated for the department by multiplying the physical quantity of the output by the unit standard costs for each of the units produced and summing the results. Actual costs, then, are compared to the total standard costs allowed for the output, and variances can be analyzed. This type of control is not possible in "discretionary expense centers" that have outputs that are not measured in monetary terms (Anthony et al., 1989). Administrative staff units such as accounting, the legal department, the R&D department and some types of marketing activities are sometimes given as examples of discretionary expense centers. It should be noted, though, that a major contribution of an activity-based costing analysis is to turn discretionary expense centers into engineered ones (as far as possible), by determining standard costs per type of output unit of these centers (e.g. the cost per invoice in the accounting department). Control in pure discretionary expense centers can not be achieved by comparing standards to actuals.

The budgeting process, of course, is embedded in the general control process of the organization consisting of strategic planning, management control and task control (see chapter 1). Given the organization's strategy and programs, the budget process begins with a prediction of sales for the next budget period or for a longer term. Based on these sales expectations, the purchasing budget is derived for purchased materials, as well as the budgets for other resource requirements such as direct labor, and overhead (Horngren et al., 1993). Usually these derivations involve some negotiation process between (e.g.) a department manager with budget responsibility and a higher-level manager responsible for resource allocation, as well as a member of the accounting staff or budget department (Anthony et al., 1989). In this negotiation process, areas of discussion are the validity of the sales expectations in the light of environmental uncertainty, the correctness of the standards used in the derivations of the expected resource consumption for next budget period, the acceptable level of budget difficulty, the degree to which the manager will be held responsible for variances between budgeted and actual performance (budget evaluation style), the degree to which the budget is fixed or changeable (flexible budgeting), etc. (Horngren et al., 1993). Also, the techniques and the calculations involved in the derivation of the budget may be a subject of discussion. For example, the budget can be derived very analytically (e.g. for 'engineered' costs), or more or less heuristically. One heuristic is to base the budget on last period's spending level, and then to add on for inflation and to adjust for new projects (Morrow & Connolly, 1991). In the next chapter I will describe in which way the activity-based way of budget derivation is different from the traditional unit-based way.

After the budget has been set, the budget process enters the phase in which the goals should be attained. Sometimes the goals are adapted to a changing situation (e.g. price changes) so that managers are held responsible only for events they can control; this is called the controllability principle (Antle & Demski, 1988). Very often, however, "*the controllability principle seems often to be ignored; it is common, even typical, for managers to be held accountable for areas over which they have little, or even no, control*" (Merchant, 1987; see also Maher, 1987). In the evaluation phase, then, managers are evaluated in comparison with the budget, and variances are analyzed. Managers who are held responsible for events outside their control, are often evaluated relative to another manager who was faced with the changing situation as well (relative performance evaluation).

This short technical description of the budget process should suffice to illustrate its technicalities, and to hint at the behavioral problems involved. In the next sections I will review the scientific progress in budgeting theory, as it evolved in the early behavioral and the incentive contracting literature.

2 The early years of budget research

Argyris' (1952) study of the budgeting process, based on interviews in four manufacturing companies in the US, is generally considered as one of the first in this area. The focus of the study was on the adverse effects of accounting controls on employee tension, and on the employees' reactions to this tension. Argyris reported that the subordinates' feelings of budget pressure (stress, tension, frustration) were positively related to the degree of budget emphasis exerted by the superior and the difficulty to meet the budget level. Also the inflexibility of the budget documents which sometimes fail to disclose the real reasons for budget variances was mentioned as a factor contributing to the feeling of budget pressure. This pressure was felt by the shop-floor workers whose operational targets were directly derived from the department budget, as well as by the department manager who was held responsible for meeting the budget. Employees reacted to these feelings by engaging in all kinds of dysfunctional behaviors such as mistrust of supervisors, indifference and apathy, reduced managerial effectiveness, and reduced performance.

In an other study, Argyris (1953) focused more deeply on employees' reactions to budget pressure. He argued that there were many ways in which management exerted pressure on the work force, but budgets were a medium through which the total effect of management pressure was best expressed. Tension arose in the work force as a result of two opposing forces: an upward oriented force toward higher efficiency (through threat of reprimand if the budget is not met, threat of feelings of failure if the budget is not met, pep talks by supervisors and foremen, etc.), and a downward oriented force toward not increasing efficiency (through informal agreements among employees, fear of loss of jobs if efficiency increases, abilities of individuals and work teams, etc.) (Argyris, 1953, p.99). Argyris continued that most people can stand some pressure, but after a certain point is passed

increased pressure becomes intolerable for an individual. Argyris described how shop-floor workers joined in groups, in order to find relief among each other, as a way to cope with increased tension. Supervisors on the other hand, who had no way of joining in groups against management, dealt with increased pressure by blaming others for the budget problems, and/or by internalizing the pressure (making it part of themselves), often with ulcers or other health problems as a consequence (Argyris, 1953, p.102). Sord & Welsch (1958) replicated Argyris' studies in a large-scale survey with 424 firms, and came to similar results.

In both studies Argyris (1952; 1953) stressed the moderating role of subordinates' active participation in the budget setting (rather than the budget being imposed by the superior), because it would help both parties to better understand each other. Becker & Green (1962, p.395) defined participation as "*a process of joint decision-making by two or more parties in which the decisions have future effects on those making them*". The importance of participation had already been assessed by Coch & French (1948) in their study of an American pyjama manufacturing company. In this field experiment different degrees of participation were tested, concerning a decision of change in the work environment; the experimental conditions involved 1/ no participation, 2/ participation through representatives, and 3/ total direct participation. The group that had been able to participate most directly showed the highest degree of job satisfaction and performance, and the lowest degree of drop-outs. This study was primarily meant to illustrate ways of overcoming resistance to change, but is has also been used to illustrate the effects of participation on worker morale and motivation (Becker & Green, 1962).

Stedry (1960) designed one of the first laboratory experiments in accounting, to test for causality between some of the variables identified by Argyris. Specifically, he tested the relationship between budget level (or difficulty) and subjects' task performance, and the intervening role of subjects' aspiration level. There were four budget-level groups: low, medium, and high budget level, and implicit budget (that is, no specific budget standard was defined). Members of each group were also divided into those who set an aspiration level after receiving the budget, and those who set their aspiration level before receiving the budget. The results showed that "*the group of high-budget subjects who received their budget prior to setting their aspiration levels performed better than any other group, whereas the high-budget*

group who set their aspiration levels before receiving the budget were the lowest performers of any group" (Stedry, 1960, p.89-90). This study was interesting because it emphasized the relationships between budget level, performance and human motivation (Becker & Green, 1962, p.399), but it was criticized by the same authors for not having measured aspiration levels correctly (ibid, 1962). Stedry measured aspiration level as what the subject "hoped to achieve", whereas Festinger (1942) had found that this was a different attitude than what the subjects "expected to get", the latter being more appropriate for the measurement of aspiration levels.

The relationship between budget tightness, motivation, and feelings of budget pressure was also studied by Hofstede (1968), in a project involving 140 managers in 5 Dutch manufacturing companies. Consistent with Argyris (1952) he concluded that some pressure had beneficial effects on motivation, but too much pressure had adverse effects (such as stress, and fear of failure), and resulted in dysfunctional behavior (such as absenteeism). In the same study, Hofstede also analyzed attitudes towards participation, and concluded that this attitude is influenced by nationality. However, this influence would be especially relevant in comparisons between Western and non-Western cultures because of the emphasis in the West on achievement. Therefore, Hofstede argued that "*the game of budget control ... is a Western game*" (Hofstede, 1968, p.281).

An important aspect of the game of budget control was found to be the creation of budget slack. Cyert & March (1963) defined organizational slack as the difference between minimum necessary costs and the actual costs of the firm. Schiff & Lewin (1968, p.51) added that "*managers consciously and intentionally create and bargain for organizational slack*". In their empirical study they tried to get an indication of the level of budget slack by looking at the superior's adjustments in the budget after the budgetee had turned in his/her proposal. They estimated the amount of slack to be at least 20 to 30% of the budget. Lowe & Shaw (1968, p.314) did a similar empirical study, and found again that "*bias caused by approval-seeking behaviour is likely to be present in most firms: where managers provide information which is later converted into expectations against which the managers are judged; where managers compete for promotion; and where managers and departments compete for a share of a firm's budget*".

3 Further research on budget pressure and leadership style

An interesting study by DeCoster & Fertakis (1968) focused on budget-induced pressure and managerial behavior of 31 supervisors with budget responsibility. Based on theories of leadership style (Likert, 1961; White & Lippitt, 1960) they hypothesized that supervisors who were themselves subject to high budget pressure would elicit a 'production-oriented leadership style'. This style would be characterized by strongly organizing and defining the relationships between the leader and his group, much intervention from the leader in the group, and much scheduling and criticizing. Supervisors who were themselves subject to low budget pressure would elicit an employee-oriented leadership style, characterized by friendship, mutual trust, and respect. Their results indicated, however, that high budget pressure was positively related to both production- and employee-oriented behavior. Therefore it was concluded that supervisors are aware that to manage their department effectively under high budget pressure, they had to be considerate of the subordinates' needs so as to encourage higher effectiveness on their part. One should be careful to infer from this that there is 'one-best' leadership style that avoids the negative implications of high budget pressure on subordinates, and that will lead to higher performance. Much evidence suggests that effective leadership in a situation of high budget pressure is strongly influenced by the situational and personality characteristics of the leader and the subordinates (Ezzamel, 1989).

Hopwood (1972; 1973) investigated further the effects of leadership style and budget emphasis in a number of cost centers in an integrated manufacturing plant. He distinguished between three styles of using budgets:

1/ A budget-constrained style in which the subordinate's performance is evaluated rigidly on the basis of his ability to meet the budget;

2/ A profit-conscious style in which the subordinate is evaluated on the basis of his ability to improve the general effectiveness of his unit's operations, with budgetary information being used in a careful and flexible manner, often supplemented with other information;

3/ A non-accounting style in which budgetary data is not considered an important part in the evaluation of performance.

Hopwood's results indicated that profit-conscious and non-accounting styles were generally associated with better job satisfaction, less job tension, better relations with supervisors and peers, less manipulation of accounting information, and more budgetary participation than the budget-constrained style of budget use.

These findings, however, were not confirmed in a later study by Otley (1978), involving 41 managers of relatively independent subunits of a UK-based manufacturing company. The use of the budget-constrained style (high budget emphasis) was not associated with more job tension when the subordinate basically agreed with the way his performance was evaluated. Also the budget-constrained style was moderately associated with better performance (meeting the targets). A number of explanations for these conflicting results have been advanced. It may be that the highly independent nature of the subunits in Otley's study made high budget emphasis more appropriate than in Hopwood's cost centers that were much more interdependent (Ezzamel, 1989). This is an explanation that considers the organizational structure, in line with the contingency view (e.g. Bruns & Waterhouse, 1975). Another possible explanation was offered by Hirst (1981), who argued that the degree of environmental uncertainty is an important situational variable. Otley's independent subunits might know much less environmental uncertainty than Hopwood's interdependent cost centers. Brownell (1982a), finally, invoked budget participation as a moderating variable. High budget emphasis in the budget-constrained style would have little dysfunctional effects if subordinates perceive budget participation to be high. All these explanation pointed to interesting situational variables for further research, but they did not solve the conflict between Hopwood's and Otley's results.

The relationships between budget pressure and performance, and the role of motivation, is still not completely understood. Factors contributing to budget pressure are attainability of the budget (difficulty), pay-dependency, and budget emphasis (reflected in the leadership style). Locke (1968) found a significant positive relationship between goal difficulty and performance, which was explained in terms of a "conscious mental set" associated with a difficult goal that would cause (motivate) people to behave in a way to achieve that goal. Searfoss (1976), on the other hand, found no significant support for his hypothesis of a positive relationship between goal difficulty and budgetary motivation. Kenis (1979)

therefore concluded that up to a certain level of difficulty higher goals would be accepted, resulting in higher motivation and performance, whereas beyond that level goals would be rejected, and motivation and performance would decline. This conclusion is similar to earlier findings of Hofstede (1968) and Dunbar (1971).

A number of studies have investigated the relationship between budgetary pressure and dysfunctional behavior (e.g. slack creation). Onsi (1973) used factor analysis to explain the variance in attitude towards budget slack, using a questionnaire among 132 managers in 7 firms. He found that budgetary pressure and budget emphasis in the evaluation system were both important factors explaining variance in budget slack. Other studies pointed to the moderating role of uncertainty (in task or environment): high budget pressure would not lead to dysfunctional behavior in case of low task uncertainty (Hirst, 1981; 1983). This is consistent with the idea that dysfunctional behavior, e.g. slack creation, is a way for the subordinate to control his performance and reward. Also budgetary participation was found to play an role in the relationship between budget pressure and dysfunctional behavior (Brownell, 1982; Hirst, 1990).

4 Further research on participation

Ken Milani (1975) has focused specifically on the relationship between participation in budget setting and managerial attitudes towards the job and the company, using a questionnaire with 88 foremen in a large manufacturing plant. He found a significant positive relationship between degree of participation and attitude towards the job and the company. This relationship was also confirmed by Searfoss (1976). Govindarajan (1986) later added that the relationship between participation and attitudes was moderated by environmental uncertainty: participation would lead to better attitudes toward the job, especially in a situation of high environmental uncertainty.

Milani (1975) found no significant relationship between attitudes towards the job and performance, which was consistent with previous findings that increased job satisfaction did not necessarily lead to increased performance (Katz & Kahn, 1966). He did find weak support for a direct positive effect of participation on performance. This finding was

confirmed by Brownell (1982a), but contradicted by Kenis (1979). It became clear that a number of personality and environmental variables might mitigate the relationship between participation and performance (Hopwood, 1974). The following conditioning variables were found:

1/ Vroom (1960) had already pointed to the importance of "authoritarianism": people who view participation as legitimate are more productive under participative supervision, whereas people who view participation as illegitimate were less productive.

2/ Cherrington & Cherrington (1973) demonstrated experimentally that the reward structure was an important conditioning variable. Participation led to increased performance when rewards were linked to budget achievement.

3/ Bruns & Waterhouse (1975) studied the role of organization structure, and found that participation led to increased performance especially in decentralized organizations.

4/ Brownell (1981) found experimentally that participation led to increased performance for people with an internal locus of control, meaning that they accept responsibility for their actions and that they want events to be under their control. Subjects with external locus of control had better performance in a situation of low participation, because they perceive events as being unrelated to their own behavior and thus beyond their control.

5/ Govindarajan (1986) used survey research and found that participation led to increased performance in situations of high environmental uncertainty.

These studies show that the relationship between participation and performance is a complex one, and that ignoring personality and environmental variables may be problematic. But also it is not very well understood what it is about participation that may be beneficial in terms of performance. It has been argued that it is the motivational role of participation that produces better performance (see above), but this has not always been confirmed. Brownell & McInnes (1986), in a survey with 108 managers in 3 companies, reported strong support for a positive relationship between participation and performance, but this could not be explained in terms of increased motivation. This led some authors to believe that the link between participation and performance goes over a cognitive rather than an emotional route. In a survey study, Chenhall & Brownell (1988) found that the positive effect of participation on performance was due to exchange of information in the budget negotiation, which reduced the subordinate's role ambiguity. Clear information regarding the expectations associated with a

role, methods for fulfilling role expectations, and the consequences of role performance resulted in increased job satisfaction and performance. Mia (1989) confirmed the importance of information exchange in the participative budget meeting, and added that this was especially relevant in situations of high job difficulty. Also Kren (1992) studied the function of participation in terms of exchange of job relevant information (JRI), and concluded that participation led to increased performance through the gathering of JRI. In her paper, however, it is not clear where the JRI comes from; Kren only indicates a correlation between participation and 'efforts for seeking JRI'. She argues that budget participation creates an environment that encourages the acquisition and use of JRI (1992, p.513); this information would be found with peers, subordinates, and superiors.

Finally, a number of studies focused on the relationship between participation and dysfunctional behavior. Early studies (Argyris, 1952; Schiff & Lewin, 1970) and more recent work (Hirst, 1981) indicated that participation moderates the relationship between budget pressure and dysfunctional behavior. Some authors focused specifically on the relationship between participation and slack creation. Merchant (1985b) used a questionnaire mailed at 201 manufacturing managers, and found support for the negative relationship between participation and budget slack creation. This was explained in terms of the motivational impact of budget participation. Also Dunk (1993) confirmed this negative relationship, although he had hypothesized to find a positive correlation. It should be kept in mind, however, that participation will never completely eliminate the propensity to create slack because of the functions of slack as a buffer against uncertainty (Hofstede, 1968; Schiff & Lewin, 1970). Furthermore, a positive relationship between participation and slack can be hypothesized since some form of participation is necessary to introduce slack into the budget. This is why Young (1985) found a positive relationship between participation and slack, as he compared it experimentally with a no-participation condition.

5 Further research on budget slack

In a theoretical study Schiff & Lewin (1970) focused on budget slack. They argued that slack was introduced in the budget by understatement of revenues and/or overstatement of costs (e.g. by not including process improvements in the standard costs - p.263). Budget slack

creation was a way for the subordinate to get control over their performance in an uncertain environment, especially when the reward system is based on budget performance (see also Hirst, 1981). Schiff & Lewin (1974), building on Maslow's findings of the need hierarchy, pointed out that managers will try to maximize achievement of their own personal goals subject to achieving the firm's objectives. They continue that "*the creation and the controlling of slack resources become the means for insuring that the manager achieves the organizational goals and his personal goals*" (Schiff & Lewin, 1974, p.9). Schiff & Lewin (1970) stressed that information asymmetry is a basic condition for the existence of slack, and that participation could never totally reduce information asymmetry. They agree with March & Simon (1958) when they say that some degree of latent conflict will always be present in organizations.

Further empirical evidence for the existence of budget slack was found by Onsi (1973). In interviews with 32 managers in five companies, he found that 80% of them were willing to state explicitly that they bargained for slack. They did it as a result of top management pressure to meet the budget targets and show yearly profit growth, and as a hedge against uncertainty (Onsi, 1973, p.537)[10]. Waller (1988) later found that not all managers are equally likely to introduce slack in the budget, and that it was dependent upon their attitudes toward risk. Waller found that risk averse people feel more need for slack creation than risk neutral people. This finding confirmed again that slack was used as a buffer against uncertainty. The role of risk attitudes should not be underestimated. Selto & Cooper (1990, p.234) stated that "*risk attitude is critical to predicting behavior, such as in accounting studies involving state uncertainty and information asymmetry. In these cases,... knowledge of subjects' risk attitude is essential to predicting subject behavior*".

In agency theory slack creation is considered a logical outcome of the principal-agent relationship in which the agent is assumed to be self-interested, risk- and work averse, and to

[10] It should be noted that there is also evidence of a phenomenon opposite to slack creation, namely being optimistic in the estimation of costs and revenues. Lowe & Shaw (1968) found evidence of overestimating future revenues when managers wanted their supervisors to believe that all was well, and that they had everything under control. Otley & Berry (1979) and Otley (1985) found support for the hypothesis that this behavior was due to the managers' propensity to base their estimates on the output mode instead of the mean, given a negatively skewed output distribution (constrained upwardly by capacity limitations, but much less downwardly constrained).

have private information (Baiman, 1982). Information asymmetry and slack creation is at the heart of the principal-agent problem (Baiman, 1982; 1990). The role of risk preferences in the principal-agent model is to account for different behaviors in relation to state uncertainty. The agent's problem is that, given state uncertainty, he does not know for sure whether he will be able to live up to the contract negotiated with the principal. When his pay is dependent on goal achievement, as is assumed in the general principal-agent model, the risk-averse agent will be reluctant to commit to too high a contract, and thus will try to introduce slack in it (Baiman, 1982).

Slack creation is usually considered dysfunctional from the point of view of the organization. Dysfunctional behavior was defined as subordinate's behavior that "*would not be perceived by their superiors as being consistent with organizational objectives*" (Hirst, 1981, p.771). Different types of dysfunctional behaviors have been described in the literature (Hopwood, 1972; 1973; O'Reilly III & Robert, 1974; Hirst, 1983; Birnberg, Turopolec & Young, 1983; Lawler III, 1983; Markus & Pfeffer, 1983). In the following classification - based on Birnberg et al. (1983) slack creation is considered a way of "biasing behavior":

1/ Smoothing: this occurs when the user of an information system creates a perception of reality that differs from that which he actually experiences, without altering the actual activities of the organization. An example of smoothing is shifting revenues from one period to another.

2/ Biasing: this occurs when a signal is entered into the information system that is most favorable for the person entering it. Overestimating expected costs (this is slack creation) or underestimating revenues are examples of biasing.

3/ Focusing: this occurs when certain favorable information is highlighted while less favorable information is hidden.

4/ Gaming: this occurs when the sender of information plays his job in such a way that the desired information is to be sent. The subordinate chooses an act that maximizes his payoff as it is measured by the superior's evaluation system. For example, a subordinate who is evaluated on produced volume, games the performance measurement system when he prioritizes large-volume orders and skips small orders on the production schedule.

5/ Filtering: this is a strategy which is closely related to focusing; the more desirable elements of the information set are communicated and the less desirable are not.

6/ Illegal acts: an example would be withholding excess output in one period to avoid an increase of the production goals in the next period.

6 Further research on information asymmetry

In the agency literature, the existence of information asymmetry between the agent and the principal is a basic assumption to explain the value of accounting information and control systems. "*The agent is assumed to have private information to which the principal cannot costlessly gain access. This private information may be with respect to the agent's action choice and/or state information*" (Baiman, 1990, p.343). Penno (1984, p.177) explained that a control problem could occur when the risk averse and self-interested agents "*use private information to make decisions consistent with their own self-interests but not consistent with the interests of the owners. The owners may try to reduce this control problem by installing management control systems which mitigate this asymmetry.*" This reasoning provided an economic motivation for the existence of management control systems.

The existence of private information (information asymmetry) was illustrated both in the budgeting literature (see above, e.g. Schiff & Lewin, 1968; 1970) and in the literature on organizational power. To the extent that lower level participants in the organization maintain control over information, they make higher-ranking participants dependent upon them (Mechanic, 1962; Pettigrew, 1972). One of the reasons for the information gap between lower level subordinates and their superiors is the former's expertise and knowledge of his/her direct work environment. French & Raven (1959) called expert knowledge one of the most important power resources, the efficacy of which depends on the degree to which the influenced person evaluates his lack of knowledge on a particular matter.

One of the consequences of information asymmetry is the phenomenon of slack creation; this phenomenon is considered to be dysfunctional from the point of view of the

organization (see above). Therefore, several mechanisms have been described in the literature to mitigate information asymmetry:

1/ As mentioned before, participative budgeting is one way in which the superior can try to get information from the subordinate (Penno, 1984). The benefits of participation are believed to come from the exchange of information between the superior and the subordinate (Chenhall & Brownell, 1988; Mia, 1989; Kren, 1992). However it should be noted that participation probably will never completely mitigate asymmetry because of power issues involved with information possession (see above).

2/ Chow, Cooper & Waller (1988) showed experimentally that information asymmetry could be mitigated by motivating subjects to share truthful information with a truth-inducing pay scheme analytically developed by Weitzman (1976). Additionally they found that in the information asymmetry condition, a truth-inducing pay scheme was associated with less slack than a slack-inducing pay scheme. Waller (1988) completed this relation (also experimentally) by indicating the important interaction with risk preference: risk averse budgetees could not be financially induced to share truthful information, and thus continued to create slack. Both Waller (1988) and Chow et al. (1988) added that truth-inducing pay schemes are hardly used in practice.

3/ Another mechanism to reduce information asymmetry is when a superior derives information about the subordinate's capacity, based on his performance in a previous period. This may lead the superior to impose a minimum level of performance, or a "ratchet" (Chow, Cooper & Haddad, 1991). They also found that this mechanism would lead to less budget slack.

4/ A fourth mechanism is based on installing better information and control systems that help the superior in assessing the subordinate's potential performance (Penno, 1984; Merchant, 1985b; Young, 1985). Kren & Liao (1988, p.297) argued that "*if the information system is able to accurately portray the true production capabilities of the firm's business units, making the subordinate perceive ex ante that excess budget slack will be revealed ex post, then the detrimental effects of private information can be reduced*". This mechanism, however, comes from inductive reasoning based primarily on agency theory, but it has never been tested with a real information system. In most experiments that used this mechanism of information asymmetry reduction, an information system was assumed to be in place in the symmetry condition when the

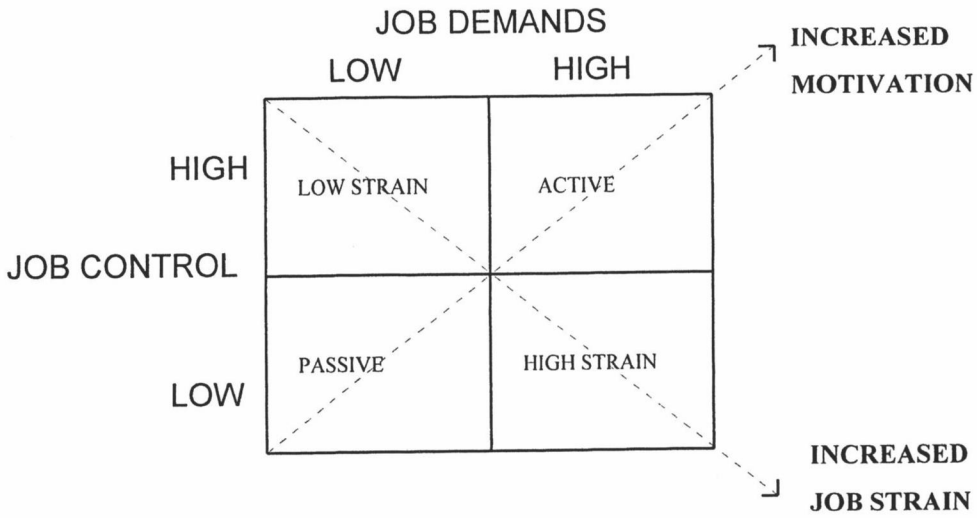
superior simply observed potential performance in a pretest (e.g. Young, 1985). The subjects, after performing in a pretest, had to show their output to the superior in the symmetry condition, while in the asymmetry condition the subjects' knowledge about their performance was kept private. Of course this simulates the existence or absence of an information system, respectively, but it doesn't tell anything about the potential of asymmetry reduction of a specific information system. Consequently there is an opportunity to test this mechanism of asymmetry reduction with a real information system, for example an activity-based system.

Very little research has focused on what it is exactly about information asymmetry that has an impact on slack creation. Why would a subordinate in an information symmetry condition create less slack than in the asymmetry condition? Most inductive studies seem to assume that when the superior has information about the subordinate task and capacity, he is going to use this information actively to prevent the subordinate from introducing slack in the budget. In other words, the superior is not going to accept a budget suggestion of which his information system says that it is suboptimal; instead he is going to adjust this suggestion to a slack-free level. Surprisingly, however, most experiments did not interpret information symmetry this way (e.g. Young, 1985; Chow et al., 1988). In the symmetry condition the manager did not react when the subjects set a goal that was below their potential assessed in a pretest. The effects of information symmetry on budget slack were expected to come from a "pressure not to misrepresent" felt by the subordinate (Young, 1985). Young (1985) found that subjects in the symmetry condition felt indeed more of this pressure than those in the asymmetry condition, but the effect on slack was not statistically significant.

In a recent research project with marketing managers, Jaworski & Young (1992) studied whether job tension would increase if information asymmetry decreased. They based this hypothesis on a theory of reduced job control associated with reduced information asymmetry, which would result in increased job tension. If lower levels of information asymmetry reduce the subordinate's ability to create slack in the budget, Karasek's (1979) 'Demand - Control' model would predict that this reduced level of job control will be associated with higher levels of job strain, especially when the job is very demanding (high job difficulty). This model has

been visualized as in Figure 1. Jaworski & Young's data confirmed that most tension was experienced in case of information symmetry combined with high job difficulty.

Figure 1: Karasek's (1979) Demand - Control Model



(The notations 'active' and 'passive' refer to an active or a passive job experience respectively.)

In line with McGrath (1983), Jaworski & Young (1992) further hypothesized that in the information symmetry situation managers would try to find a way to deal with increased job tension, for example by engaging in different types of dysfunctional behaviors. In their study they found indeed that managers with high job difficulty and reduced job control from information symmetry experienced increased job tension which they tried to mitigate by engaging in information filtering types of behaviors. The type of answer people select to respond to increase job tension is a function of the availability of response alternatives (McGrath, 1983, p.1378). People may shift from one response alternative to another if the range of alternatives changes. For example, if they originally buffered against uncertainty and tension by introducing slack into the budget, after changing to an information symmetry condition (e.g. after the installation of a new type of information system) they may try to mitigate increased job tension by engaging in another type of dysfunctional behavior.

Finally it should be noted that little is known about what types of information are meant in the construct of information asymmetry. In the incentive contracting literature it is usually quantitative information about the subject's potential capacity that is varied between the

symmetry and asymmetry condition. But this may very well be not the only type of information that affects budget slack. There has been no research however that investigated this problem. The results of my study - it will be shown - are a first step to fill this gap.

7 Contingency research in budgeting

While many of the aforementioned studies deal with contingency variables in some way or another, there are only a few that more directly investigate the "fit" hypothesis in budgeting research. Typically, the contingency variables studied in accounting can be classified in four categories: 1/ the environment, 2/ the organizational structure, 3/ the technology used, and 4/ strategy (Emmanuel et al., 1990).

Relating to the environment, a couple of studies focused on the degree of competition faced by the firm and its effect on management control practices (Khandwalla, 1972; Otley, 1978). The relationship seems to be that companies facing a tough market (high competition) are better off with a more flexible style of budgeting and control, while those in a more liberal environment can be best managed with a more rigid style of performance evaluation (Otley, 1978). Also, Mia & Clarke (1995) focused on this relationship, but the measures are debatable. Another contingency factor in this category is environmental uncertainty (Hirst, 1981; Govindarajan, 1986); in this situation the firm would show better performance with a participative style of budgeting.

The second category of contingency variables is organizational structure. Bruns & Waterhouse (1975) had already pointed to a necessary fit between organizational size and budget system. Merchant (1981) basically replicated this study with a survey in 19 companies involving 201 managers in the electronics industry. He hypothesized that large, decentralized and diversified firms would be more likely to have an "administrative control system" characterized by more participation, more budget emphasis, more formal communication, and more sophistication than an "interpersonal control system"; this hypothesis was confirmed. His data also supported the hypothesis that the more "fit" between the control system and the organization's characteristics, the better the performance. Merchant found weak support for a

positive relationship between administrative control system and motivation, which was attributed to the participative nature of such a control system. While this study was performed on the corporate business level, a later study by Merchant (1984) extended this research to the departmental level. It was found that size, degree of automation and functional differentiation was associated with greater formality in the control process, and that this fit resulted in greater performance.

In the category of technology as a contingency factor Sathe (1978) and Dunk (1990) both pointed to a necessary fit between automation and reliance on budget control. Merchant's (1984) study can also be mentioned in this category because he found that the degree of automation was associated with a higher use of an administrative control system. Another study by Merchant (1985b) gave weak support for the hypothesis that the propensity of production managers to create budgetary slack was negatively related to the predictability (automation) of the production process.

In the category of strategy, finally, there is still very limited research. Govindarajan (1988) and Bruggeman & Van der Stede (1993) found support for a necessary fit between competitive strategy on the SBU level and budget evaluative style.

This ends the overview of behavioral research in budgeting and the incentive contracting literature relevant to my study. In the next section I will present a list with definitions of all the variables mentioned in this review.

8 Definitions of the variables

In the above review the used variables were not always precisely defined, because the multitude of definitions would have hindered the readability of the text. Therefore I will define all important variables below (in alphabetical order), so that their meaning is clear in the remainder of the thesis.

Aspiration Level: In Stedry (1960) this was defined as the level of performance one hopes to achieve. Becker & Green (1962), however, argued that it was better to define it as the level of return one expects to get.

Authoritarianism: High-authoritarian individuals accept formal authority structures and are more comfortable in an autocratic situation. Low-authoritarian individuals can be described in terms of opposite tendencies and preferences. (Brownell, 1982b, p.141)

Budget Attitude: Govindarajan (1986) based on Hofstede (1968) defined budget attitude as the construct that was measured by the following items: 1/ if given a chance, you would prefer to work with budgets; 2/ if no budgets were set but your instruction would be to work as efficiently as possible, this would make your responsibility center's performance higher than it is now; 3/ you would work as well without budgets.

Budget Emphasis: This is the degree of importance attached to the budget in the evaluation of an individual's or department's performance.

Budget Motivation: Govindarajan (1986) defined budget motivation as the construct that was measured by the following items: 1/ good performance relative to budget gives you a feeling of accomplishment; 2/ attaining the budgeted goals contributes to your personal growth and development; 3/ you get a great sense of personal satisfaction when your actual performance compares favorably with the budget.

Budget Rigidity: This is the inflexibility of the budget objectives. Goals are not adjusted to changing situations.

Budget Slack: Slack is introduced in the budget by understatement of revenues and/or overstatement of costs (Schiff & Lewin, 1970, p.263). When the cost budget is stated in terms of physical units instead of monetary terms, slack is introduced by understating the physical output an individual or department can produce.

Dysfunctional Behavior (of a subordinate): Subordinate's behavior that would not be perceived by the superior as being consistent with organizational objectives (Hirst, 1981, p.771).

Environmental Uncertainty: The task environment is the set of stimuli to which an organization is exposed and to which it attempts to respond (Ferris, 1977, p.23). The perception of the environment is really the relevant construct, rather than the physical environment (Weick, 1969). Uncertainty is a condition of the environment, and should also be understood through an individual's perception (Ferris, 1977, p.23). Duncan (1972) identified three dimensions of uncertainty: 1/ the lack of information regarding the environmental factors associated with a given decision-making situation; 2/ the inability to assign probabilities with any degree of confidence with regard to how

environmental factors are going to affect success or failure; and 3/ not knowing the outcome of a specific decision in terms of how much the organization would lose if the decision were incorrect.

Goal Difficulty: A goal is difficult when expected performance is compared to a high standard (Kren & Liao, 1988, p.285), based on Locke et al. (1981).

Information Asymmetry: The agent's possession of private information to which the principal cannot costlessly gain access. This information may be with respect to the agent's action choice and/or state information (Baiman, 1990, p.343).

Job Satisfaction: This is the construct measured by respondents' answers on 23 facets relating to their current job; the measure was developed by Wanous & Lawler (1972), and was used by Ferris (1977).

Job Tension: a negative feeling of job-related strain (LaRocco, House & French, 1980).

Leadership Style: In a budgeting context this variable refers to three styles of a superior's use of the budget (Hopwood 1972; 1973): 1/ a budget-constrained style in which the subordinate's performance is evaluated rigidly on the basis of his ability to meet the budget; 2/ a profit-conscious style in which the subordinate is evaluated on the basis of his ability to improve the general effectiveness of his unit's operations, with budgetary information being used in a careful and flexible manner, often supplemented with other information; 3/ a non-accounting style in which budgetary data is not considered an important part in the evaluation of performance.

Locus of Control: This is a construct used to define individuals along two dimensions: internal or external. Those classified as internals feel that reaching or failing to reach objectives is determined by their own actions while external individuals feel that outcomes are determined by faith or some force beyond their control. (Kren & Liao, 1988, p.288)

Participation (e.g. in budgeting): A process of joint decision-making by two or more parties in which the decisions have future effects on those making them (Becker & Green, 1962, p.395).

Pressure Not to Misrepresent: A feeling discouraging the subordinate from misrepresenting himself when a superior has information on the subordinate's productive capability (Young, 1985, p.830).

Risk Attitude: The construct that determines or reflects an individual's willingness to bear the consequences of a risky choice (Selto & Cooper, 1990, p.230)

Role Ambiguity: This occurs where the sent role expectations for an individual lack sufficient clarity in terms of the required behaviors or expected performance levels (Chenhall & Brownell, 1988, pp.226-227).

Task Difficulty: Refers to the degree of complexity of the search process in performing the task, the amount of thinking time required to solve work-related problems, and the body of knowledge that provides guidelines for performing the task (Van de Ven & Delbecq, 1974, p.183; based on Perrow, 1967). Kren & Liao (1988, p.285), based on Locke et al. (1981), refer to task difficulty simply as the level of effort or ability required to perform the task.

9 Modeling the game of budget control

A model is a way of representing a system, constructed for studying parts of the system or the system as a whole (Emory & Cooper, 1991, p.63). The model below represents the "game of budget control" as it has been studied in the reviewed literature. Inevitably this model is incomplete, because additional variables may be found that play a role in the system or additional relationships may be investigated in future research. Nevertheless, I believe, the model gives a good representation of the general relationships investigated in this part of the literature. The major objective of the model is to classify the discussed variables in terms of their role in the game of budget control. The reasons for this classification are both to summarize the relationships analyzed in the aforementioned studies and to give a general overview of the research domain. In order to understand the nature and the significance of the relationships, however, the model should be read together with the discussed findings. Specifically, the following categories will be used (Based on Emory & Cooper, 1991):

1/ Antecedent variable (AV): this is a variable that affects the dependent variable only by determining the form or value of the independent variable;

2/ Independent variable (IV): this is the causal variable;

3/ Dependent variable (DV): this is the variable that is affected by the independent variable;

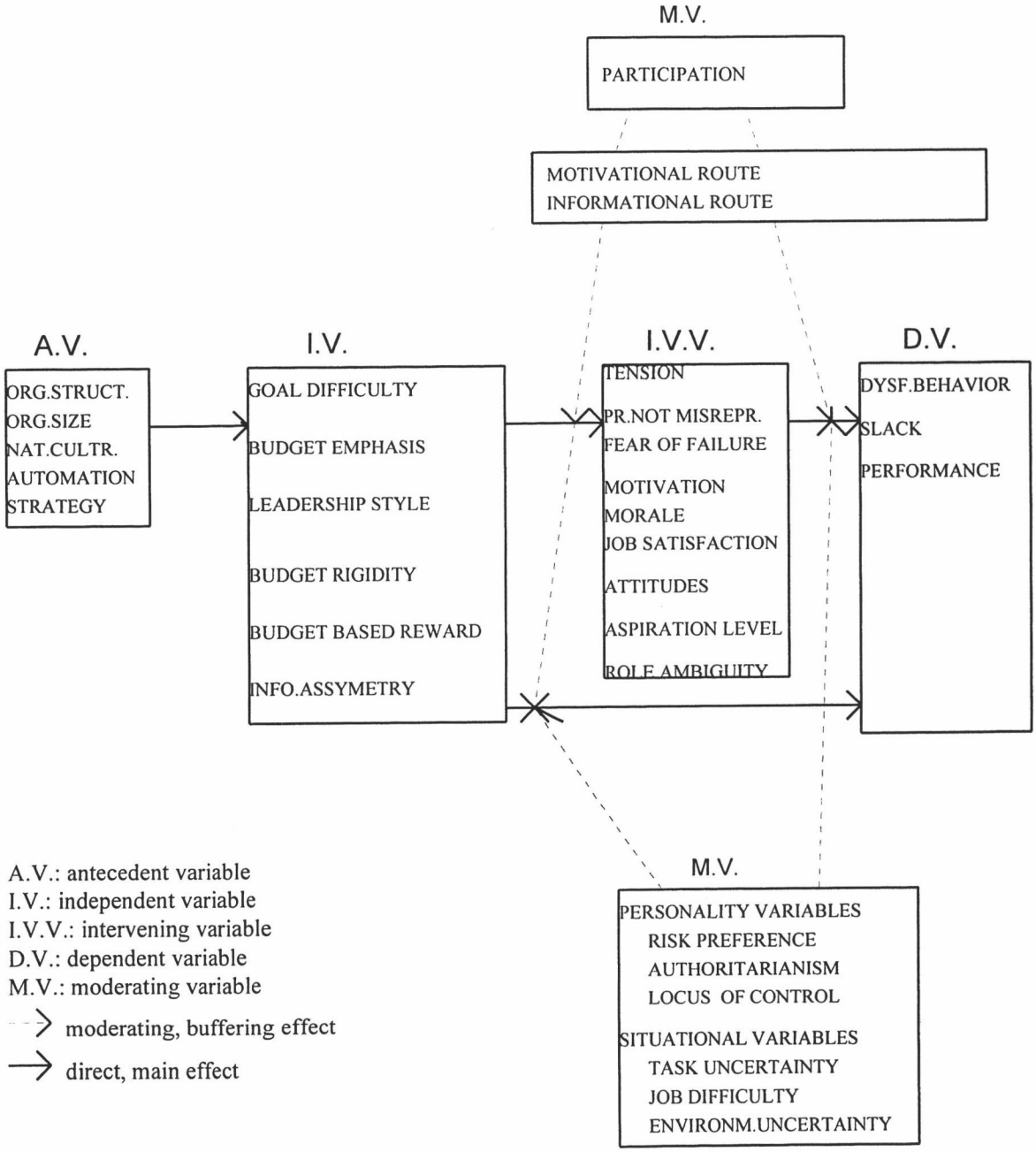
4/ Moderating variable (MV): this is a second independent variable that is included because it is believed to have a significant contributory or contingent effect on the originally stated IV-DV relationship;

5/ Intervening variable (IVV): this is a conceptual mechanism through which the IV and MV might affect the DV.

Of course, the classification of a variable in a category is dependent on the specific focus of the study (Emory & Cooper, 1991). For example, budget participation can be seen as an independent variable affecting performance or slack through the intervening effect of motivation or information sharing. But also it can be seen as a moderating variable, moderating or conditioning the original IV-DV relationship between budget emphasis and slack creation. In the same way, some intervening variables (e.g. motivation) may themselves be the focus of a study in which they are treated as dependent variables. Also, some antecedent variables (e.g. organizational structure) may themselves be the focus of a study in which they are considered dependent variables. Finally it should be noted that interrelations can exist between two independent variables, for example budget emphasis and leadership style, or between two dependent variables, for example slack creation and other dysfunctional behaviors. These interrelations are not explicitly represented in the model in order not to make it overly complex. Therefore, the model is not a generic or all-purpose representation of a system; instead it should be seen in the light of the specific study for which the model is constructed.

The model is shown in Figure 2. Its graphical representation is a combination of a model of supervisory style effects on performance (Briers & Hirst, 1990, p.371), a model of participation effects on budgetary outcomes (Brownell, 1982b, p.146), and a model of occupational stress (LaRocco, House & French, 1980, p.203).

Figure 2: Model of the Game of Budget Control



Some clarification to the model may be necessary in order to see the link with the literature review. First of all, in this domain of the management control literature, the dependent variables of interest are usually behaviors and/or performance. Therefore, performance, slack creation, and other dysfunctional behaviors are presented as the main orientation of the model.

Most of the antecedent variables are taken from the contingency literature, specifically Organizational Structure, Degree of Automation, Organizational Size, and Strategy. National Culture is added, since it was suggested that the game of budget control is primarily a Western game (Hofstede, 1968). These variables are considered antecedent because they have an impact on the design characteristics of the budget control system; they are not expected to have an important direct effect on the dependent variables. For some variables, a direct link with the dependent variables may not be excluded though, for example between degree of automation and slack creation (Merchant, 1985c). Finally, environmental uncertainty is often considered an important contingency factor affecting the design of the budget control system (e.g. Govindarajan, 1986); but also it is often seen as a moderating variable (e.g. Hirst, 1981), moderating the relationship between budget characteristics (e.g. budget emphasis) and outcome variables (e.g. slack creation). Since my research focus is more similar to the latter approach than to the contingency orientation, I've classified environmental uncertainty as a moderating variable.

The independent variables are generally features of the budget control system. They relate to budget characteristics as Budget Emphasis (or Budget Pressure), Budget Difficulty, Budget Rigidity, Budget-Based Reward (Pay - Dependency). Of course there is also the variable Information Asymmetry which is a characteristic of the budget setting situation. There may be some discussion about the variable Leadership Style, which may be classified either as an independent or a moderating variable. Again it should be stressed that this classification depends on the major focus of the study. In the budgeting literature reviewed above, Leadership Style is usually studied as an independent variable. In fact, Hopwood's (1972) styles of budget use are very close to the Budget Emphasis variable, which is generally seen as an independent variable. Other studies have distinguished between some other variables relating to Leadership Style, such as 'needling', 'raising standards', 'frequency of contacts', 'focus on negative results', 'punitive style', etc..., but they are mostly grouped into a more general variable similar to Budget Emphasis.

The intervening variables all describe some mechanism through which the independent variables affect the dependent variables. Mostly they refer to some feeling or attitude that can

not be observed directly. In the budgeting literature, these variables have all been considered to play the same intervening role between budget characteristics (IV's) and budget consequences (DV's). In other literatures however (e.g. the social support literature in social psychology) one distinguishes between stress, tension, and pressure on the one hand, and their effect on motivation, morale, job satisfaction and attitudes on the other hand (e.g. LaRocco, House, & French, 1980). Since, most of the time, this is not done in the budgeting literature, I haven't split these variables either.

Finally, there are a number of moderating variables included. Most attention has been paid to Participation and the way it mitigates some effects through a motivational route or through a process of information sharing or transfer. It is not completely clear where Participation impacts on the relationships: it may act as a buffer against tension and other negative feelings, or it may reduce the detrimental effects of these feelings without actually reducing them. The same problem, mutatis mutandis, applies to the positive effects of participation. Also, it may be that the moderating role of participation doesn't have any effect on the identified intervening variables, but impacts on another place between the independent and the dependent variables. In the literature review, examples of all possibilities have been mentioned; therefore I've included several arrows coming from participation, and leading to different places in the model. Other moderating variables are a number of Personality and Situational variables, of which the points of impact in the model are also not very well understood, and underresearched. Finally, I should note that Reward Structure has been identified as a situational variable by Cherrington & Cherrington (1973), but that it is mostly seen as an independent variable (Budget-Based Reward), describing the characteristics of the budget system.

I hereby finish the overview of the behavioral research in budgeting and the incentive contracting literature. The objective was to describe general relationships among variables that would later be used to predict outcomes in the specific situation of activity-based budgeting. The specificities of the activity-based budget setting will be described in the following chapter. Also, in line with the research process described in chapter 1, the hypotheses related to the research questions will be developed in that chapter.

CHAPTER 3: ACTIVITY-BASED BUDGETING: REVIEW OF THE LITERATURE AND HYPOTHESES DEVELOPMENT

Now that the general relationships in the game of budget control have been described, it is time to apply them to the specific context of activity-based budgeting (ABB), and to make predictions based on the general relationships and the characteristics of the technique and the process of activity-based budgeting. In the first chapter I have already described the evolution in the field of management accounting, and I have presented ABC as a new technique designed to bring relevance back into cost management and control. I haven't explained the uses and the technique of ABC yet, nor the philosophy of ABM (-management) and ABB. This explanation is essential though, since it is part of the theory of the impact of activity-based systems on information asymmetry, slack creation and other dysfunctional behaviors. Therefore, I begin this chapter with a description of activity-based systems and the differences with so-called 'unit-based' systems (see below). This description is relatively basic, but it can't be omitted in a dissertation on the behavioral effects of activity-based budgeting. After this description I will discuss the expected effect of this type of budgeting on information asymmetry, and, based on the general relationships outlined in the previous chapter, on specific intervening (e.g. tension) and dependent variables (e.g. slack creation).

1 Activity-based costing (ABC)

Activity-based costing has fully developed within the management accounting area, and it has no objectives whatsoever in the financial accounting discipline. Its relevance lies in the provision of more accurate product or customer cost information for management decision making about products and customers. Also, ABC is used for management control purposes, such as activity-based budgeting and performance evaluation. Very often, one of the major objectives of ABC is to provide insight in the organization's activities and resource consumption. ABC then is used to provide a "comprehensive economic map of the organization" (Kaplan, 1992). According to Cooper's (1990, p.6) definition of ABC, activity-based systems identify the major activities of a facility's production process, and classify them into a unit-level, batch-level, product-level, and facility-level. Costs in the first

three categories are assigned to cost objects using cost drivers that capture the underlying behavior of the costs that are being assigned (e.g. Turney, 1991). The costs of facility-level activities however are treated as period costs.

In many companies, in Belgium (FET, 01/08/95) and abroad (e.g. American Express, AT&T, National Semiconductor, Kraft USA, ARCO Alaska), ABC-ABM has been called a great success, which means that the project contributed to one or more of the following objectives (Carlson & Young, 1993; Hobdy et al., 1994):

1/ Providing insight in the activities of the firm, and quantifying the cost of these activities;

2/ Providing insight in the factors that drive the cost of these activities, the so-called "cost drivers";

3/ Providing insight in the cost of all kinds of services and cost objects, such as reports, lab tests, purchase orders, customer checks, batches, pallets, parts, engineering changes, etc.;

4/ Providing better insight in the profitability of products and customers through more correct allocation of overhead to the appropriate products and customers;

5/ Building a simulation model with which all kinds of "what-if" questions can be asked, such as: "What is the effect of increasing batch size on costs?", or "What is the effect of reduced product diversity on product costs?";

6/ Pointing to priorities of process improvements, so that more value can be created for the customer (e.g. through faster delivery, better quality, or more service), in a way to increase company profit;

7/ Pointing to possibilities of cost savings and increased profit through elimination of activities that don't add value to the customer (instead of unfocused or arbitrary cost cutting).

The ABC-technique provides these insights through a two-stage process (e.g. Innes & Mitchell, 1993). In the first stage overhead costs are traced to activities, based on direct correlation between the cost and the performing of the activity (Hirsch & Nibbelin, 1992, p.39; Brimson, 1991, pp.153-168). A helpful concept is to think about activities on different levels of the organization (Cooper, 1990):

1/ Unit-level activities are activities that are performed for each additional unit of the product. Most direct production activities fall into this category (e.g. printing, weaving, painting,

etc.), but also some overhead activity may be unit-driven (e.g. inventory counting & control).

2/ Batch-level activities are activities that are performed for every batch of the product. Setting up a machine and batch-wise quality controls are examples of manufacturing overhead activities on this level.

3/ Product-level activities are activities that are performed for every additional product in the product mix. The cost of administrating the bill of materials is an example of product-level costs.

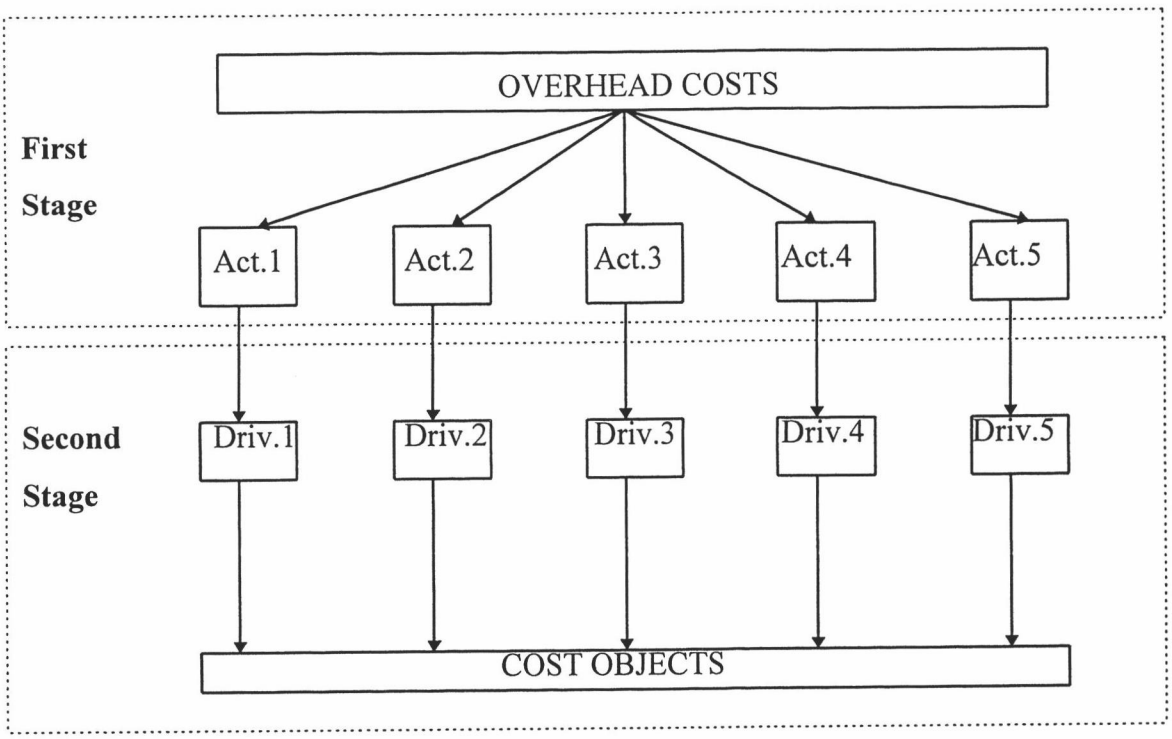
4/ Facility-level activities are activities that could not be traced to any previous level, such as most activities of top management. Sometimes also department-level activities are distinguished.

In the second stage of the ABC-process, costs of activities are assigned to cost objects (e.g. intermediate products, services, reports, tests, or final products and customers), based on cost drivers that capture the underlying behavior of the costs that are being assigned (Innes & Mitchell, 1993). On the unit-level, for instance, the costs of finished goods inventory control can be assigned to customer orders using number of product units as a cost driver. In this way, voluminous orders get more of these costs assigned than small orders, which is logic since more time is spent counting high inventory. On the batch-level, costs can be assigned to a customer order based on the number of batches needed to produce the order. On the product-level, costs of bill of material (B.O.M.) maintenance can be assigned to products in function of the number of products of which a B.O.M. is maintained. Finally, the facility-level costs, theoretically, should not be assigned to products, but should be considered as period costs[11].

[11] By tracing all costs to the level of activity on which they can be considered "direct", and by not assigning facility-level costs to products, ABC is really an extension of the direct costing concept. Kaplan (1992) explained that "once Robin (Cooper) developed and articulated the hierarchical structure of activity-based costing, we understood that ABC was really a contribution margin approach, not an attempt to get more accurate fully-allocated unit costs".

This two-stage process can be illustrated with the following figure (Figure 3):

Figure 3: Two-stage ABC process



Practically speaking, activity-based cost system development can be described in five steps (Innes & Mitchell, 1993):

1/ Preparation of a list of activities relating to overheads. Usually this step involves extensive interviewing of people employed in overhead functions.

2/ Identification of the resources consumed by the activities. Labor costs are usually assigned based on time spent on the activities; other cost categories may follow the same or different assignment rule (e.g. floor space used for the activity). Identification of the appropriate activity cost quantification method is also done in the interview process.

3/ Identification of the cost driver for each activity, again through interviewing. Basically this is a search process for the factors influencing the resources needed for the activity.

4/ Select a set of activity cost pools and cost drivers that will form the basis of the activity-based system. This is a rationalization step in which activities driven by the same driver are grouped into homogeneous cost pools. Also the number of cost drivers may be reduced by eliminating cost drivers that are highly correlated with another one. The final design of the system and the level of detail maintained, depends on the purposes of the model.

5/ Assessing the cost driver rates and applying them to the products or orders. This step involves measuring the volume of each cost driver per year (e.g. the number of batches, the

number of pallets, the number of invoices, etc.), and calculating a cost per unit cost driver for each activity (or activity cost pool)[12].

The end result of this five-step process should be a table (or a set of tables) like in Figure 4.

Figure 4: ABC output table (hypothetical example)

Activity	Cost of Activity per year	Cost Driver	Volume per year of Cost Driver	Cost per unit Cost Driver
Machine set-up	$100000	number of set-ups	1000 set-ups	$100 per set-up
Product testing	$200000	number of product units	100000 units	$2 per product unit
Part administr.	$150000	number of parts	750 parts	$200 per part
Delivery inspection	$50000	number of deliveries	2000 deliveries	$25 per delivery

It is possible to increase the managerial value of the ABC information by:

1/ grouping the activities in business processes, e.g. the purchasing process, the process of responding to engineering changes, the quality control process, etc; these processes can cross departmental boundaries, or even company borders (Lawson, 1994);

2/ including an assessment of value of each activity for the customer; for example, the costs of quality control and rework to correct quality problems that add no value to the customer; the customer would be better off if quality is guaranteed by the production process, so that no ex post control and rework is necessary (Turney, 1992);

[12] This step involves a division of the activity cost per year by the volume of cost driver. If one divides by the actual volume of the cost driver, say of the last year, one becomes an ex post estimate of the cost per unit cost driver of that activity. According to Cooper & Kaplan (1992) this ex post estimate should not be used in decision making since it is dependent of capacity utilization. A product cost in ABC, or the cost of any cost object in ABC, should be independent of the actual capacity utilization, and therefore should be based on the practical capacity for each activity. The meaning of "costs" in ABC is the resource usage of the cost object for that specific activity. Products (or cost objects in general) that use an activity for which there is overcapacity (resource spending is higher than total resource usage of that activity) should not be penalized for using that activity. For example, if a person is employed for quality checking (resource spending on wages is $25000 per year), and if that person should be able to do 1000 quality checks per year, the cost of resource usage for that activity is $25 per quality check, even though the actual number of checks in the last year may have been far less than 1000.

3/ adding information about what part of the activity cost can be influenced in the short run, and what part is fixed or sunk (Woods, 1992; Hirsch & Nibbelin, 1992).

Activity-based systems differ from most traditional "unit-based" systems in the following ways[13]:

1/ Since unit-based systems allocate overhead in function of volume-based drivers such as number of direct labor hours, they misallocate costs that are not volume-driven (e.g. costs that are fixed per order, irrespective of the number of units in that order). Therefore, these systems generally overcost high-volume products or orders, and undercost low-volume ones (Cooper & Kaplan, 1988).

2/ Unit-based systems usually don't capture drivers such as product complexity (e.g. number of parts) or diversity (e.g. number of stock keeping units). Therefore, these systems generally overcost standard products or orders, and undercost complex ones (Cooper & Kaplan, 1988).

3/ Since traditional unit-based systems usually work with cost center budgets, they don't shed a light on costs that cross the departmental processes (McNair, 1990).

4/ Since most traditional cost systems allocate costs to cost centers in the first stage, they assume that all costs in that cost center behave according to the same cost driver. However, a cost center usually is not a homogeneous grouping of activities in terms of the cost drivers involved (Beaujon & Singhal, 1990).

5/ By using volume-based cost drivers such as the number of direct labor hours, traditional cost systems suggest that product costs can be reduced by eliminating direct labor (McIlhattan, 1987; Turney, 1989).

6/ Traditional cost systems are not very informative about how to manage costs: only activities can be managed, costs can not (McNair, 1990).

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[13] The definition of traditional or "unit-based" cost systems is based on Cooper's (1990) study of fifty cost systems in thirty-one companies. It is the common denominator of what he found as cost systems in those companies. It is a general description of the nature of traditional costing system, as they evolved during the years under pressure and dominance of financial accounting needs and regulations. Typically, these unit-based systems assigned costs to cost centers or departments in the first place, and then to products in strict relation to production volume (in terms of direct labor hours, machine hours, material dollars, or other "volume-based" drivers).

7/ Traditional cost systems usually don't give much information on the cost per cost driver of overhead activities (e.g. the cost per new supplier in the activity "supplier selection") (Brimson, 1991).

Finally, I want to give an indication of the adoption rate of ABC in industry. Of 251 companies participating in a survey by Innes & Mitchell (1995) in the UK, 20% had adopted ABC, and of the remainder, 27% were in the process of actively considering ABC for adoption. The adoption rate was higher than in surveys conducted in the beginning of the '90s (Innes & Mitchell, 1991; Nicholls, 1992), in which adoption rates were typically not higher than 14%. In their survey, Innes & Mitchell (1995) found that a markedly significant higher rate of adoption was apparent in the larger firms. Of those companies using ABC, 65% considered their overall experience with it as fairly successful; 35% of the users were actively assessing how ABC could be further developed and applied in other sections of the company. The purposes of ABC were very diverse, 59% of the users using it for activity-based budgeting. Another 14% were currently planning to use it for budgeting.

2 Activity-based management (ABM) and Activity-based budgeting (ABB)

The use of activity-based information in various analyses designed to yield continuous improvement is called activity-based management (ABM) (Turney, 1992). According to Boër (1991), an accounting information system that is relevant for managing a process of continuous improvement should assist this process by pointing out to priorities of improvement, by influencing and motivating appropriate behavior, and by measuring the effect of the improvements. An accounting information system designed in terms of activities rather than cost categories is believed to be more appropriate for assisting this process of continuous improvement (Cooper & Turney, 1989; McNair, 1990; Miller, 1992; Turney, 1992).

It's important to note that the objective of ABM is continuous improvement, which means cost reduction, efficiency improvement, and effectiveness improvement. These goals

can be achieved by managing the cost drivers and/or by managing the activities, as is illustrated in the following points:

1/ Managing the cost drivers. Very often product complexity, in terms of the number of product parts, turns out to be an important cost driver, for several activities throughout the organization. Product complexity may drive process time in manufacturing, but also it may drive manufacturing overhead such as bill-of-material administration as well as warehouse costs. Therefore, by reducing the number of product parts in the product design phase, product complexity can be reduced and resources can be set free or employed for other purposes. Another example is reducing the number of suppliers, in order to simplify supplier administration in the purchasing department and to use the purchasing resources more efficiently.

2/ Managing the activities. The following ways can be distinguished to manage activities: activity reduction, activity elimination, activity selection, and activity division (Turney, 1991b). Activity reduction is doing the activity in less time than before. This can be done by redesigning a process (e.g. to reduce set-up costs), reorganizing production flows and availability of materials, and by training people to do their job more efficiently. Activity elimination is the elimination of activities that have become redundant or obsolete, and that don't add value for the customer. Activity selection is the process of selecting the most efficient or effective activity, often in the process design stage. Activity division, finally, means designing the products or processes in such a way that the number of unique activities is minimal. Unique activities are activities that can only be used for a limited number of products.

One way to plan, guide, monitor, and control the process of continuous improvement is activity-based budgeting (ABB). The ABB process, like every budget process, can set goals that consequently have to be achieved and/or improved. Like every budget process (see chapter 2), ABB starts with a prediction of the expected business for next budget period, based on market projections and strategic objectives (Brimson & Fraser, 1991). Differently from most budgeting processes though is the next step, in which these expectations are translated in terms of workload for specific activities. "*Under ABB, these planning guidelines are then cascaded down to the level of detail required to provide objectives for individual*

activities within the business, and thus for the managers responsible for them" (Brimson & Fraser, 1991, p.43).

There are two ways in which this translation to activities can take place: analytical and heuristic (Green & Flentov, 1990, p.57).

1/ In the analytical way, the expected volume of the cost drivers is derived from the sales expectations, using technical relations between the volume and the nature of the sales and all kinds of operational parameters. For example, when 2000 customer orders are expected for next period, this can be translated to (e.g.) 4000 production orders or batches (assuming an average of two batches per customer order). Based on a standard cost of resource consumption per batch (e.g. set up costs, and other costs of batch-related activities), the expected resource consumption for batch-related activities can be estimated for next period (Morrow & Connolly, 1991)[14].

2/ The heuristic way can be used for higher-level activities (e.g. plant level) for which the link with operational cost drivers is less direct. These heuristics should be based on insight in the activities and on prior experience (Green & Flentov, 1990).

In the process of activity-based budgeting, continuous improvement can be achieved by activity reduction and activity elimination. Activity reduction would mean that the standard time for that activity is reduced, as a result of more efficient and faster work organization, waste elimination, etc. "*The standard for performance has become perfection: zero defects, 100% yields, zero scrap, 100% on-time delivery, and no waste in throughput times or processing. ... If benchmarks short of ideal operations are desired, then the standards should be set based on the performance of the company's best worldwide competitor. But this can only be a short-run objective, since by the time the company achieves this performance level, its best competitor will be well beyond that performance*" (Kaplan, 1991, p.206). This quote

[14] It should be noted that this analytical derivation assumes a linear relationship between costs and cost driver (Noreen, 1991). Since ABC is a model of resource usage, this assumption is believed to hold. On the resource spending level this linear relation can not be assumed for all resources, because decisions on spending levels involve management decisions about adding or eliminating resources (Kaplan & Cooper, in King, 1991). Kaplan & Cooper argue, however, that, in the long run, models of resource usage are good predictors of future resource spending (in King, 1991; also Cooper & Kaplan, 1992). Even if resource spending is not linear, this doesn't mean that it can't be modeled, and so some people have begun making models of resource spending (Greenwood & Reeve, 1992). These models are based on stepwise functions that indicate when a given spending level will be insufficient for an expected volume of cost driver.

illustrates the nature and the objective of activity reduction in the philosophy of continuous improvement. Activity elimination in the budgeting process would mean that resources spent on non-value adding activities are cut out of the budget, and eventually reallocated to create more value.

The following example is taken from Turney (1991, p.175-176), because it illustrates very well the analytical approach to ABB as well as the process of cost driver and activity reduction:

> *"The company in the example has scheduled 1000 products for manufacture in the coming period. This production schedule requires 3750 production runs (the number of production runs is the activity driver that helps determine work load for the activity). A setup is required each time there's a production run, so the activity is also performed 3750 times. In the preceding year it took, on average, two hours to complete a setup. During the year, however, operators were trained in setup time reduction, and tools were placed more readily at hand. This reduction in key cost drivers brought the average time down to one hour. One hour per setup for 3750 setups requires 3750 hours of effort. If each person is available to perform setups 1500 hours per year, 2.5 people are required to do the work. (It would have been 5 people if the cost drivers had not been reduced.) The budgeted cost of the activity is $100000. This is 2.5 people at $40000 total salary and benefits for each person."*

This example shows:

1/ how the budget is derived analytically: the calculation of resource demand for the activity is a multiplication of the standard time per unit cost driver times the expected number of units of the cost driver;

2/ how the standard time per unit cost driver is brought down through a process of continuous improvement based on training in setup time reduction and job redesign, which can be interpreted as taking slack out of the estimates;

3/ how the standard times with which the system works do not distinguish between different levels of abilities, but instead assume an average ability level (i.e. it is assumed that everybody can do the setup in one hour);

4/ how the number of people needed for the job is based on the total expected work load and the average time a person is available.

Another example is taken from McNair (1991, p.E4-26), and describes the philosophy of activity-based budgeting in a medium-sized manufacturer of electronic devices for uses in computers. In that company (called FCD), "*managers are asked to forecast both the cost and volume of activities to be performed in their area over the coming year. Pursuing the goal of reduced cost per activity occurrence, managers cannot simply ask for more resources as workloads increase. Instead, they are expected to analyze the work process and attempt to eliminate unnecessary steps and procedures to increase the effective capacity of their area. .... For example, the test laboratory manager was facing increased loads due to the introduction of several new product lines. The increased demand for service was responded to by a request for more employees. In a traditional setting it is quite likely that simply justifying the increased workloads would have been ample reason for hiring another person in the test laboratory. Not so at FCD. The manager in question was asked to review the work procedures in his group and suggest ways the increased workload could be handled with existing resources. In other words, the manager was asked to eliminate waste from current procedures to free up the capacity of the test group for new products. With the help of the ABC accounting manager, a detailed value chain analysis was performed. The analysis suggested that 20 percent of the existing work could be eliminated totally and that another 20 percent could be improved. The savings from these two areas of change would offset the work load from the new products. The laboratory manager was not asked to reach farther than this for the coming year, but it was clear that, in the future, white-collar productivity improvements would be needed to keep the testing process within acceptable cost and delivery objectives.*"

The crucial distinction between activity-based budgets and budgets based on unit-based information is that unit-based systems, as they are often encountered in the field, do not have detailed information about activities and cost drivers. In the previous chapter I have already

described the steps in the traditional budgeting process, but I haven't talked about the techniques and calculations involved in deriving the resource demands. Since in these systems volume is the cost driver mostly used (in terms of direct labor hours, machine hours, or material dollars), there is usually insufficient information to derive the budget analytically. Therefore, very often the budget is derived in a negotiation process with simple heuristics. Morrow & Connolly (1991, p.38) describe how it goes:

Step 1: Take last year's spending for each department.

Step 2: Add on for inflation.

Step 3: Adjust for new projects.

Step 4: Negotiation takes place between the department manager and finance department to agree on a spending limit.

Step 5: All expense budgets are then reduced anyway to arrive at the profit figure the managing director wants.

It should be noted that in many textbooks (e.g. Horngren & Foster, 1991) traditional budgeting systems are described that do work analytically, particularly for the so-called "variable costs". This is based on the assumption that these costs have a linear relationship with the number of units produced. Although other sources of variability are recognized in the traditional literature (see e.g. Dickey, 1967, Solomon, 1968), in the real world they are often ignored by the management information system, as was explained in the first chapter (Kaplan & Johnson, 1987; Cooper, 1990). That's why Cooper (1990) called these systems unit-based, because they only worked with unit-based drivers (direct labor hours, machine hours) to allocate overhead costs to products. It is this real-world situation that I have in mind when I think about traditional unit-based information and control systems. Unit-based systems, as they ignore other cost drivers, calculate an average resource consumption per unit. When the product mix is diverse, this results in an overestimation of the resource consumption of simple products and an underestimation of resource consumption of complex products (Kaplan & Cooper, 1988). If these estimates were used to derive a budget analytically, the system would overestimate the total time and resource demands for simple products, and underestimate the time and resource demands for complex products.

This ends the discussion of activity- and unit-based budgeting. In the next sections I will develop hypotheses based on the characteristics of ABC and ABB, and on the general relationships described in the previous chapter.

3 Activity-based budgeting and information asymmetry

The descriptions of the techniques of ABC and ABB in this chapter has indicated that these systems are often very detailed. Kaplan (1992) compared an ABC system to a "comprehensive economic map of the firm", and generally this mapping of activities is considered to be an important (if not the most important) outcome of the ABC analysis (Kingcott, 1991). The end result of the ABC analysis, especially when it's designed for purposes of ABM (Turney, 1991), is an often detailed activity model in which cost drivers describe the linkages between the cost of the activities and their outputs. The detail of these systems, when compared with a less detailed unit-based cost information system, is already an argument to suggest that subordinates in the activity-based situation perceive that their superiors have increased knowledge about the subordinates' work environment.

This argument is enforced by case study information from Bhimani & Pigott (1992). They illustrated very clearly how in a British company ABC had a significant impact on the information flow between line managers and accountants. "*In a way, ABC altered the mode of communication and the nature of information exchange by providing line managers and accountants with a common language for articulating organizational concerns, be they financial, production or sales oriented. By the same token, accounting itself became significantly more entrenched in the management of the organization, particularly at the factory level*" (Bhimani & Pigott, 1992, p.129). This quote suggests again that ABC may do something to reduce information asymmetry between a superior and a subordinate, as perceived by the subordinate.

The subordinates' perception of information asymmetry reduction may come both from the process of the development of the activity-based system and from the use of the end product of the analysis. In the beginning of this chapter, the development process of an ABC

cost information system was described as a five-steps process (Innes & Mitchell, 1993). Information transfer from the well-informed subordinate to the uninformed superior or accountant may happen in the first three steps of this process, which involve extensive interviewing to identify activities, time distribution on activities, cost assessment of activities, and identification of cost drivers. The fourth step in this process is basically a rationalization step in which the most appropriate design of the information model is discussed, but the fifth step implies an information transfer again. In this step cost driver rates are determined by measuring the volume of cost driver (e.g. the number of invoices) a person processed last year, or should be able to process in a given activity time. This development process of an activity-based information system is nothing less than an operational audit, or at least part of an operational audit program. Detail and accuracy of information systems and more thorough operational audits were all meant by Merchant (1985b) when he argued that better information systems could mitigate information asymmetry between subordinate and superior. Surveys among ABC users in the US as well as in Europe have shown indeed that the activity-based information systems provided an improved understanding of the economics of production and activities performed by the organization, and improved possibilities for cost control (Innes & Mitchell, 1991; Nicholls, 1992; Green & Amenkhienan, 1992). Also it is argued that activity-based systems better reflect the actual resource consumption in the production process and related activities (Turney, 1989; McNair, 1990; Miller, 1992; Turney, 1992). Another indication of a potential effect of ABC on information asymmetry was found in Innes & Mitchell's (1995, p.143) survey in the UK. They noted that 41% of the ABC users had some reservations about it, particularly about having to maintain time sheet type of records to support the ABC system and about the increase in personal accountability which resulted from activity analysis. This may indicate that those employees felt a decrease of information-based power associated with the information transfer to accounting staff and superiors.

When these detailed activity-based information systems are used to derive budgets, it may be inferred that subordinates in the activity-based budget meeting perceive less information asymmetry than in the unit-based budget meeting, characterized by less detailed and possibly inaccurate cost information. Therefore, the following hypothesis may be formulated:

Hypothesis 1: Subordinates perceive information asymmetry to be higher in a situation of unit-based budgeting than in a situation of activity-based budgeting.

This hypothesis assumes a participative budget meeting between a superior and a subordinate, who, like an agent, is familiar with his task. Another assumption is that the ABC system is not only detailed but also accurate; in other words the standards with which the information system works should be perceived as correct or realistic, otherwise the subordinates won't accept the superior's budget suggestion, and consequently, they may still perceive to be in the information advantage. The unit-based system, on the other hand, as described above, is at least less detailed since it doesn't work with activity information and it employs only one cost driver: number of units. In terms of it's accuracy however, it may or may not be less accurate. It is possible that the unit-based estimate of the average resource consumption per unit, disregarding the degrees of complexities of the different units, leads to the same budget suggestion as a system incorporating complexity as a cost driver. This would happen when the expected product mix is such that the overestimation of expected resource consumption for simple products is canceled out by the underestimation of expected resource consumption for complex products. In that case, the end result of the unit-based budget, even though it was inaccurately derived, may not be perceived unrealistic. Differences in perceived information asymmetry, then, will come especially from the differences in detail of the budget derivation.

4 Activity-based budgeting and budget slack

If activity-based information systems reduce information asymmetry between a superior and a subordinate, it may be expected that less slack will be introduced in the activity-based budget as compared to the unit-based budget. This expectation is based on the general relationship between information asymmetry and budget slack creation, as outlined in the previous chapter. Also discussed in the previous chapter, this slack reduction may come both from an active intervention by the superior, and/or from a pressure not to misrepresent one's potential felt by the subordinate. In an ABC context, slack reduction by active intervention

by the superior would mean activity elimination, for example of non-value adding activities (McNair, 1990; Turney, 1991), or activity reduction, for example reducing the standard time required per setup (Turney, 1991; Kaplan, 1991). Slack reduction may also come purely as a result of the subordinate feeling a pressure not to misrepresent his potential, knowing that the superior is well-informed about the subordinate's work environment and capacities as reflected in the activity-based information system.

In the unit-based budget, on the other hand, the subordinate may perceive that he has better information than the superior, and thus may not fear to be "caught" by the superior when misrepresenting his potential (Kren & Liao, 1988). Therefore, to the extent that other slack-reducing mechanisms are not employed, the subordinate in the unit-based situation may still try to introduce slack in the budget. When the budget is based on heuristics, like in the budget process described by Morrow & Connolly (1991), slack may be introduced in each of the steps of this process. Slack may be taken over from last year's budget (step 1), but also it may be introduced in each of the adjustment- and negotiation steps (step 2 and 3). When the budget is derived analytically, based on an average resource consumption per unit of production, slack may be introduced when the subordinate convinces the uninformed superior that the standards are inaccurate and that more resources are needed.

According to the literature review in the previous chapter, however, an important interaction with a personality variable should be noted, namely with risk preferences. The general relation is that in case of information symmetry, risk averse people will be less likely to reduce slack creation than non-risk averse people (e.g. Waller, 1988). Applied to the activity-based context, it would mean that slack creation is reduced in the activity-based budget setting as compared to the unit-based setting, especially for non-risk averse subjects. Risk averse people will continue to create slack in the activity-based budget, because they need it as a buffer against uncertainty. These expectations are reflected in the following hypothesis:

Hypothesis 2: The difference in slack creation in activity-based versus unit-based budgeting is smaller for risk averse subjects than for non-risk averse subjects.

This hypothesis assumes that the activity-based budget setting is characterized by more information symmetry than the unit-based setting, and that there are no other slack-reducing mechanisms involved. It also assumes that participation in the budget setting does not completely mitigate the need for slack creation, as was argued by Hofstede (1968) and Schiff & Lewin (1970). It further assumes that the environment is characterized by uncertainty, and that the reward structure is budget-based, as was indicated in the previous chapter. From agency theory it takes the assumptions that subordinates are basically self-interested and work averse, and that they have a high utility for money. The leadership style can best be described as budget-constrained (Hopwood, 1972), characterized by high budget emphasis. Finally it assumes that the activity-based system is itself relatively slack-free, meaning that no slack is introduced in the estimation of the standards[15].

Slack reduction in the activity-based context, as explained before, may come from an active intervention from the superior, and/or from a pressure felt by the subordinate not to misrepresent his capacity. In most previous research on budget slack and information asymmetry, it was assumed that this pressure would be felt in the information symmetry condition (see previous chapter). If activity-based systems are characterized by less information asymmetry, the following hypothesis can be derived:

Hypothesis 3: Pressure not to misrepresent is higher in an activity-based budgeting situation than in a unit-based budgeting situation.

This pressure not to misrepresent is the intervening variable between the characteristics of the budget setting and the need for slack creation. There has been no research on possible personality variables affecting this pressure not to misrepresent.

5 Activity-based budgeting and job tension

In chapter 2 it was explained that job tension increases when information asymmetry decreases, because of reduced job control (Jaworski & Young, 1992). It follows, that, if

[15] If slack were introduced in the activity-based standards, they would be the focus of a process of continuous improvement (activity reduction), in order to become relatively slack-free standards.

activity-based budgeting systems are characterized by less information asymmetry than unit-based systems, more job tension from reduced job control would be expected in the activity-based situation. Specifically, people in the activity-based context may feel that they have very limited discretion about what to negotiate in the budget meeting, which may give them a feeling of reduced job control resulting in increased job tension. This expectation leads to the following hypothesis.

Hypothesis 4: Job tension induced by reduced job control is higher in the activity-based system than in the unit-based one.

This hypothesis assumes that no differences exist between the two situations in terms of other organizational stressors. Both systems have a budget-constrained leadership style characterized by high budget emphasis, rewards are budget-based, there is environmental uncertainty, and budget participation does not completely mitigate tension. Also, this hypothesis assumes measurement before the final budget level is determined, because it is likely that the activity-based budget will be more difficult than the unit-based budget, which is a stressor itself. Indeed, if activity-based budgets are characterized by less budget slack, whatever the mechanism of slack reduction was (active or via a pressure not to misrepresent), they are likely to be more difficult than unit-based budgets in which more slack may be introduced. The resulting effect on job tension, however, should be separated from the previous stressor, since it is dependent on the level of job demands. In chapter 2 it was explained that high budget goals would create more tension, especially in a situation of high job demands or job difficulty (Karasek, 1979; Mia, 1989). If people in the activity-based budget setting are confronted not only with reduced job control but also with high job demands, they are likely to feel more tension than people in a unit-based budget, even if the latter have the same job difficulty. This leads to the following interaction effect.

Hypothesis 5: The combination of type of budget system with high job difficulty induces more tension in the activity-based context than in the unit-based one.

This hypothesis assumes measurement after the final budget has been negotiated, and the job difficulty is known. Also it assumes that no differences exist between both systems in terms of the motivational and stress-buffering effects coming from participation. It further assumes a budget-constrained leadership style, a budget-dependent pay scheme, and high budget emphasis.

6 Activity-based budgeting and dysfunctional behaviors (other than slack creation)

If people can no longer buffer against uncertainty by creating slack in an activity-based budget, job tension may increase, and they may engage in other dysfunctional behaviors, as was explained in the general relationships in chapter 2. Therefore, the following hypothesis may be formulated.

Hypothesis 6: Dysfunctional behaviors (other than slack creation) are more likely in an activity-based budget setting than in a traditional unit-based setting.

This hypothesis assumes a budget-constrained leadership style characterized by high budget emphasis, and budget-based rewards. Also it assumes that other possibilities for dysfunctional behavior exist, beyond the control of the supervisor. In other words, information symmetry in the activity-based condition does not cover all possible information. A further assumption is, following agency theory, that the subordinate is self-interested and work-averse, and has a high utility for money.

The hypotheses developed above are based on the characteristics of ABC and ABB, and on the general relationships between budget variables described in chapter 2. Many of these variables play a role as moderating or intervening variables, or they specify the characteristics of the budget control system (e.g. budget emphasis) where these relationships are expected to hold. Together, these hypotheses and their assumptions form a theory, developed based on existing theories, following a research process outlined in chapter 1. In the next section I will summarize this theory and its assumptions (or scope conditions).

7 The theory of the behavioral effects of activity-based budgeting, and its scope conditions

The theory developed above can best be summarized as follows:

1/ Because of its effect on information asymmetry, activity-based budgeting will show less budget slack than unit-based budgeting, especially with non-risk averse subjects. The superior's active use of his newly acquired information, together with the subordinate's pressure not to misrepresent his potential, account for the slack reduction.

2/ The subordinate, having lost a possibility to buffer against uncertainty by creating budget slack, will experience more job tension from reduced job control. Also when the job is demanding, the combination of reduced job control and high job difficulty will give more tension in the activity-based budget situation than in the unit-based setting, even if the latter has the same high job difficulty.

3/ The subordinate, seeking a way to reduce job tension in the activity-based setting, will engage in dysfunctional behaviors other than slack creation, more than in the unit-based situation.

The following are the scope conditions within which the theory is hypothesized to hold:

1/ The budget is derived participatively between the superior and the subordinate; this participation does not completely mitigate the need for slack creation.

2/ Reward (i.e. pay) is dependent on budget achievement.

3/ There is uncertainty in the job, because of environmental uncertainty and/or task uncertainty.

4/ Leadership style is budget-constrained, characterized by high budget emphasis.

5/ Subordinates commit themselves to the budget objectives. There are no ex post budget adjustments.

6/ The superior and the subordinate act like a principal and an agent, respectively. They are self-interested, behave rationally, and have certain risk attitudes. The agent is work-averse and has private information.

7/ The activity-based information system is detailed, reliable and accurate, and the standards with which the system work are sharp (aimed at continuous improvement)

but attainable. The unit-based system, on the other hand, is at least less detailed; it may or may not be less accurate.

8/ The focus of the activity-based budgeting process is on continuous improvement. The superior does not settle with grossly suboptimal performance, as judged by his information system.

At this point, there is a theory that can be tested. In the following chapter a method will be selected appropriate to test this theory. The strengths and weaknesses of this method will be outlined, and it will be argued that the strengths outweigh the weaknesses. Also the general research approach will be described, that is, the way in which this research is framed within a particular approach to conducting science.

CHAPTER 4: RESEARCH METHOD AND SCIENTIFIC APPROACH

In this chapter I will select and motivate the research method with which the theory will be tested. This is the fourth step in the research process described by Kinney (1986) or Simon (1976). The actual design of the research method will be explained in the chapter hereafter. The current chapter will also describe the scientific approach taken to my research, based on a typology of approaches to research in the social sciences, developed by Burrell & Morgan (1979). Every research holds some assumptions about ontology, epistemology, and methodology, and, following Hopper & Powell's advice (1985, p.456), I will substantiate these assumptions underlying my approach to research in management accounting and control held in this study. Together with Hopper & Powell, I believe that this is helpful to create a frame within which the research should be understood.

The selection of the research method is based on Kerlinger (1973, p.300), according to whom there are two primary reasons why one should be concerned about a careful research design: 1/ to provide answers to the research questions, and 2/ to control variance. These two concerns are used to organize my motivation and choice of the research method. Also I will evaluate the limitations of the chosen method and assess their implications.

1 The research method should provide answers to the research questions

The objective of the research is to test a theory developed around expectations of answers to the research questions. This theory is a causal theory (there are dependent and independent variables), and specific conditions within which the theory is expected to hold are formulated. It would be wrong to believe that only one method is appropriate to solve a particular research problem. For example, in exploratory research surveys, case studies and experiments may all be appropriate (Yin, 1989). But generally, one method has a distinct advantage over another in a particular situation. In descriptive research, where "How?" and "Why" questions are addressed, and in situations where the researcher can not manipulate particular variables, case studies have a distinct advantage (Yin, 1989; Ryan, Scapens & Theobald, 1992; Merchant & Simons, 1991; Ferreira & Merchant, 1992; Eisenhardt, 1989). When it comes to testing a theory, like in my case, lab experiments have a distinct advantage

because most natural empirical settings contain more variables than are specified in the theory to be tested. Removing or keeping constant those variables and conditions that are not part of the theory creates an environment in which the theory can be tested in its purest form. The resulting artificiality of the laboratory is, in case of theory testing, an asset: when the environment contains all and only the theoretically specified factors, the theory in question may be expected to predict better (Swieringa & Weick, 1982; Webster & Kervin, 1971; Kerlinger, 1973, p.401). Since my objective is to test a narrowly specified theory, in which all relevant variables are determined based on the literature, and with well-defined scope conditions, I believe lab experiments have a distinct advantage.

Some proponents of case study research argue that the objective of theory testing can also be achieved with case studies. Eisenhardt (1989) describes a process of building theory from case studies, and confronting the emerging theory with new observations in new cases. As long as the theory is not contradicted by new evidence, it continues to be valid. Otherwise modifications in the theory should be made, and again these should be confronted with new cases. This iterative process ends when no new qualifications have to be made to the theory. The result is a new theory, grounded in empirical findings, and often rich in terms of the number of variables that are considered; the downside is that the resulting theory is often very narrow in scope, and that it lacks the simplicity of overall perspective (Eisenhardt, 1989, p.547).

This case-based process of theory building and testing, however, is not the one most appropriate for my purposes. The theory I have developed is basically an extension of existing theory (agency theory, budgeting and control theory) to a new type of information systems (activity-based systems). The relationships I am relying on are well-documented in the literature, and have been tested before. The scope conditions and assumptions under which these relationships are found to be valid have also been explained in the literature (see previous chapters). My objective is not to add new variables and qualifications to these relationships or to the theory in general. Instead I want to maintain the relative simplicity of the theory as well as its overall perspective. I want to test the behavioral consequences of activity-based budgeting, based on the variables and the conditions that have been found relevant in the past. For this purpose, as I said before, lab experiments have a distinct

advantage because they create an environment in which all variables that are not part of the theory are removed or held constant. The distinct advantages of case studies (building "richer" theory, providing profound descriptions of the organizational reality, providing deep insight in the "why?" of phenomena,...), on the other hand, are not assets in my situation for the reasons just explained.[16]

Additionally, in my study I want to study causality between variables (e.g. type of information system, and slack creation). By manipulating the experimental conditions, and by controlling all other variables, experimentation is the method to demonstrate causality (Fromkin & Streufert, 1983, p.419). Manipulation of variables, in most situations, is not possible in case studies and field research (Yin, 1989).

For these reasons I conclude that lab experiments are most appropriate for answering my questions and for meeting my research objectives.

2 A research method should control variance

Kerlinger (1973, p.300) describes three types of variance to control:

1. Maximize systematic, experimental variance (or explained variance): this is the variance explained by the manipulation, or in ex post facto research the variance left over after blocking out all other variances.
2. Control systematic, extraneous variance attributable to sources outside the scope of the study.
3. Minimize error variance due to random error, individual differences, and measurement error.

Generally speaking, experimental studies are stronger in terms of control than are non-experimental studies: *"The likelihood of confounding effects impacting upon the relationships under analysis is higher in non-experimental designs"* (Ryan, Scapens, & Theobald, 1992, p.90). Consequently, experimental studies generally score better in terms of internal validity: whether or not the observed differences between treatments can be safely attributed to the treatments (Campbell & Stanley, 1963, p.5).

[16] An identical line of reasoning is followed by Chow (1983, p.672) to motivate the choice of a lab experiment for testing clear propositions derived from theory.

A basic virtue of lab experiments is the possibility of randomization, which assures that all experimental groups are similar (Kerlinger, 1973, p.130). This reduces the selection threat to internal validity, and eliminates a source of systematic variance due to extraneous variables (Campbell & Stanley, 1963). In field studies it is almost never possible to randomize, which leaves the possibility of matching groups and/or co-varying in order to get comparable groups and to minimize variance due to extraneous variables (Kinney, 1986). Since it is almost impossible to match all groups on all potentially important variables (e.g. scope of ABC implementation, degree to which ABC information is actively used in the budget negotiation, level of detail of the ABC analysis,...), randomization should normally be preferred. Finally co-varying can be used to equate the groups on some relevant variable, but this procedure is not without risk (Glass & Hopkins, 1984, p.503).

For these reasons I conclude that lab experiments are the most appropriate method to control variance in my study.

3 Limitations of lab experiments

3.1 External validity

Lab experiments have both convinced defenders and opponents. Although few people doubt the internal validity of well designed lab experiments, the ideas are mixed about their external validity. Bracht & Glass (1968, p.437) defined external validity as *"the extent and manner in which the results of an experiment can be generalized to different subjects, settings, experimenters, and, possibly, tests"*. Several threats to external validity have been described as they apply to experiments and quasi-experiments in general (e.g.Campbell & Stanley, 1963; Bracht & Glass, 1968; Cook & Campbell, 1983). I am not going to replicate these threats here; instead I want to address the problem of whether or not lab experiments, per definition, are weak on external validity and thus can never produce generalizable results[17].

[17]It should be noted that some lab experiments are not concerned about external validity. Sometimes lab experiments deliberately seek artificiality because they are basically interested in testing a theory in a specific

Basically, generalization is an inductive process that applies the results found in a specific setting to all "similar" settings. The evaluation of what is a similar setting is a judgment based on "*identification of critical differences between a specific research setting and a specific organizational setting*" (Fromkin & Streufert, 1983, p.431). This evaluation assumes that we know what factors are critical to the experimental findings and what factors aren't. This "knowledge" is really nothing more than "*guesses as to what factors lawfully interact with our treatment variables, and, by implication, guesses as to what can be disregarded*" (Campell & Stanley, 1963, p.17). For example, I can generalize the results of my lab experiments to all activity-based budgeting situations, implying that size of the company (e.g.) is a factor that can be disregarded. It is characteristic for this inductive reasoning that the idea of what can and what can't be disregarded is fundamentally a guess or a judgment. This made D.Hume believe that generalization is never logically justified, because it assumes that one knows the relevant laws that carry the findings of the study beyond its limits (Campbell & Stanley, 1963). Along the same lines Cronbach (1975, pp.122-123) commented that generalizations "*decay. At one time a conclusion describes the existing situation well, at a later time it accounts for rather little variance, and ultimately it is valid only as history. The half-life of an empirical proposition may be great or small. The more open a system, the shorter the half-life of relations within it are likely to be.*" In open systems studied in the social sciences, the half-life of generalizations may be very short (Hogarth, 1982, p.112).

A crucial element in the generalization of any theory is to specify the scope conditions or boundary conditions that indicate "*the circumstances under which the relationship specified in the assumptions is expected to hold true*" (Webster & Kervin, 1971, p.266). These scope conditions are an explicit description of when and where the theory claims to be able to make predictions (Swieringa & Weick, 1982, p.81). For example, the theory that activity-based budgeting will lead to less budget slack than traditional unit-based budgeting, is conditional on the activity-based system being relatively detailed and accurate. An explicit

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setting (Henshel, 1980). The question in those experiments is not whether the findings generalize to the outside world, but to "discover regularities that are *capable* of existing, if only the outside world ever provided the appropriate conditions" (Henshel, 1980, p.472). This reasoning always legitimizes lab experiments, because it assumes that real-world situations could exist that match the experimental settings.

definition of the scope conditions determines the criterion range to which generalization can be valid (assuming that generalization can ever be justified at all). The boundary conditions of the theory to be tested were specified at the end of the previous chapter.

By building the boundary conditions in the experiments, one simulates a world in which the essential characteristics of the criterion setting - those elements that are required as a minimum for the phenomena to occur - are reproduced (Fromkin & Streufert, 1983; Locke, 1986). Again this process implies disregarding a number of conditions that are believed not to be relevant to the theory. Consequently, evaluating the realism of the lab experiment, "*like generality and artificiality, may be reduced to a matter of judgment*" (Fromkin & Streufert, 1983, p.442). Fortunately, for purposes of testing a theory, it is not necessary to strive for high mundane realism: the degree to which the experiment accurately replicates the real world (Swieringa & Weick, 1982, p.80). To the contrary, according to the same authors artificiality may even be a distinct advantage of lab experiments. What is crucial, however, is to strive for high experimental realism: the degree to which the experimental procedures are meaningful to subjects, accurately capture the variables of interest, and have the most impact on and credibility for the subjects (Swieringa & Weick, 1982). Achieving experimental realism is partly a matter of "the art of experimentation" (Swieringa & Weick, 1982), but also of providing incentives to the subjects to attend to the task and take the experiment seriously. In my domain of research, and specifically in the incentive contracting literature, incentives are usually monetary, and they are believed to induce motivation (Smith, 1976, 1982). The tendency is to set expected pay roughly equal to presumed opportunity rates of subjects (Cooper & Selto, 1993, p.113).

The conclusion of this section is that, assuming that generalization is logically justified, it should be done within the boundary conditions of the experiment.

3.2 Demand characteristics, Evaluation apprehension, and Experimenter expectancies

It is argued that subjects in a lab experiment may assume specific roles (like the "good" subject, the "negativistic" subject, etc.), look for cues in the experimental setting from which

they infer how they are expected to behave, and are biased by the experimenter (Orne, 1959, 1962; Weber & Cook, 1972; Swieringa & Weick, 1982; Fromkin & Streufert, 1983)[18]. In the literature these claims have been discussed under the heading of demand characteristics, evaluation apprehension, and experimenter bias. Though these problems are not taken lightly, the following sections shortly evaluate these threats and their implications for this study.

1/ Learning about the researcher's hypotheses has indeed been found to cause bias, regardless of what role the subject assumes (Weber & Cook, 1972). However, at the same time it should be acknowledged that this problem can be overcome by making it more difficult for the subjects to learn about the hypotheses. If subjects only experience one experimental condition for example, it is not very likely that they will successfully guess what the hypothesis is (Weber & Cook, 1972, p.290). In the present study, I believe that the research questions are sufficiently complex and not easy to anticipate; the purpose of the study will be generally situated in the area of budgeting. The subjects will only know one experimental condition at a time, and they will not know what the other group is exposed to.

2/ A more serious problem is the threat of the subject assuming a specific role (good, negativistic, passively faithful, or apprehensive). When the subjects assume any of these roles, it is possible that the experimental findings should not be attributed to the treatment but to the subject's role. Much of this problem can be overcome by assuring experimental realism (see earlier). When the experimental situation looks meaningful and realistic to the subjects, it is less likely that they will assume the good, the negativistic, or the passively faithful role (Weber & Cook, 1972). Apprehensiveness on the other hand, is more difficult to deal with because the mere fact of being in an experiment may induce the subject to be alert for cues which indicate appropriate responses. Some attempts to reduce the likelihood of apprehensiveness include: assure anonymity, keep contact with the experimenter to a minimum, as an experimenter keep low profile, etc. (Weber & Cook, 1972, p.292-293).[19]

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[18]It should be noted that these threats are not unique to lab experiments, as was demonstrated by Argyris (1968) and Fromkin & Streufert (1983).

[19]Much of this discussion is based on literature about psychology research. The discussed threats are probably more of a problem in psychology than in accounting research, especially when the former deals with assessing personality traits. When the purpose of the experiment is more of a technical nature than an investigation of the subjects' personalities, the problem of apprehensiveness is less critical (Fromkin & Streufert, 1983, p.438).

Also the technique of "role-playing" (i.e. asking the subjects to behave as if they were in a real organization) is often used to assure more experimental realism (e.g. in O'Reilly & Robert, 1974; Young, 1985; see also evaluations of role-playing in Greenberg, 1967; Willis & Willis, 1970; Darroch & Steiner, 1970).

3.3 The use of students as surrogates in behavioral accounting research.

The question is whether students and employees are sufficiently similar in terms of their behavioral responses to experimental treatments. Locke (1986, p.5) argued that there might be enough similarities between these groups to allow generalization. Both groups are human beings, many students have work experience, and most of them will become employees after graduation. Furthermore, Locke (1986) argues that there is no way to assess deductively, from present knowledge, what types of differences between students and employees would affect the generalizability of specific findings. Birnberg and Nath (1968) suggested though that students and nonstudents may differ in terms of skills, personality traits and experience. Obviously, selected students should have the skills to accomplish the experimental task. The successfulness of this selection can be easily assessed in check-out questions. As for personality traits, there is little reason to believe that one should observe a different range of personalities in students than in nonstudents. Finally, in some situations experience may cause nonstudents to behave differently than students. Ashton & Kramer (1980) performed a study on this matter and concluded that inexperienced auditing students behaved similarly to experienced auditors.[20] Their results confirmed previous findings that when the experiment involves decision making (rather than attitude measurement and attitude change) the results are very similar for both students and nonstudents (see for example Hawkins, Albaum, and Best, 1977; Sheth (1970)). In the present study, the topic is more about subjects' decisions (budget setting) than it is about attitudes.

I want to conclude this evaluation of lab experiments with findings from an interesting study by Locke (1986). He wanted to pull the discussion about the value of lab experiments

[20]Some significant differences were found, but they were not consistent accross different statistical tests.

away from judgment, and wanted to add more empirical evidence to it. His book contains a number of comparisons between the results from lab experiments and related field studies in the domain of industrial psychology. The results from both research methods were interpreted to be similar if at least the direction (rather than the magnitude) of the effects were similar. The message of the book is very clear: the data do not support the belief that lab experiments produce different results from field studies.

I believe that the previous sections will have made clear that lab experiments are a valid method in the light of my research objectives, and that the criticisms to this method are either based on subjective judgment, or/and can be overcome in a carefully designed study. In fact, it is part of the "art of experimentation" to design a setting and procedures that are free of these apparent weaknesses. The degree to which this objective is met in my experiments, was checked in check-out questions at the end of the experiments. Based on the answers to these questions and the detailed descriptions of the experimental procedures and texts, the reader should evaluate whether the study was well-designed and the results internally valid, with possibilities for generalization within the scope conditions of the study.

The choice of the method of experimentation implies implicit assumptions about ontology, epistemology, and about the human nature. For example, it is implicitly assumed that conditions can be created in such a way that human reactions are predictable, that these conditions can be objectively observed by people, and that their reactions can be objectively measured. Therefore, the choice of the method of experimentation already reflects a specific approach to research in the social sciences in general, and in behavioral management accounting in particular. I believe it is necessary to substantiate the assumptions underlying this approach, and to specify the consequences of selecting this particular approach. These are the objectives of the next sections.

4 Characteristics of the chosen approach to research in management accounting for control

4.1 Framework of possible approaches to research in management accounting for control

A useful framework to map the different approaches to organizational and management research has been developed by Burrell & Morgan (1979). Given the connections between organization theory and management accounting (e.g. the link between organization structure and accounting information flows and techniques, as is most apparent in budgeting (Sathe,1978)), this framework has been used to map management accounting research as well (Hopper & Powell, 1985; Bhimani, 1993). The Burrell & Morgan framework is constructed from two independent dimensions: one relating to assumptions about the nature of social science, and another relating to assumptions about the nature of society, with which I'll begin.

1/ The dimension about assumptions on the nature of society has a focus on regulation, order and stability on the one side, and on division of interests, conflicts, power asymmetries, and consequently the potential for radical change on the other side. From chapter 1 it may be clear that most management accounting and control research (including mine) is aimed at regulation, achieving control, preserving order and stability in the organization, and considers this to be a desirable state. Thus, the major part of research in management accounting and control, including my study, is on the regulation side of this dimension. On the other side are the radical accounting theorists who see management accounting and control as being biased towards managerial interests, giving management a legitimate tool and language to rationalize managerial decision making which leads to the alienation of the workforce (Burchell et al, 1980; Bougen & Ogden, 1982; Puxty, 1993). Radical accounting theorists, then, will call for a change in society, based on alternative values that are not exclusive to managerial interests (Hopper & Powell, 1985).

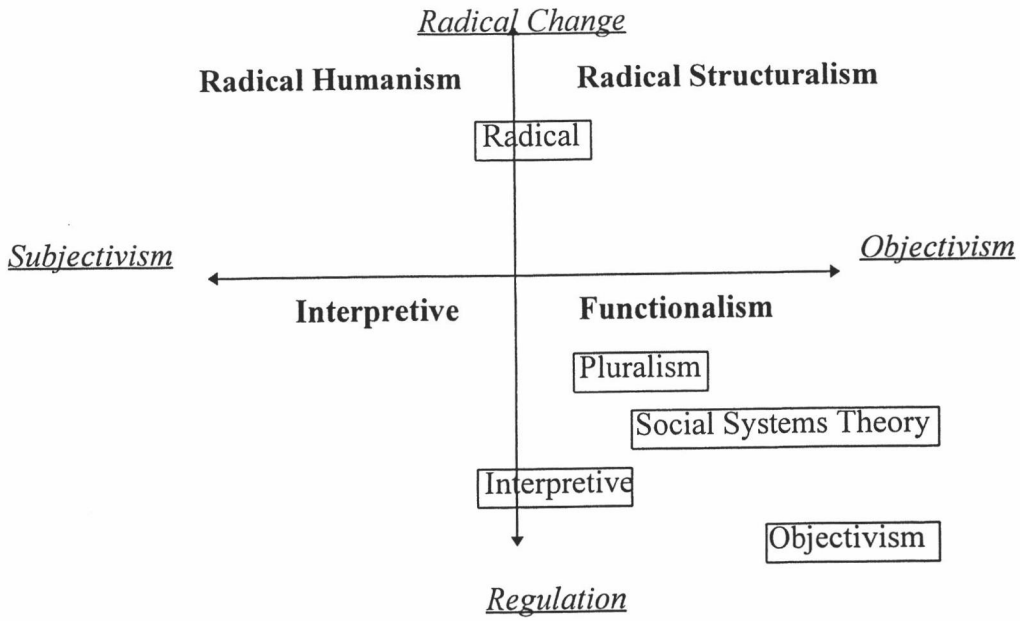
2/ The other dimension is about the nature of social science, and can be seen as a continuum from an "objectivist" to a "subjectivist" view. The following figure (Figure 5) depicts the differences between the two extremes on this dimension:

Figure 5: The Objectivist versus Subjectivist view on social science

	OBJECTIVIST VIEW	SUBJECTIVIST VIEW
Ontology	There is an objective reality "out there" (object), presumed to be independent of the knower (subject) (Chua, 1986, p.606; Manicas, 1993).	"*The external social world simply consists of concepts and labels created by people to help them understand reality and negotiate a shared conception of its nature with others*" (Hopper & Powell, 1985, p.431).
Epistemology	Knowledge is achieved when the researcher correctly mirrors and discovers objective reality (Chua, 1986, p.606) Objective reality can be observed (Hopper & Powell, 1985); Strong belief in positivism (Puxty, 1993; Bhimani, 1993).	Knowledge is essentially a social product, and comes about using representation and attribution of meaning, but not "mirroring" (Manicas, 1993).
Relationship between human nature and the environment	People's behavior is constrained and determined by their environment (Hopper & Powell, 1985).	People are potentially autonomous and free-willed, and capable of creating their own environment (Hopper & Powell, 1985).
Methodologies	Measurement instruments, questionnaires, surveys, experimentation, statistical analysis (Hopper & Powell, 1985; Puxty, 1993).	In-depth interviews, participant observations, profound case studies in order to understand organization members' inner worlds, motives, drives, needs, etc. (Hopper & Powell, 1985).

The combination of the two dimensions leads to a structure with four quadrants in which different approaches to management accounting and control can be placed. These quadrants have been named "Functionalism", "Interpretive", "Radical Structuralism", and "Radical Humanism", and accounting research approaches (in rectangular boxes) have been positioned like in Figure 6 (Hopper & Powell, 1985):

Figure 6: Accounting Schools and Sociological Paradigms



4.1.1 Functionalist approach in this study: Social Systems Theory and Objectivism

Within Functionalism, Social Systems Theory and the Objectivism approach represent mainstream accounting research (Puxty, 1993). They have in common that they are unitarist, and framed from the perspective of the organization; this means that the organization is usually considered as a functional unity, and little attention is paid to issues of power and conflict assumed to be present under pluralism (Hopper & Powell, 1985). Even when conflicting interests are recognized, the focus of accounting research is on designing accounting and control systems that will lead to effective management and achievement of the organizational goals; the potential of conflicts to stimulate organizational change, and the role of accounting in this process is de-emphasized (Hopper & Powell, 1985, p.435). Ontologically they consider reality to exist independently of the human mind, and capable of being observed and measured. The models they use to represent reality may differ in terms of complexity and the nature of the variables considered, but they all try to model a world that is "out there". Assumptions about human nature vary from economically rational to complex and trying to satisfy diverse needs, but generally human nature is believed to be predictable and capable of being understood through systematic investigation of attitudes and behavior. Epistemologically both these approaches try to gain knowledge by objectively representing (mirroring) the world, and methodologically they are biased towards quantitative statistical

methods and measurement instruments. Examples of management accounting developments in Objectivism and in Social Systems Theory are presented in Figure 7 (Based on Hopper & Powell, 1985; Puxty, 1993). The dotted line between the two columns indicates that the demarcation is not always very sharp, and that there may be some overlap.

Figure 7: Objectivism and Social Systems Theory

OBJECTIVISM	SOCIAL SYSTEMS THEORY
* Traditional, technical analyses of cost allocations, job-order costing, standard costing, budgeting, investment decision making, etc. * Application of mathematical modeling to traditional techniques. * Anthony's planning and control theory. * Behaviorist accounting studies based on the Traditional Economic Theory of the Firm, Classical Organization Theory, and Agency Theory.	* More complex studies of Behavioral Accounting Research, based on Human Information Processing psychology, Social Psychology, and Motivation Psychology. * Structural Theories (they study the link between organization structure and accounting and control systems). * Open Systems Theories and Contingency Theories.

Both these approaches have the following characteristics to a more or less extent:

1. They are unitarist: they consider the organization as one unitary functional whole, with well-defined goals and objectives.
2. They have a technical orientation. Structural Theories and Contingency Theories are generally very technical and deterministic; they leave very little place for key decision-makers' discretion and the effect of values, beliefs and ideologies on decisions and choices (Hopper & Powell, 1985, p.441). Many studies in Behavioral Accounting Research, based on psychological and socio-psychological theories, have a somewhat less deterministic nature, and therefore can be placed somewhat more to the subjectivist dimension in Figure 6.
3. They are positivist: relationships between variables can be established, and can be elevated into natural laws governing the design of accounting and control systems (Colville, 1981; Hopper & Powell, 1985, p.441).
4. They are more or less reductionist, in the sense that they tend to simplify human nature and processes, and that they reduce the number of variables thought to be relevant to understanding human behavior (this may be less so in Open Systems theory). They are also reductionist in another sense, namely that they are often concerned with control over

the individual on the supposition that optimizing a function with respect to the individual manager will optimize the function for the organization as a whole.

The approach taken in my study, in terms of its assumptions about ontology, epistemology, methodology, and human nature, can best be described as Functional. Within this quadrant it tends towards Objectivism and Social Systems Theory. From the Objectivist approach it takes many ideas from agency theory (see literature review and scope conditions). From the Social System Theories it uses elements of behavioral accounting research (e.g. its psychological and organizational underpinnings). This approach - combining the agency theory perspective with other behavioral and psychological variables - is very common in "incentive contracting research" (Young & Lewis, 1995), a body of literature within which my study falls (see chapter 1). Sometimes in that literature the tie with agency theory is rather weak, and is limited to the consideration of some agency variables like information asymmetry and the problem of slack creation. Sometimes the tie with agency theory is more explicit, when the focus of the research is on the nature of the incentive schemes (contracts) between principal and agent, and their effects on behavior and performance (e.g. Chow, 1983; Waller & Chow, 1985; Baiman & Lewis, 1989). In my case, reliance on agency theory is rather implicit. In any case, the combination of agency models, behavioral and psychological variables, produces "*hybrid theories that incorporate behavioral and economic variables into models that (can) be experimentally tested*" (Young & Lewis, 1995, p.27). In terms of the framework developed above, these hybrid theories (like mine) lie between the Objectivist and Social Systems approach to management accounting.

In line with the Functional approach, my research emphasizes regulation and control through an activity-based budgeting system, aimed at achieving the organization's goals. It studies the behavioral effects of this type of control system, some of which are seen as dysfunctional from the point of view of the organization. It assumes that the theory developed from the literature can be objectively tested, using measures and techniques designed to capture objective reality. It also assumes that the phenoma of interest can be meaningfully studied in isolation of a range of other variables[21].

[21] This assumption does not imply that other variables are considered irrelevant, but only that the study is meaningful with a limited set of variables.

More clarification about the underlying models of behavior is necessary, though. When studying behavior, one can adopt the pure mechanistic model of the behaviorist (e.g. Pavlov) who interprets behavior as a response to external stimuli. In this model of behavior there is either no role for internal mental processes between stimulus and response, or these mental processes are seen as caused by the external stimuli but not themselves directing behavior (Lens, 1985, p.8). Neo-behaviorists on the other hand tend to incorporate more complex intervening variables between stimulus and response (e.g. incentives), but they still look at the mental process as an associative process connecting the external stimulus with the response (ibid, p.5). More motivational oriented models of behavior (e.g. Locke's goal setting theory, 1968), finally, do not believe that behavior is a straight response to an external stimulus. Instead, cognitive motivation psychologists believe that people reflect on stimuli based on their prior information, expectancies, and aspiration levels, and that this mental process directs behavior rather than the behavior being driven by the external stimulus (Lens, 1985, p.9). In management accounting and control, behavioral models range from the mechanistic deterministic one, to the ones based on motivational and other psychological theories (Birnberg, 1995). My study (like most recent studies in the incentive contracting literature), should be situated somewhere in the middle of that continuum since it sees slack creation (response) not just as a reaction to a control system but as a combined effect of the control system (stimulus), the subject's prior expectations about the task difficulty, and his/her attitude towards risk.

4.2 Comparison of chosen approach with other approaches

4.2.1 Functionalism: Pluralism

The implications of these general assumptions may become more clear when the Objectivist and Social System approaches are contrasted with the other approaches. Within Functionalism, a Pluralist perspective would look at an organization as a set of loose coalitions within which control is defined as containing conflict rather than eliminating it. Accounting and control rules and mechanisms would not be seen as the product of objectively rational procedures based on a value free and neutral perspective, but as the outcome of political processes based on sectional interests (Hopper & Powell, 1985, p.443). Accounting

information reports would not be seen as the input for decision-making, but rather they would be seen as the output of political processes and decisions (Burchell et al., 1980). In the Pluralist view, accounting researchers would be interested, for example, in how activity-based systems affect the power position of the accounting function by reducing information asymmetry between accountants and line management (e.g. Bhimani & Pigott, 1992). Budget procedures would be seen as a vehicle through which different interests, opinions and claims are contrasted in a process that should enable organizational learning through dialogue (e.g. Argyris & Schön, 1978). Most Pluralist studies, however, do not express any judgment on the relative power distribution - in contrast to for example Radical accounting studies - and therefore still center around a believe in regulation rather than radical change (Hopper & Powell, 1985, p.445). Its ontology is still realist, but since it leaves more room for interpretive ideas and methods it may be classified a little bit towards the subjectivist dimension. It is part of the Functionalist paradigm though, since it still implicitly assumes that "*optimal accounting control systems can be designed for any situation, given the ability to master its inherent complexity*" (Ibid, p.441).

4.2.2 The Interpretive view

More away from the Functionalist paradigm is the Interpretive view on accounting and organizations. Interpretive (or interactionist) studies in accounting do not consider it the accounting researcher's primary job to create better accounting systems; rather it is their primary objective to try to understand the subjective realities of individuals in organizations, and then to design accounting systems that eventually may facilitate social interactions between these individuals, encourage debate, and promote learning (Hopper & Powell, 1985, p.448). The major distinction with the previously discussed approaches is that Interpretive studies do not hold a realist ontology. Instead the focus is on individual meaning and people's perceptions of reality, rather than any independent "reality" that might exist external to them (ibid, p.446). The underlying ideas about ontology are those of the Chicago school of symbolic interactionism, with well-known sociologists as Cooley (the "looking glass self"), Thomas, Mead, and Blumer (Puxty, 1993, p.60). It is believed that people constantly create and negotiate their social reality in interaction with each other. Interpretive researchers try to understand people's behavior by interpretation rather than observation; epistemologically they

are not aimed at getting to know the "facts", but at trying to understand shared meanings, interpretations and beliefs. Methodologically, of course, they rely less on experimental designs and statistical techniques, but more on qualitative data gathering approaches. In accounting, interpretive studies would look at accounting as a language people use to make sense of their environment (e.g. Cooper et al., 1981). In designing accounting information systems, interpretive researchers would argue that accounting systems should be "idea machines" rather than "rationalization machines" (Earl & Hopwood, 1979), and that they should stimulate experimentation and creativity rather than stifling this behavior (Cooper et al., 1981). If interpretive accounting researchers would study activity-based information systems, they would be interested, for example, in the way these systems change shared meaning about job contents, value of activities, customer orientedness, etc. The activity-based system would not be seen "a comprehensive economic map of the firm" (as in Kaplan, 1992), but as some interpretation of what is going on in the organization, useful as a platform for dialogue. Interpretive studies are still classified in the quadrant of regulation, although not at the most extreme end, because unlike Radicalist they are less concerned with the evaluation of wider social and political collectivities, and how these influence construction of shared meaning. "*By accepting the dominant ideology and by not questioning the fundamental nature of capitalism, functional and interpretive theorists are seen as helping to sustain and legitimize the current social, economic and political order*" (Hopper & Powell, 1985, p.450).

4.2.3 Radicalists

Radical accounting theorists finally, take a broader stance when looking at the organization and the use of accounting systems. Like Pluralists they focus on the diverse interests of different groups in the organization, but unlike Pluralists they believe that these diverse interests and the resulting conflicts are intertwined with the nature and the ideology of the social and political environment, specifically the capitalist society (Burchell et al., 1981). When Functionalists see organizational goals as a congruence of interests, Interactionists see them as a subject of negotiation, and Radicalists see them as articulations of vested interests. When Functionalists see management accounting as a technical and neutral information device, Interactionists stress the role of accounting as a language to construct shared meaning, and Radicalists see it as a mechanism that installs social control (Hopper, Storey, & Willmott,

1987). This control is achieved by the technology used on the job, by control over the work process, by the de-skilling of the job, and by the control of information about the profitability of the job; at the same time, this coercive control is mixed with persuasion by management through social conditioning (e.g. in newsletters and the media) to make employees believe that they are being consulted and cared for (Hopper et al., 1987; Puxty, 1993). Radical accounting theorists look at the evolution of accounting not as a process towards more relevant managerial information, but as a process to establish and control power relations in line with the evolution of economic and political ideology. Attempts to reduce subordinates' budget slack by installing more symmetrical information relations (e.g. in activity-based budgeting) would be seen as leading to a further alienation of the workforce. Therefore, Radical accounting theorists call for a change in society, based on alternative values that are not exclusive to managerial interests (Hopper & Powell, 1985). Accounting systems should promote rather than impede change. Homogenization of accounting information throughout the organization by installing an activity-based accounting system, would be seen as detrimental to the change process because it reduces diversity in the firm and thereby takes away the potential for change (Hopwood, Bruges, June 1995). For reasons of completeness, I add that the distinction between Radical Structuralists and Radical Humanists is based on an objectivist and subjectivist ontology, respectively (Hopper & Powell, 1985).

I hereby end the discussion about different approaches to research in management accounting. By positioning my research between the Objectivist and the Social Systems approaches, a common approach in the incentive contracting literature, and by taking a model of behavior between the Neo-Behaviorists and the more psychologically based models, I explicitly adopt the assumptions held in these approaches, and I accept their limitations. I believe that it is important to look at the research focus and the method selection within the context of these assumptions and limitations.

5 Data Analysis

In this chapter on research methodology I should also include some more information about the technique with which I will analyze the data. That technique is based on the general ANOVA (Analysis of Variance) procedures. ANOVA can be considered "*the baseline*

methodology in experimental research. Whenever the experimenter has a single, metric dependent variable and a nominal independent variable (two or more groups), then ANOVA is the standard procedure" (Lewis-Beck, 1993, p. X). When only two groups are compared, the ANOVA results are identical to those of a simple t-test; moreover, the t- and the F-statistic are mathematically related according to the following formula: $t^2 = F$ (the equivalence of the t- and F-test is demonstrated in Brown & Melamed, 1993). Although the experimental designs described in the following chapters never compare more than two groups (an activity-based group and a unit-based one), there are reasons to prefer ANOVA to a simple t-test. Generally speaking, ANOVA has the following advantages to the t-test (Glass & Hopkins, 1984, p.325):

1/ It yields an accurate and known type-I probability, whereas the actual alpha for the set of several separate t-tests (in case j groups, $j > 2$) is higher than the nominal alpha-level[22];

2/ It is more powerful (when alpha is held constant) - that is, if the null hypothesis (no difference between the population means: $\mu_1 = \mu_2 = ... = \mu_j$) is false, it is more likely to be rejected;

3/ It can assess the effects of two or more independent variables (factors) simultaneously.

Since I have only two groups ($j = 2$) but more than one factor in some of the tests, the last point is most relevant in my situation. Two- or three-factor ANOVA - which is basically an extension of the simple one-factor ANOVA - allows to study not only the main effect of each of the factors, but also the interaction effect of two or three factors combined. I will explain the interpretation of interaction effects later in this section. The three factors that will be used in the experiments are: 1/ type of budget system (activity-based or unit-based), 2/ job difficulty (high or low), and 3/ risk preference (risk averse or non-risk averse). It should be noted, however, that four of the six hypotheses developed in the previous chapter only involve main effects, and that the interaction hypotheses never involve more than two factors. Consequently, the test to analyze the main effects and the interaction effects are never on a higher level than two-factor ANOVA's.

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[22] It can be shown that the actual probability of a type-I error would be (1 - (1 - alpha)k), with k = the number of pairwise comparisons between the j groups; k = (j * (j-1))/2 (see for example Glass & Hopkins, 1984, p.325).

5.1 Assumptions

The t-test can be considered as a special case of the general ANOVA procedures (Iversen & Norpoth, 1987, p.12), and therefore both techniques hold the same assumptions. There are three assumptions that should be considered before undertaking the tests:

1/ The variables investigated should be normally distributed in the population from which the samples are drawn;

2/ Observations both within and between the groups should be independent;

3/ The population variance in each group should be the same (Glass & Hopkins, 1984, p.237-240; Burns & Dobson, 1981, p.297).

If these assumptions are met, the p-value calculated in the t-test or in ANOVA is correct. These assumptions are pretty restrictive, but it will be shown that the tests are robust against violations of some of these assumptions, in specific situations.

The assumption of normality, it has been found, has almost no practical consequences for using the t-test or ANOVA, and should not be retained as a serious constraint (Glass & Hopkins, 1984, p.237). Although it is interesting to know how the distribution of the variable looks like for descriptive purposes, violations of the normality assumption do not seriously distort the actual level of Type-I errors, given a certain nominal alpha level. Also the power of the test is not affected by departures from normality (Boneau, 1960; Glass, Peckham & Sanders, 1972).

The second assumption of independent observations is an important one. Independency within groups means that the observations of one person should not be influenced by another person; independency between groups means that observations of persons in one group should not be influenced by the persons in the other group. When only two groups are considered, violation of the independency assumption can be easily dealt with by using a paired t-test for the main effects. When more than two groups are involved, the solution is less straightforward; correction procedures should be used, based on the correlation between the observations (for example as in Repeated Measures designs: Glass & Hopkins, 1984). The best one can do is to assure that the observations are independent, which can be accomplished by administering the treatment individually so that no interaction between the subjects is

needed (Glass & Hopkins, 1984, p.353). This is exactly what I have done in my experiments (for example, there are no group discussions or interactions involved), and therefore the independence assumption will pose no serious problems in my analyses.

The third assumption of homogeneity of variance is also an important one and should be carefully evaluated. There exist several tests to evaluate this assumption in ANOVA, for example the Hartley's F_{max} test, Cochran's C statistic, or Bartlett's test based on Chi-Square (see for example in Glass & Hopkins, 1984). The null hypothesis in these tests is that there is no difference in the variance of the populations from which the samples are drawn. The standard procedure to test for heterogeneity in the one factor ANOVA and in the t-test in SPSS Windows is the Levene test; this test takes the absolute deviations from the observed scores to the means in each group, and performs an ANOVA on these deviations. This test, however, has been found to be sensitive to nonnormality (Durrand, 1969), and therefore other tests will be performed as well. In the general factorial ANOVA procedures of SPSS for Windows, the Bartlett test and the Cochran test are available as well.

If these tests show that the population variances are different, one can proceed with the so-called t'-test (quasi-t) for the main effects between two groups. The t'-test works with a "separate variance estimate" instead of a "pooled variance estimate" of the population variance. If the homogeneity of variance assumption is tenable, both these estimates give the same value for the population estimate used to calculate t or t'; but when the assumption is rejected, the separate variance estimate is the more reliable. Therefore, Prof.Dr. Hopkins, in his course at Boulder, Colorado, argued that the separate variance estimate should become standard. In cases where ANOVA is the method of choice (instead of the t-test), there exists a similar F' (quasi F)-test when the homogeneity of variance assumption is violated. This F'-statistic is also known as the Welch, or the Brown-Forsythe modifications of ANOVA (see drafts of new edition of Glass & Hopkins, 1984).

There is one more way, however, how one can avoid these more complex ANOVA computations in case of heterogeneity of variances; that is by balancing the experimental design. Balancing the design means that one tries to get about the same number of subjects in each cell of the design. For example, one can assign the same number of people to group 1 as

to group 2.[23] If the design is balanced, the t-test and the ANOVA are robust against violations of the homogeneity assumption (see for example Burns & Dobson, 1981, p.297; Glass & Hopkins, 1984, p.239). If the design is not balanced and the variances are not equal, the researcher should interpret the results of the ANOVA (or t-test) carefully because in that case the actual probability of a Type-I error will differ from the nominal alpha level. The seriousness of this problem is dependent both on the degree of divergence of the variances and on the degree of difference between the cell sizes (see Glass & Hopkins, 1984, p.239). The effect on the actual alpha level can be summarized as follows: if the larger variance is paired with the smaller n (cell size), the actual alpha level will be greater than the nominal level; if the larger variance is paired with the larger n, the actual alpha level will decrease. In the first case, one should only worry if the null hypothesis was rejected; if it was accepted there is no problem. In the latter case the test is conservative, and one should worry only if the null hypothesis was accepted; if it was rejected there is no problem since the real alpha is even smaller than the nominal one.

5.2 Computations in ANOVA

Even though the computer does all the computations for you, a minimum understanding of the underlying mathematics is necessary. Since my experiments involve only two groups, the explanations below will focus on this particular case. The technique of ANOVA is based on the idea that if the null hypothesis is true, the population variance can be estimated both from the between-group and the within-group variance. The within-group variance (MS_w) is derived by averaging the variances in each sample. The between-group variance (MS_b) is derived from deviations of the sample means from the overall mean of the variable. If the null is true, the ratio of MS_b/MS_w (= F) should be about 1. By comparing the observed value of F to the critical F value, given alpha, one evaluates whether or not both samples come from the same population.

In the following sections I will present a summary of the calculations involved in ANOVA (based primarily on Glass & Hopkins, 1984). I will consider first the one-factor case, and then the two-factor case.

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[23] Of course, it is easier to make a balanced design with manipulated factors than with measured ones, since one can never be sure about the outcome of the measurement.

5.2.1 The one-factor case

The following design is an example of one-factor, or simple one-way ANOVA design; the example is based on the experiments described in the coming chapters. Suppose that the researcher is only interested in studying the effect of the Type of Budget System on Perceived Information Asymmetry (variable X). This factor is designed to have two levels (J = 2): the budget system is either activity-based or unit-based. Suppose further that the design is balanced: there are 40 subjects in each condition (n = 40). This design can be visualized as follows:

Design of a one-factor experiment

Group 1 (n = 40): Activity-based Condition $x_1, x_2, x_3, \ldots, x_{40}$
Group 2 (n = 40): Unit-based Condition $x_1, x_2, x_3, \ldots, x_{40}$

The between-group variance

A variance is always the ratio of a "sum of squares" and the corresponding degrees of freedom. "Sum of squares-between" SS_b in a balanced design is calculated as follows:

$SS_b = n * \text{Sum for all J (mean } X_j - \text{grand mean X)}^2$

with J is the number of levels of the factor

mean X_j is the mean on X for group j

grand mean X is the mean on X for all observations

The degrees of freedom-between (v_b) is the number of levels minus one: $v_b = (J - 1)$. In the above example v_b is 1.

The within-group variance

This is again the ratio of a Sum of Squares and degrees of freedom. If the null-hypothesis is true either one of the two within-group variances can be taken, or better, one takes the average of the two within-group variances. The calculations are the following:

$SS_w = SS_1 + SS_2$

with SS_1 is the sum of the deviations from the mean in group 1, and

SS_2 is the sum of the deviations from the mean in group 2

The within-group degrees of freedom (v_w) are total n - J (in the above example: 78)

A simpler calculation of the within-group variance is to sum the variances in each group and to divide it by the number of cells K (in this case this is equal to the number of levels J). This is a "pooled variance estimate".

The F-ratio is MS_b / MS_w..

The critical F-ratio with which the calculated ratio is compared, given a certain alpha-level is $_{(1\text{-alpha})}F_{vb,vw}$..

5.2.2 The two-factor case

In the experiments described in the following chapters some hypotheses involve a two-factor ANOVA-test. Suppose, for example, that the researcher wants to study the impact of the type of Budget System (factor A) on budget Slack (variable X), controlling for Risk Attitude (factor B). Suppose that factor A has two levels (J = 2), activity-based or unit-based, and factor B has two levels as well (K = 2), risk averse and non-risk averse. Suppose further that the design is balanced, and that there are 20 subjects (n) in each cell. This design looks as follows:

Design of a two-factor experiment

	Risk averse	**Non-Risk averse**	Row Mean
Activity-based	subjects n_{11} meanX_{11}	subjects n_{12} meanX_{12}	subjects n_{1+} meanX_{1+}
Unit-based	subjects n_{21} meanX_{21}	subjects n_{22} meanX_{22}	subjects n_{2+} meanX_{2+}
Column Mean	subjects n_{+1} meanX_{+1}	subjects n_{+2} meanX_{+2}	subjects n_{++} meanX_{++}

Some clarification with the notations:

- meanX_{11} is the mean on variable X for the subjects in the first row and first column (the first level of each factor);
- meanX_{+1} is the first column mean; in this case it is the mean on X for all people who are risk averse, across both budget systems; in other words, it will be used to measure the main effect of the factor Risk Attitude on slack creation;
- meanX_{1+} is the first row mean; in this case it is the mean on X for all people in the activity-based condition, regardless of their risk attitude; in other words, it will be used to measure the main effect of the factor Type of Budget System on slack creation;
- meanX_{++} is the total grand mean; it is the mean of all subjects, regardless of the type of Budget System and Risk Attitude.
- n_{11} is the number of subjects in that cell; a more general notation is n_{jk}, with j referring to the level in factor A, and k referring to the level in factor B;
- n_{+1} is the number of subjects in the first column; it is the total number of risk averse people; a more general notation is n_{+k} (the sum of subjects over all K levels of factor B)
- n_{1+} is the number of subjects in the first row; it is the total number of people in the activity-based condition; a more general notation is n_{j+} (the sum over all J levels of factor A);
- n_{++} is the total number of subjects in the experiment (in this case 80); a more general notation is n_{jk} (the number of subjects over all levels J of factor A and all levels k of factor B).

In the two-factor case there are two between-group variances, one for factor A and one for factor B. The null hypothesis for factor A is that there is no difference in the means of the two levels of that factor. In the example it is that there is no difference in the means of the Activity-based condition and the Unit-based condition; $\mu_{1+} = \mu_{2+}$. The null hypothesis for factor B is that there is no difference in the means of the two levels of factor B. In the example it is that Risk Averse and Non-Risk Averse people have the same mean on X; $\mu_{+1} = \mu_{+2}$. Below I summarize the calculations for each of these main effects.

Factor A variance

This is again the ratio of a Sum of Squares and degrees of freedom. It is the between group variance for factor A (Type of Budget System), regardless of risk attitude. In other words, one compares the row means with the grand mean (just as we did in the one-factor ANOVA). The calculations (in a balanced design) are as follows:

$SS_A = n*K *$ Sum for all J $(meanX_{j+} - meanX_{++})^2$

with n = number of subjects in each cell;

K = number of levels of factor B;

J = the number of levels for factor A;

$meanX_{j+}$ is the mean of row j;

$meanX_{++}$ is the grand mean.

The degrees of freedom v_A is the number of levels of factor A minus 1 (J - 1).

Factor B variance

This is again the ratio of a Sum of Square for B and the degrees of freedom for B. It is the between-group variance for factor B (Risk Attitude), regardless of the type of Budget System. In other words, one considers the column means and compares them to the grand mean (just as we did in the one-factor ANOVA). The computations are as follows:

$SS_B = n*J *$ Sum for all K $(meanX_{+k} - meanX_{++})^2$

with n is the number of subjects per cell;

J is the number of levels of factor A;

K is the number of levels for factor B;

$meanX_{+k}$ is the mean of column k;

$meanX_{++}$ is the grand mean.

The degrees of freedom for B (v_B) are the number of levels of B minus 1 (K - 1).

The within-groups variance

In analogy with the one-factor ANOVA this is an average variance over all cells. It can be calculated by summing all the variances of each cell and dividing by the number of cells (J*K), or by summing the cell Sum of Squares and dividing by the within-groups degrees of freedom (n_{++} - J - K).

SSw = Sum for all J and for all K $(s_{jk})^2$
with J is the number of levels of factor A;
K is the number of levels of factor B;
$(s_{jk})^2$ is the variance in cell jk.

The F-ratio for both main effects is calculated by dividing the factor variances by the within-group variance. The critical F-value to compare the ratio of A with is $_{(1\text{-alpha})}F_{vA,vw}$; for factor B v_B is used.

The interaction effect

The big advantages of a multi-factor ANOVA to a t-test are that interaction effects can be evaluated, and that power increases. The null hypothesis for an interaction effect in a two-factor design can be formulated as follows: the difference in means on factor A is the same across all levels of the other factor. In the example it would be that the difference in slack creation between activity-based and unit-based budgeting is the same for all levels of Risk Attitude. Graphically it would mean that the line connecting the points with mean slack creation for Risk Averse people in ABC and Unit-based systems runs parallel with the line connecting the means of slack creation for Non-Risk Averse people in ABC and Unit-based condition. A distinction is made between ordinal or disordinal interaction (Lubin, 1962): disordinal interaction occurs when the lines cross each other; ordinal interaction occurs when the lines do not cross. In the latter case, the direction of the results (but not the magnitude) is the same across all levels of the factors; in the former the results are opposite. In order to identify the nature of the interaction effect, the interaction should always be graphically illustrated.

The mean square for the interaction effect is again the ratio of the SS_{AB} and the degrees of freedom for the effect (v_{AB}). The F-ratio for the interaction effect is again the ratio of the MS_{AB} and the MS_{within}.

5.3 Fixed and Random Factors

The discussion above only applies to a situation of fixed factors. The factors used in my experiments are all fixed (except for the factor "subjects", of course), meaning that their levels are not drawn out of a population of factor levels. For example, in an educational setting the factor "teacher" could be random if the researcher wants to generalize his findings to "other teachers like these". In management accounting, a situation could be thought of in which "companies", "accountants", or "supervisors" are random factor. Examples of fixed factors are "Type of Budget System" (I'm only talking about two specific types of budget systems), "Job Difficulty" (I'm only talking about two levels of job difficulty), "Risk Attitude" (I'm only talking about two levels of risk attitude), "Type of Accountant" (for example CPA or non-CPA), etc.

The distinction between fixed and random factors has major consequences on the ANOVA computations (Iversen & Norpoth, 1987). If factors A and B are fixed, they both get the same error term (MS_w) in the denominator of F. If A is fixed and B is random, the error term in the calculation of F_A becomes the mean square of the interaction effect AB. Also the critical F for the fixed factor changes (it increases) because the interaction term in the denominator has less degrees of freedom. The best research strategy for a model involving random factors is to analyze it first as a fixed factor model and than to see whether it generalizes to other levels of the random factors by recalculating the F's that were significant in the first case (Hopkins, 1983).

5.4 Crossed and Nested Factors

In my experiments all factors are completely crossed (except "subjects", of course), which means that in both the activity-based and the unit-based condition I will have high or low job difficulty and risk averse or non-risk averse subjects. "Subjects" is a random factor because the participants are only exposed to one cell in the design, without crossing the other cells. Nested factors are always random. The ANOVA computations above only apply to the

crossed factors case. When factors are nested it has implications on the denominator of some of the F-ratios. The denominator of F for the fixed crossed factor becomes the mean square of the nested factor.

I hereby end the conceptual explanation of ANOVA. When the analyses are done in the coming chapters, it will be checked whether or not it is necessary to refer to robustness studies, or whether eventually other techniques should be used.

6 Organization of the descriptions of tests, experiments, and results

In the next chapters I will outline the design of the tests and experiments developed to study the theory. In order to organize the discussion, I will talk about one test or experiment per chapter. The overall objective of the whole process, as I said before, was to test the theory described in the previous chapters, using the method of lab experiments. Basically the experiments required the subjects to negotiate a budget in terms of the number of products they were going to produce in the next period. Slack would be measured by comparing the subjects' real potential to the budget level they suggested in the budget meeting. In this meeting, the superior would either have a detailed activity-based argumentation about the budget level he wants to see, or an aggregate unit-based argumentation in which complexity of the expected product mix is ignored. After the budget setting, the subjects would try to meet the budget, that is, to produce the number of products to which they committed. Subjects' pay would be dependent on budget achievement. This was the general outline of the experiments. Several tests had to be designed, however, to test the experimental tasks, the pay schemes, to develop the activity-based information systems, etc.

The following table (Figure 8) gives an overview of the series of tests and experiments that were done, when, where, and with whom they took place, their main objectives, and some of the main findings and major weaknesses. Also the chapter in which the test or experiment is described is added.

Figure 8: Tests and Experiments

(see next page)

	TEST 1	EXPERIMENT 1	EXPERIMENT 2	TEST 2	EXPERIMENT 3
DATE	September 30, 1994	November 18, 1994	February 2, 1995	March - April, 1995	April 26, 1995
PLACE	Boulder, Colorado	Boulder, Colorado	Ghent, Belgium (DVSM)	Ghent, Belgium	Ghent, Belgium (UG)
SUBJECTS	30 undergraduate students (volunteers)	62 MBA students (non-volunteers)	80 undergraduate students (volunteers)	10 + 4 volunteers (non - students)	62 undergraduate students (volunteers)
ASSISTANTS	5	2	8	none	5
MAIN OBJECTIVES	1/ Test experimental task 1 2/ Develop activity-based information system	1/ Role-play the experiment in about 35 minutes	1/ Run the experiment with less severe time restrictions and in more optimal conditions	1/ Test experimental task 2 2/ Develop activity-based information system	1/ Run experiment in optimal conditions
MAJOR FINDINGS	1/ Task 1 is useful 2/ Subjects can be motivated financially to show high effort 3/ Standards for activity-based system	1/ Actually doing the task instead of role-playing is necessary 2/ Subjects should be motivated by the potential earnings in the experiment	1/ Four of the six hypotheses are confirmed 2/ Construct of information asymmetry is multi-dimensional	1/ Task 2 is useful 2/ Task 2 takes much less time to practice 3/ Task 2 is "cleaner" 4/ Standards for activity-based system	1/ Five of the six hypotheses are confirmed 2/ Interesting results in combination with Experiment 2 3/ Potential new line of research
MAJOR WEAKNESSES	1/ Practicing with task 1 takes a lot of time	1/ Impossible time constraint 2/ Problems with experimental procedures	1/ Activity-based standards, assessed in Test 1, appeared to be too sharp 2/ Problem of separating effects of different parts of the treatment		
RESULTING PAPER			Paper accepted at the Fifth Management Accounting Research Conference, Vancouver, Canada, October 13-14, 1995		Paper accepted and presented at the Second International Seminar on Manufacturing Accounting Research, Bruges, Belgium, May 31, June 1-2, 1995
CHAPTER	5	6	7	8	9

CHAPTER 5: TEST 1 - TESTING THE EXPERIMENTAL TASK 1 AND DEVELOPING THE ACTIVITY-BASED INFORMATION SYSTEM

1 Introduction

As explained before, budgets are determined for departments or individuals responsible for doing a particular job or task. Therefore, experiments that simulate a budgeting context need to have a task too; it is for this task that objectives have to be set, and on which performance determines the budgetee's pay. Thus, I developed an experimental task (TASK 1) that could be used in the experiment. This task is "generic", which means that it is just an abstraction of a natural task. Swieringa & Weick (1982, p.63) describe very clearly what the objective of generic-task experiments is: "*An attempt is made to highlight selected behavioral processes and certain conditions related to these processes. Variables and tasks are abstracted from natural settings and are represented in more fundamental form. The attempt is not to create tasks and settings which look like natural tasks and settings, but to create tasks and settings which evoke behaviors that unfold in natural tasks and settings. The hallmark of laboratory experimentation is abstraction - that is, the deliberate manipulation of one or more crucial variables, the deliberate control of many others, and the precise measurement of one or more variables which characterize the behavioral processes of interest.*" Also Ashton (1982, p.105) called generic-task experiments the hallmarks of laboratory experimentation because of their focus on control. The generic task designed for my experiments needed to have the following characteristics:

1/ It needed to be relatively simple, and relatively cheap in terms of materials needed.

2/ Different activities and cost drivers needed to be distinguishable, so that the development of an activity-based information system would make sense.

3/ The environment in which the task would be operated should have the characteristics that make the development of an activity-based information system relevant; specifically, the product mix should be diverse in terms of the products' resource consumption per unit. In other words, product complexity should be an important cost driver (Cooper, 1990).

4/ It had to have some simple output that could be measured as performance. It should be possible to produce several units of output in a short period of time.

The task (TASK 1) described below is a labor intensive, operational task, but since it is generic it does not preclude generalization to other types of tasks (e.g. overhead activities). The task is an abstraction from any natural task in which different activities can be distinguished, driven by different cost drivers, and in which complexity plays. Tasks used in lab experiments described in the literature could not be adopted because separate activities were not distinguished, and/or complexity could not be operationalized.

2 Description of TASK 1

The task was to produce "catalogs" to order. A catalog is a collection of four cards on which some figure (or logo) was printed (e.g. a glass of wine, a bull, a tennisracket, a suitcase,...); these cards had to be stapled together with one staple. All subjects had a plastic holder (like coin collectors use to display their coins) attached to their table, with 20 compartments (5 rows and 4 columns). The top row contained a card with the name of the category of logos in that column. The categories were Party (logos related to Party: Wine, Dancers, etc.), Wildlife (Bull, Bear, etc...), Travel (Luggage, Jet,...), and Sports (Golf, Tennis, etc....). See Appendix 1 for overview of the categories and the logos. In every category there were 4 logos, and for every logo the subjects had 15 cards in the designated compartment. The task was to assemble catalogs according to a production schedule (Appendix 2: production schedules 1,2,3). These schedules contained 20 orders; every order required production of one catalog. For example: one order could be to produce a catalog with "Wine, Hats, Jazz, Dancers". Orders had to be produced in the sequence occurring on the production schedule. Orders could contain logos from one category or from different categories. A finished catalog had to be put in an envelope, and the envelope had to be marked in a way to identify the catalog that was inside. This identification system used round labels that had to be stuck in a table, stamped on the frontside of the envelope. Sheets with those labels were attached to the plastic holders. Complexity was introduced in the task by varying the number of labels to be stuck from 2 to 8, depending on the type of catalog in the envelope. The number of labels was determined by both the number of categories used in the catalog, and the

number of different colors of cards in the catalog (white, blue, red, or green). In Appendix 1, the colors of the logos are added on the pictures. For example: a catalog with four logos from the Party category required only two labels on the envelope: one greenglow label for the category Party, and one blue label for colors (because all the cards in this category were blue). A catalog with logos from each of the four categories, on the other hand, required up to 8 labels on the envelope: four for the categories, and two to four labels more for the colors in the catalog. The three production schedules in Appendix 2 vary in terms of the number of complex orders on the list: Schedule 1 has medium complexity, Schedule 2 high complexity (many orders requiring 8 labels), Schedule 3 low complexity (few orders requiring 8 labels).

Summarizing, this task consisted of three activities[24]:

1/ **Assemble a catalog** according to specifications on the production schedule; cost driver is the number of catalogs.

2/ Put the catalog in an **envelope**; cost driver is the number of envelopes.

3/ **Label** the envelope; cost driver is the number of labels.

This task was chosen because of its relevance in terms of ABC. The task has three separate activities, and there is a cost driver which represents complexity (the number of labels to be stuck on the envelope). In the next sections I will describe how this task was tested, and how standard times per activity and per unit cost driver were assessed.

3 Objectives of TEST 1

The objectives of this testing were the following:

1/ Evaluate the usefulness of the task in the experiment.

2/ Evaluate whether abilities on the task differ substantially between individuals.

3/ Evaluate whether relatively slack-free standards can be assessed using an effort-stimulating pay scheme. This bonus system paid $2 extra to the best 4 performers in every group, on different occasions throughout the tests. In the literature, Ashton (1990) and Heiman (1990) showed indeed that people work harder under a tournament-based pay scheme than under a flat wage system. At the same time, however, dispersion of effort and performance is usually higher, because some people give up when they think

[24] Strictly speaking, there was also a fourth activity: storing the finished envelope in a box. However, this activity did not take any time since it could be done while reading the next order on the production schedule. A test was carried out to see whether or not storing should be retained as an activity (see further).

that they are not in the running for the bonuses (Ashton, 1990; Heiman, 1990b; Bull et al., 1987). On a cognitive task, Libby & Lipe (1992) confirmed that average effort (measured as time spent on the task) was significantly higher under a combination of a piece-rate and tournament system than under a flat wage system. Average performance too increased significantly under the effort stimulating pay scheme. Therefore I expect that an effort-stimulating pay scheme can indeed be used to assess relatively slack-free standards.

4/ Assess standard times per activity and per unit cost driver, assuming high effort and average ability. Standard times should be relatively slack-free, since they simulate standards that are assessed after a thorough operational analysis carried out during the installation of an activity-based information system (see chapter 3).

The subjects used, and the design of the tests are discussed in the following sections. The standard times that were finally derived are in section 7.2, and a global evaluation of the task is in section 8.

4 Subjects

Subjects were 30 undergraduate students from the College of Business Administration of the University of Colorado at Boulder; they participated on a voluntary basis. They had been recruited from a group of about 100 students, to whom I had explained the purposes of the test (in general wordings) and what they could earn. Conform with the procedures for research involving human subjects at the University of Colorado, participants received an informed consent form, on which their signature implied consent with the test procedures[25]. An example of this consent form is added in Appendix 3. The subjects' mean age was 20 years. They were told that they were going to participate in a test of an experimental task, and that they could earn $12 for 1.5 hours of their time, plus the possibility to earn bonuses (+$2) at different times during the tests. The subjects were randomly assigned to two groups, with 15 persons in each group. The groups were equivalent in terms of age.

[25] Conform with the procedures for research involving human subjects at the University of Colorado at Boulder, the Human Research Committee of the university had to approve of the proposed study (both for the tests and the actual experiments). This committee reviewed a proposal in which the purpose of the study was explained, the method, the measures, the procedures, the subjects' rights, their pay, etc. The study was approved on condition that an informed consent form would be given to the subjects.

5 Overview of the tests

5.1 Tests of the effort-stimulating bonus system

Two tests (A & B) were designed to evaluate whether the bonus system could be used to stimulate the subjects' effort, so that relatively slack-free standards could be assessed using this effort-stimulating pay scheme:

A/ Test A used Production Schedule 1 (Appendix 2). Both groups got 5 minutes to make as much orders on the list, in the given sequence. Group 1 was not financially stimulated to show maximum effort. Group 2 was told that the 4 best performers in that group would get $2 extra (= effort-stimulating bonus system).

B/ Test B used a variant of Production Schedule 1 (Appendix 2) with the same level of complexity. Both groups got 5 minutes to make as much orders on the list, in the given sequence. Group 1 was told that the 4 best performers would get $2 extra. Group 2 was told that people who succeeded to beat their performance on the previous test would get $2 extra.

5.2 Tests to assess standard times per activity and per unit cost driver

Four tests (C, D, E, & F) were designed to measure the standard times per cost driver for each activity, including the storage activity (all tests were done with the effort-stimulating bonus system):

C/ In Test C, group 1 made 5 of the simplest catalogs, while group 2 made 5 of the most difficult. Comparison of the times needed to finish the catalogs in both groups would give an indication of the standard time per catalog. Also it would be possible to evaluate whether or not complexity is a cost driver for this activity.

D/ In Test D, group 1 made and enveloped 5 of the most difficult catalogs, while group 2 made and enveloped 5 of the simplest. Comparison of the times between both groups would allow to calculate a standard time per envelope. Also it would be possible to evaluate whether or not complexity is a cost driver for this activity.

E/ In Test E, group 1 made, enveloped, and labeled 5 of the easiest catalogs, while group 2 did the same for 5 of the most difficult. This test would allow to measure a standard

time per label, and to evaluate whether this was indeed the major indicator of complexity.

F/ In Test F, group 1 made, enveloped, labeled and stored 5 of the most difficult catalogs, while group 2 did the same for 5 of the most difficult. This test would evaluate whether or not the storing activity takes time.

6 Overview of the test procedures

The tests were run with all the subjects at the same time. The experimenter explained the tests and guided the subjects through the different steps; four assistants and one administrator gave support. Each assistant "controlled" 7 to 8 subjects (distributing and collecting material, assisting in case of problems, counting performance, etc.); the administrator calculated pay and bonuses, based on information collected by the assistants. The experimenter followed a detailed script at all times; the text of this script is printed in the procedures in Appendix 4. Also the assistants had a checklist with their tasks at every stage of the tests. This checklist is included in Appendix 5. The experimenter and the assistants took great care to keep everything running smoothly, keep communication between subjects to a minimum, and maintain control. Everybody agreed afterwards that this goal (maintaining control) had been achieved. Every subject was seated at a desk on which all the material was prepared in advance. The subjects received a "handbook" (in two parts) in which all the steps of the tests were explained. An example of the handbooks for group 1 is added in Appendix 6. The procedures can be summarized as follows (see Appendix 4 for more detail):

1/ Welcome and random assignment of subjects to two groups.

2/ Demonstration of the task and practice session.

3/ Test A

4/ Test B

5/ Subjects make as many orders as they can in 5 minutes of Production Schedule 2, and then of Production Schedule 3, both under the effort-stimulating bonus system. Performance on these Schedules would later be used to test the reliability of the standard times.

6/ Pause

7/ Test C

8/ Test D

9/ Test E

10/ Test F

11/ Payment of subjects

7 Results

7.1 Could relatively slack-free standards be assessed with the bonus system?

First of all I analyzed whether the bonus system stimulated effort. The answer to this question is yes. This is based on the following evidence from the check-out questions (Appendix 7) and the tests:

1/ 83% of the subjects (25 out of 30) answered "yes" on the question "Did the bonus system motivate you to do your very best?". 17% of the subjects (5 out of 30) answered "no"; some of their comments indicated that they knew that they were not going to be fast enough to earn bonuses.

2/ Tests A & B were designed to evaluate whether the bonus system stimulated effort. The following table (Figure 9) summarizes these tests and their results (mean number of finished orders, and standard deviations for group 1 and 2).

Figure 9: Means and standard deviations on test A & B

	Test A	**Test B**
Group 1 (n = 15)	Message: "Concentrate on Speed." Mean Gr1TestA = 8.8 SD Gr1TestA = 1.76	Message: "Concentrate on Speed. Four best performers in your group get $2 extra." Mean Gr1TestB = 10.0 SD Gr1TestB = 1.9
Group 2 (n = 15)	Message: "Concentrate on Speed. Four best performers in your group get $2 extra." Mean Gr2TestA = 9.6 SD Gr2TestA = 1.724	Message: "Concentrate on Speed. If you beat your previous performance, you get $2 extra." Mean Gr2TestB = 10.4 SD Gr2TestB = 2.0

On Test A the group 2 that worked under the effort-stimulating pay scheme produced more orders than group 1, but this difference was not significant ($t = -1.15$; two-tailed $p = .26$). However, when group 1 worked with the bonus system in Test B, they did significantly

better than without it in Test A (paired t = -3.7; two-tailed p = .002). This result indicates that indeed the bonus system is capable of stimulating effort and thus performance. The difference between Test A and Test B for group 1 should not be attributed to learning: when both groups worked with the same incentive system but in different periods, there is no difference in their performance (t = .59; two-tailed p = .675).[26]

The bonus system definitely stimulates effort, but does it maximize effort? In other words, will the standards that are assessed under the bonus system be relatively slack-free? The answer to these questions is that the bonus system does not maximize performance for everybody, but generally speaking it sure sets performance pretty high. This can be concluded from the following evidence from Test A & B, and from the check-out questions:

1/ On average, group 2 could beat its own performance of Test A in Test B (paired t = -3.59; two-tailed p = .003). So the bonus system in Test A did not maximize group 2's performance. However, when group 1 worked with the bonus system in Test B they surely did a very good job: there was no difference between their performance and that of group 2 that was stimulated twice (the bonus system in Test A and the challenge to beat their performance in Test B) (t = -.55; two-tailed p = .588). This means that group 1's performance on Test B, only stimulated by the bonus system, was definitely high. It was as high as in group 2 that was challenged to beat its already stimulated performance.

2/ Also there is reason to believe that the bonus system maximized performance for the subjects who performed well, but not for those with a low performance. In other words, subjects with high performance were pretty much at their maximum, while subjects with low performance could still improve. The correlation between performance on Test B and subjects' answers on "I was on my maximum" (1) or "I could still improve" (2) was -.5067 (two-tailed p = .019).

[26] The surprising non-significance between group 1 and 2 on test A may be an artifact of the small sample size, and/or due to the subjects' high motivation and freshness early in the testing. Wright (1987) confirmed indeed that intrinsic motivation increases effort. The same test performed at the end of the procedures may have been significant.

7.2 Assessment of standard times per activity and per unit cost driver

When I developed the task, I had intended that "number of catalogs" would be the only cost driver for the activity "catalog making", "number of envelopes" for the "enveloping" activity, and "number of labels" for the "labeling" activity. In other words, it was assumed that "complexity" in terms of the number of labels was not a cost driver for the activities catalog making and enveloping. Complexity was meant to be the cost driver only for the labeling activity. These assumptions were valid, based on results of Test C, D, & E (all performed under the effort-stimulating pay scheme):

1/ In Test C there was no difference between the groups in the average time needed to make 5 of the easiest or most difficult catalogs, respectively ($t = -1.18$; two-tailed $p = .25$).

2/ In Test D there was no difference between the groups in the average time needed to make and envelope 5 of the most difficult or easiest catalogs, respectively ($t = .89$; two-tailed $p = .384$).

3/ In Test E there was a significant difference between the groups in the average time needed to make, envelope, and label 5 of the easiest or most difficult orders, respectively ($t = -5.83$; two-tailed $p = .000$).

Finally, Test F was performed to show that "storing" should not be retained as an activity. With both groups taken together, there was no significant difference between Test E and Test F in the average time needed to make-envelope-label, or make-envelope-label-store, respectively ($t = .05$; two-tailed $p = .958$).

These tests were also designed to assess standard times per unit cost driver, to be used in the activity-based information system. These standards needed to have the following characteristics (see also chapter 3):

1/ They needed to be relatively slack-free, because they simulate activity-based standards measured during an operational analysis in the development process of an activity-based information system.

2/ They needed to be perceived as realistic by the subjects, because unrealistic information may not reduce perceived information asymmetry between supervisor and subordinate.

3/ They needed to be attainable, because they should convey the message that the superior knows about the subordinate's potential performance. On the other hand, of course, there could be only one standard per cost driver, which for some people would be set too high. On average though, the standards should be attainable for most people.

The following table (Figure 10) summarizes the times per cost driver for each of the activities, across both groups:

Figure 10: Times per cost driver and per activity

Activity	**Median**	**Mean (= 60% percentile in most cases)**	**75% percentile**
Making catalog	8.28 seconds per catalog	8.92 seconds per catalog	9.86 seconds per catalog
Enveloping	2.22 seconds per envelope	3 seconds per envelope	3.02 seconds per envelope
Labeling group 1	2.65 seconds per label	2.78 seconds per label	2.94 seconds per label
Labeling group 2	2.10 seconds per label	2.23 seconds per label	2.28 seconds per label

Based on this information, and considering the required characteristics of the standards, I will use the following standard times (most of them based on the 60% percentile):

Figure 11: Retained standard times for use in the activity-based system

Activity	**Standard time per unit cost driver in seconds**
Making catalog	8.2 seconds per catalog
Enveloping	3 seconds per envelope
Labeling	2.6 seconds per label

With these standards the activity-based information system calculates that one should be able to produce the first 12 to 13 orders of Schedule 1 (see Appendix 2) in 5 minutes, as is illustrated in Figure 12:

Figure 12: Activity-based potential performance on Schedule 1 in 5 minutes

Activity	First 12 orders	First 13 orders
Making catalogs	98.4 seconds (12 catalogs)	106.6 seconds (13 catalogs)
Enveloping	36 seconds (12 envelopes)	39 seconds (13 envelopes)
Labeling	156 seconds (60 labels)	161.2 seconds (62 labels)
Total Time	**290.4 seconds**	**306.8 seconds**

The reliability and usefulness of these standards was verified by comparing the activity-based potential performances on the different schedules with the actual performances observed in the tests. On Schedule 1, 60% of the subjects were within 1 standard deviation from the activity-based prediction of 12 orders; on Schedule 2, the activity-based prediction of 9 orders was less than 1 standard deviation away for more than 60% of the subjects; on Schedule 3, finally, 60% of the subjects were within one standard deviation from the activity-based prediction of 15 orders. I believe these comparisons indicate that the standards are sharp but attainable, which is exactly the way they were intended to be.

In a similar way, standards for use in the unit-based system were assessed. Results from Test F were used to calculate an average time per order for the total job (making-enveloping-labeling-storing). Recall that group 1 did 5 of the most difficult catalogs, while group 2 did 5 of the easiest. Figure 13 shows the times per order for the whole job in both groups:

Figure 13: Times per order

	Median	Mean = 66% pcentile	75% percentile
Group 1	27.2 seconds per order	29.6 seconds per order	34.5 seconds per order
Group 2	17.1 seconds per order	17.8 seconds per order	20.1 seconds per order

Based on this data, and again considering the requirements for the standards, I selected the 66% percentile to derive an average time of 23.7 seconds per order. Recall that a unit-based system does not consider complexity of an order, as was explained in chapter 3. The

unit-based system will tell the subjects that, taking an average time of 23 to 24 seconds per order, they should be able to produce 12 to 13 orders.[27] This is illustrated in Figure 14.

Figure 14: Unit-based potential performance in 5 minutes

	With 23 seconds per order	**With 24 seconds per order**
12 orders	276 seconds needed	288 seconds needed
13 orders	299 seconds needed	312 seconds needed

8 Global evaluation of the usefulness of task 1

The general impression from the results was that the task was useful and could effectively be used in later experiments. Judging from the check-out questions, most subjects liked participating in the tests: 8 subjects found the tests "rather enjoyable", 18 found it "OK", and only 4 thought it was "quite boring". These answers gave an idea about how the subjects reacted to the manual and rather banal task. Additionally, 20 subjects (60%) stated that they were willing to participate in a later experiment, if they had the chance; 6 subjects preferred not to participate again, and 4 subjects gave no answer to this question. Again these results made me believe that the task could effectively be used in later experiments.

The results of the tests indicated that effort could be stimulated by using an effort-stimulating pay scheme. This mechanism would later be used in the real experiments when subjects had to assess their potential on a given production schedule or product mix. By using this effort-stimulating pay scheme, it could be assumed that this assessment would be relatively slack-free.

Task 1 may seem relatively cumbersome, but the test showed that it could be used if it is well-explained and if the subjects have enough time to practice. 28 of the subjects thought that the task was well-explained, and the same number of people said that they understood the

[27] It should be noted that both the detailed activity-based system and the average unit-based system lead to the same prediction of potential performance on Schedule 1, namely 12 to 13 orders. I will explain the consequences of this later; right here it suffices to say that this was a necessary feature of the experimental treatment.

task well after the practice session. All but one subjects found the testing well-organized. 23 out of the 30 subjects said that they had not encountered any problems with the little staplers they had to use to assemble the catalogs. Finally, some subjects may have been less able than others to do the task, but generally speaking more people were good at the task than bad. Performance on all tests was highly skewed, with tails towards lower performance. Very likely, these distributions reflect a mixture of effort and skill (ability), but since effort was financially stimulated it may be assumed that the differences in performance reflect ability more than effort[28].

For these reasons I conclude that Task 1 could be used, and that the standards assessed in the tests could be used in the activity-based information system. In the next chapter I describe the objectives and results of a first experiment designed to test the hypotheses.

[28] If an effort-stimulating pay scheme is not used (e.g. Chow, 1983; Waller & Chow, 1985), there is no way to distinguish between effort and ability.

CHAPTER 6: EXPERIMENT ONE - A ROLE-PLAY

1 Introduction

In this chapter I will describe a first experiment that was designed to test some (not all) of the hypotheses. After having tested TASK 1, I wanted to do a first experiment in Boulder. The major problem was going to be the recruitment of subjects, especially on a voluntary basis. Volunteers for the testing had been found only after a long and difficult recruitment process. Therefore, I did not expect to find over 60 volunteers easily.

An opportunity occurred when Prof.Dr. J.Tracey (accounting) offered me his first- and second-year MBA students to participate. They could be more or less obliged to participate, since the experiment could be fitted in some way or another in the accounting class. The condition was, however, that the experiment would not take the complete 60 minutes of the class. I would have to try to clear the job in about 35 minutes. At first, that seemed an impossible time constraint, since the experiment that was already designed would take about 90 minutes (see next chapter). But here was a class with 62 MBA students available, and it would be a pity if this opportunity were not taken. Therefore I decided to try to design a shorter experiment that would allow to test some of the hypotheses.

Of course, the time constraint had the biggest implications on the length of the practice session and the production sessions. In the originally designed experiment (next chapter) the length of the practice session was already about 30 minutes, and after the experience with Test 1 (previous chapter) this was believed to be essential. Therefore, the conclusion was that the short experiment with the MBA students would need a new task, or no task at all. The possibilities of an experiment with no task became apparent to me after reading about role-playing methodology. Not all hypotheses would be testable with that approach, but still I wanted to take the opportunity. The readings about role-playing convinced me of the possibilities of that method.

2 Role-Playing

Role-playing as an alternative to laboratory research is based on the idea that people, under specific conditions, can accurately predict their behavior in a hypothetical (imaginary) situation, without actually experiencing that situation. Kelman (1967) and Greenberg (1967) suggested that the human capacity to foresee one's own reactions to experimental conditions may be sufficient to permit role-playing to be substituted for actual experimentation. "*If individuals can accurately predict their behavioral and attitudinal reactions to experimental manipulations, investigators can avoid a variety of ethical and practical difficulties merely by asking people to imagine themselves to be subjects in appropriate research settings*" (Darroch & Steiner, 1970, p.303). Role-playing is suggested as an alternative to experiments for both ethical and/or practical reasons: ethically it avoids deception of the subject by clearly explaining the objectives of the experiment, and practically it can be done in much shorter time and with less organizational and logistic problems. The underlying theory of role-playing is based on Festinger's (1957) theory of cognitive dissonance (the finding that subjects could be induced to play the role of an advocate of a position which they privately oppose), and on Bem's (1965; 1967) comparisons between experiments and role-plays.

Tests of role-playing versus real experimentation have led to the following conclusions:

1/ Subjects can usually predict their own behavior better than somebody else's behavior (Darroch & Steiner, 1970).

2/ Comparisons between results from role-playing and experimentation usually do not differ in terms of the observed relationships and the conclusions to which they lead, although they may differ in terms of the absolute values (Darroch & Steiner, 1970).

3/ The success of role-playing depends on the experimenter's ability to play the subject's role himself and to identify the information that must be communicated to the subject (Greenberg, 1967; Darroch & Steiner, 1970; Willis & Willis, 1970).

4/ Role-playing may be limited to test more obvious main effects, rather than more subtle (interaction) effects (Willis & Willis, 1970).

5/ The success of role-playing may depend on the subjects' ability to empathize with a hypothetical situation, and thus role-playing may call for sophisticated rather than naive subjects (Greenberg, 1967; Kelman, 1967).

These findings led me to believe that a role-play could be designed with a limited set of objectives. The MBA students could be assumed to be sophisticated, and capable of imagining a hypothetical situation, if only the situation would be well-explained. Instead of letting them practice with the task, I could explain them what the task was and how complexity was introduced. I could tell them what their maximum performance on a given production schedule could be, simulating a situation in which they had experience with the task. In fact, this approach would even avoid the whole problem of efforts and abilities, by just telling the subjects to imagine that their potential on a given mix was so much. That would actually be an advantage of the role-play to the real experiment. The measure of slack (being the difference between the subjects' potential which was the same for all of them, and the budget level they committed themselves to) would be free of any distortion coming from differences in abilities or effort. Therefore, I decided to run the role-play, with the objectives described in the next section.

3 Objectives of the role-play

The objectives of the role-play were the following:

1/ Test hypothesis one about the effect of activity-based budgeting on perceived information asymmetry.

2/ Test hypothesis two about the effect of activity-based budgeting on budget slack creation, both the main effect and the interaction effect with risk attitude.

3/ Test hypothesis three about the effect of activity-based budgeting on pressure not to misrepresent.

The other hypotheses would not be tested in the role-play because I believed that actually doing the task would be necessary to experience job difficulty and to see any effects on job tension or need for dysfunctional behaviors. Another objective was, ideally, to contribute to research on role-playing, by comparing the results of the role-play with later results of the other experiments. Finally, if successful, the role-play could be seen as a relatively quick pilot study, in preparation of the later experiments.

The subjects, the pay scheme, the experimental design, and the procedures are described below. Most topics are discussed relatively briefly, since the role-play did not produce the desired results. Actually, only one of the two conditions was run because of the problems encountered in the first group. Therefore, I'll talk about this experiment very briefly. Procedures that were about the same as in the later experiments will only be touched on here, and discussed in more detail in the next chapters. In this way, the discussion of experiments two (chapter 7) and three (chapter 9) will be more coherent. Readers who want to turn to the conclusions immediately find them in section 9.

4 Subjects

Subjects were 29 first-year and 33 second-year MBA students from the Graduate School of Business Administration of the University of Colorado at Boulder; their participation was part of an accounting class taught by Prof. Dr. John Tracey. Subjects mean age was about 22 years. Since participation was presented as an exercise in the course, there was no need for consent forms.

5 The pay scheme

The pay scheme was the same as the one that would be used in the later experiments. This pay scheme was also used in similar experiments described in the literature (e.g. Young, 1985). Subjects' pay was dependent on budget achievement, but there was a penalty for over- or underachievement. Of course, since in the role-play there was no actual production, another way had to be found to determine the subjects' actual production. The way this was done is described in the section about the procedures. The pay scheme was the following[29]:

Pay Received = (K * actual number of orders produced) -
K * |(budgeted number of orders - actual number of orders produced)|

[29] The pay scheme allowed the subjects, in all experiments, to earn relatively high wages. It has been shown that low wages may not yield detectable effects, even if such effects exist (Chow, 1983, p.673).

K was $0.5; since there was only one constant K in the formula, the amount received for finishing one more order was equal to the punishment for under- or overachievement. This was done on purpose, in order to avoid the possibility of "gaming the incentive scheme". If the punishment for under- or overachievement were smaller than the amount received for the production of an additional order, subjects might set the budget lower than they would have done with this scheme. This would not be a desirable attitude; the budget should be a function only of the treatment and the subjects' risk attitude. More explanation of this pay scheme will be given in next chapter, since the same scheme was used in experiment 2.

6 Environmental Uncertainty

Environmental uncertainty was manipulated the same way as would be done in the actual experiments. I will explain this manipulation more profoundly in next chapter, but basically uncertainty came down to foreseeing that the actual product mix that the subjects would receive after the budget setting could differ from the expected mix on which the budget was based. The subjects were explained that the actual mix is exactly like the expected one in 50% of the periods, it is more difficult in 25% of the periods, and it is easier in the other 25% of the times. In experiments 2 and 3, the subjects received the actual production mix after the budget setting, but in the role-play - since there was no task - the actual mix was provided in another way (see procedures).

7 The design

The role-play experiment had a 2 * 2 - information system by risk attitude - factorial design. The first factor was a manipulation (treatment), the second factor was a measurement. Figure 15 depicts that design:

Figure 15: Factorial Design of the Role Play

Factor 1	**Factor 2**
Type of Budget System	**Risk Attitude**
Activity-based n = 29	Risk Averse Non-Risk Averse
Unit-based n = 32	Risk Averse Non-Risk Averse

7.1 Type of Budget System.

The group with the first-year MBA students did the activity-based condition. During the budget meeting, which took place completely on paper, the subjects received a page with a detailed activity-based argumentation about the number of orders they should be able to produce in a period of 5 minutes. This argumentation was identical to the one that was going to be used in the actual experiment (next chapter). Since this treatment was more successful in the actual experiment than in the role-play, I will describe it in more detail in the next chapter. That argumentation led to a suggestion by the superior of 12 to 13 orders to be produced of the expected product mix (based on the standards developed in the previous chapter). On the same page the subjects had to give their suggestion, which, hypothetically, would be a function of the detail of the superior's argumentation and the subjects' risk attitudes. The group with the second-year MBA students were going to get the unit-based condition, but that condition was not run.

7.2 Risk Attitude.

This was a measured factor; risk attitude was measured in the same way as would be done in the actual experiment (next chapter). Again, since the treatment and this measurement was more successful in experiment two, I will describe the measure of risk attitude in more detail in the next chapter.

8 Procedures of the role-play experiment

The experiment was going to be run at two different times. Group 1 (activity-based condition) would be run first, and then Group 2 (unit-based condition); however, the experiment was interrupted at the end of the first condition. The procedures were designed to be self-explaining: the subjects received a bundle in which the complete situation and the task was described and illustrated. This is what a role-play is all about: instead of experiencing the situation, the subjects read about it and predict what their response would be in terms of specific variables. The subjects were supposed to read the information in the order it appeared in the bundle. The following information was provided, in this order:

1/ A description of the situation (see Appendix 8). The subjects were asked to imagine themselves working in a "Catalog Department" of a major "Logo Design Company". The content of their job was described, which was basically a description of TASK 1. In order to aid the subjects in visualizing the task, a holder containing the logos - the same as in the actual experiment - was included in their folder. An example of orders of different complexity levels was also included, so as to improve the subjects' understanding of the task. After the description of the task, the subjects were explained the budgeting procedure in their company. They were told that they would have to determine a budget level for next production period, based on product mix expectations for that period. Also they were explained that there was environmental uncertainty and that the actual mix could differ from the expected mix with known probabilities (see section 6).

2/ The next page in the bundle contained the explanation of the pay scheme. Several examples were added to clarify the scheme. This page was identical to the explanation provided in the experiment 2, and will be discussed in more detail there.

3/ The next page contained the measure of risk attitude. I will also talk about this measurement in next chapter.

4/ Then, a page with the expected product mix was included. On that page, the subjects were told that they had evaluated this mix, and had come to the conclusion that they could produce the first 12 orders in 5 minutes (see Appendix 9). With that knowledge, with the probabilities about uncertainty, and with the pay scheme, they were invited to a budget meeting. Also, they were explained that in the role-play there was not going to be actual production. Instead, the complexity level of the actual mix would be

determined by a wheel on which the chance distribution of the actual mix was depicted. An arrow fixed on a needle in the center of the wheel would determine the actual mix. The wheel would be turned after the budget setting, and the so determined actual mix in comparison with the subject's budget would be used to determine their pay.

5/ The next page contained the budget meeting. This was almost identical to the meeting in experiment 2, and will be discussed in more detail in the next chapter.

6/ Then, a page was inserted with the measures of perceived information asymmetry and pressure not to misrepresent. They will be discussed in the next chapter.

7/ Finally, manipulation checks were added, which were again very similar to the checks in experiment 2.

These procedures were completely finished with group 1 but were interrupted before the start of group 2. I decided not to run the second condition after evaluating the disappointing results of group 1. The results and the problems encountered in the first group are described in the next section.

9 Problems and results

Most problems became apparent while observing the proceeding of the first condition, and after evaluating the answers on the measures and the manipulation checks. The problems were the following:

1/ Not all subjects consulted the examples of the orders included in their folder, so that many of them did not understand the task nor the complexity. Also, many subjects did not read the description of the situation well enough to understand the consequences.

2/ Subjects began talking to each other and asking questions, so that control was not maintained.

3/ Subjects did not read the information in their folder in the order it was presented. They went back and forwards in their information, and consulted the task description again when filling out the measures or the manipulation checks. This problem could have been overcome by presenting and collecting the pages one by one.

4/ The subjects considered the exercise as a pure gamble in which they could earn some money. All but a couple of the subjects set a very risky (high) budget that could only be

realized with a very easy product mix in 25% of the times (according to the chance distribution of the product mixes). Since the wheel did not stop on this mix, most students were penalized for underachievement. But since they were not really motivated by the potential earnings, they didn't care. This problem could have been overcome by taking volunteers who are motivated by the potential earnings.

5/ Because of the time constraint, all explanations had been kept relatively short, which presented a problem for some people.

Because of these problems it was decided not to run the second condition. This experience was quite disappointing, of course, but on the other hand it taught me some valuable lessons for the next experiments:

1/ Run the experiments only in optimal conditions, and above all, don't let the procedures be dictated by a time constraint.

2/ Choose volunteers who are motivated by the potential earnings. This is absolutely essential, since slack will only be built by subjects who want to reduce the risk of loosing money in an uncertain environment. Subjects who don't value the potential earnings in the experiment, won't perceive risk and therefore won't create slack.

3/ Stimuli should be presented to the subjects one by one and in a fixed order; the possibility of going back and forwards in the documents should be limited.

4/ Experimental control should be maximized: communication between the subjects should be kept to a minimum.

5/ The task may be more complex than first believed. A good explanation or a long practice session is essential.

These were the conclusions of the role-play experiment. I still believe that role-playing has a potential if it is organized with more control, and if the expectations of the subjects can be better anticipated. Anyway, back in Belgium, a real experiment was organized, to test the hypotheses in more optimal conditions. This experiment is the focus of next chapter.

CHAPTER 7: EXPERIMENT TWO - OPTIMIZING THE EXPERIMENTAL PROCEDURES

1 Introduction

In this chapter I will describe the first of two experiments that were done in Belgium. This experiment was designed to test all of the 6 hypotheses in more optimal conditions. That is, subjects needed to be volunteers who were motivated by the potential earnings, the duration of the experiment should be sufficiently long to pose no important constraint on the procedures, and maximum control should be achieved in the procedures. These objectives, I believe, have been met, and the results of the hypotheses testing are interesting. Therefore, I will talk about this experiment in more detail than I did in previous chapter.[30]

In the following sections I will describe the subjects, the incentives, the measures, the design, the manipulations, and the procedures more or less the way they were explained in the paper. Also the results of the ANOVA's performed to test the hypotheses are reported. Finally a discussion section is added, in which the findings are summarized and the limitations specified. Suggestions to overcome some of the limitations will be formulated, and will be incorporated in an altered design of a new experiment (chapter 9). But let's concentrate on the current experiment first. I note that all appendices relating to this experiment are added in Dutch. The English version, in most cases, can be found in the paper for the conference.

2 Experimental task

The task was TASK 1, which was explained in chapter 5. Summarizing, the task consisted of three activities:

1/ Assemble a catalog according to specifications on the production schedule.

2/ Put the catalog in an envelope.

3/ Label the envelope in a way to identify the catalog that is inside.

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[30] This experiment has resulted in a paper that was accepted after review at the Fifth Management Accounting Research Conference, in October '95, in Vancouver. This conference is organized by the editor of the Journal of Management Accounting Research, one of the top journals in the management accounting field. This reference may give some indication about the academic interest in the research.

This task was tested in Test 1 (chapter 5), and was found to be useful for the purposes of the experiment.

3 Subjects

Subjects were 80 undergraduate students who voluntarily participated in the experiment. They were recruited from the second year students of the School of Economics at the University of Ghent, Belgium. The students of that year (a total of about 180) had received a letter in which the experiment was presented as a voluntary exercise in the context of the introductory course on cost accounting (Professor Dr. Werner Bruggeman). The letter (in Dutch) is included in Appendix 10. The initiative had been approved of by the dean of the school. In the letter the objectives of the exercise was explained in general wordings, the potential earnings were stressed, as well as the other benefits from participation (e.g. a new experience about budgeting). It was explained that the exercise was about budgeting, that it would take about 1.5 hours of the student's time, and that they were going to be rewarded between 300 and 800 Francs (about $10 to $25). A date was communicated on which I was going to give additional information on the exercise in the lesson cost accounting, together with Prof. Bruggeman. On that day (about one week before the date of the experiment), it was added, the students could subscribe for the exercise. On the day of the experiment, about 105 students showed up, 25 of whom where sent home with a fixed pay of 300 or 100 Francs depending on whether or not they had subscribed in advance. The experiment took place in two rooms at the Vlerick School of Management. Subjects' mean age was 20 years (s = 1.4). None of the subjects was dropped from the analysis. The subjects had not received any courses dealing with budgeting nor ABC related topics.

4 Incentives

The subjects' pay was dependent on both the number of orders budgeted and the number of orders actually made. The incentive system was the same as in Young (1985):

$$\text{Pay received} = (K * \text{actual number of orders made}) - K * |(\text{budgeted number of orders} - \text{actual number of orders})|$$

K was 50 Belgian Francs (about $1.7). Since there is only one constant K in the formula, the amount received for producing one more order is equal to the punishment for under- or overachievement. This was done on purpose in order to avoid the possibility of "gaming the incentive scheme". If the punishment for under- or overachievement were smaller than the amount received for the production of an additional order, subjects may set the budget lower than they would have done with this scheme. This is not a desirable attitude; the budget should only be a function of the treatment and the subjects' risk attitude. Also, any other scheme would confound the measurement of budget slack (Young & Lewis, 1995, p.20). Weitzman (1976) pointed out that this type of scheme provides no incentive for a risk neutral budgetee to create slack, yet potentially provides an incentive for a risk averse budgetee to create slack.

Thus, subjects are induced to produce no more than the standard they selected, because they are not any better off monetarily if they do so; but if they produce less than the standard selected they will be penalized monetarily. Examples of different levels of budgeted and actual production, and their effect on pay, can be found in Appendix 11; this is the explanation of the pay scheme the subjects received at the right time in the experiment (see procedures). Additional verbal explanation was also provided.

5 Simulation of environmental uncertainty

As explained before, the budget setting required the subjects to set a goal about the number of orders they were going to produce in the next budget period, based on the product mix expectations for that period. The expected product mix in the experiment was Schedule 1 (see Appendix 2). This was a product mix with a medium level of complexity, in terms of the number of complex orders appearing on the schedule. During the practice session in the experiment, the subjects had gotten the chance to assess their potential on this schedule in 5 minutes, motivated by the effort stimulating pay scheme (see procedures). At that time, they did not know yet that Schedule 1 contained the expected product mix for next period. The subjects were told that the actual production schedule that they were going to receive after the budget setting, and on which they were going to be evaluated for pay, could differ from the

expected mix. The actual production schedule could contain a product mix with the same, less, or more complexity than the expected mix. The expected mix, however, had the highest probability of occurring, namely 50%. There was a 25% chance that the mix was easier than expected, and 25% chance that it was more complex than expected. The subjects were told that the mix that they were actually going to receive after the budget setting was determined by the color of the card they had drawn at the beginning of the experiment (see procedures). There were four colors, two of which, so they were told, represented a product mix with the same complexity as the expected mix, one color stood for a more difficult mix, and another color stood for an easier mix. The explanation of uncertainty was provided to the subjects on a single page (Appendix 12) at the right time in the experiment (see procedures). Additional verbal explanation was also provided.

6 Measurement of the variables (Appendix 13 contains all measures)[31]

6.1 Perceived information asymmetry

This instrument measures the degree of information asymmetry in the advantage of the subordinate, as it is perceived by the subordinate. It does not measure information asymmetry in the advantage of the superior, because this is not part of the concept of information asymmetry as it was defined by Schiff & Lewin (1970). Consequently, existence of information asymmetry as measured by the scale, means that the subordinate perceives having better information about his/her productive capacities than the superior does. Absence of information asymmetry as measured by the scale, implies that the subordinate perceives having either equally much or less information about his/her productive capacities. Responses are given on a 7-point Likert Scale from Strongly Agree (1) to Strongly Disagree (7). The instrument has 6 items, partially based on Jaworski & Young (1992) and Dunk (1993); these instruments could not be used because they were developed for field studies and have case-specific terminology. The length of the measure is chosen to increase reliability. The measure is only relevant taken as a whole; the responses on individual items should not be interpreted independently (DeVellis, 1991). A subject's total score on the measure should be interpreted relative to the responses of the subject's group and the other groups (DeVellis, 1991, p.27). The length of the scale (7 response alternatives) is chosen so that there is a midpoint, and potential variance of the measure is increased (DeVellis, 1991). In order to get a high score with high information asymmetry, all items except 4 and 6 were reversed. The

[31] All the measures were originally designed and formulated in English; then they were translated to Dutch, for use with Dutch-speeking subjects.

instrument was presented to the subjects right after the budget setting, but before the production of the actual product mix (see procedures). Cronbach's Alpha was .774. The Dutch measure is included in Appendix 13; below I summarize the (original) English version.

1. In comparison with my supervisor, I have better information to estimate the number of orders I can make from the expected product mix.
2. In comparison with my supervisor, I know better what are complex orders and what are easy ones.
3. In comparison with my supervisor, I know better what it takes to perform this task.
4. My supervisor is well informed to set a performance objective on this task.
5. In comparison with my supervisor, I know better how long it takes to perform specific activities of this task.
6. My supervisor has good information to evaluate the complexity of the production schedules.

6.2 Budget slack.

Three concepts of slack are measured. SLACK1 is the difference between the subject's individual performance on Schedule 1 (assessed in a pre-test) and his budget suggestion before adjustment (SUBJ_SUG). Schedule 1 contained the expected product mix for next period, on which the budget should be based. The budget is stated in terms of the number of orders to be made. SLACK2 is the difference between the theoretical level of slack-free performance on Schedule 1 (assessed by the activity-based information system) and the subject's budget suggestion before adjustment (SUBJ_SUG). This theoretical level of slack-free performance is the number of orders a subject should be able to produce in 5 minutes on Schedule 1, as suggested by the activity-based system. Recall that this activity-based system worked with relatively slack-free standards assessed in a TEST1 (chapter 5). On Schedule 1 the activity-based system suggested a production goal of 12 to 13 orders.

6.3 Pressure not to misrepresent

Young (1985) used a single open question in which he first defined "social pressure", and then asked the subjects whether they had felt such a pressure when they met with the supervisor. Responses were measured on a 7-point scale from none to a very great deal. In my study I developed a 4-item instrument specifically for the experimental setting. Responses are given on a 7-point Likert scale from Strongly Agree (1) to Strongly Disagree (7). In order to get a high score with high pressure, all items were reversed. The measure was presented right after the budget setting, but before reception and production of the actual mix. The

Dutch measure is in Appendix 13; below is an English summary of the items. Cronbach's Alpha was .578.

1. When I gave my budget suggestion, I had a feeling that I could not misrepresent myself because the supervisor seemed to know about my potential.
2. When I gave my budget suggestion, I felt that the supervisor would know if I underestimated my potential.
3. When I gave my budget suggestion, I felt that the supervisor knew exactly what he wanted me to suggest.
4. When I gave my budget suggestion, I felt that I had little discretion about what to suggest.

6.4 Job tension

Two measures of job tension were used. One was a three-item measure assessing job tension induced by reduced job control, and was used to test hypothesis 4. This measure was presented to the subjects right after the budget meeting, but before actual production. Answers are given on a 7-point Likert scale from Strongly Agree (1) to Strongly Disagree (7). In order to get a high score with high tension, the first two items were reversed. Cronbach's Alpha was .65. The Dutch measure is in Appendix 13; an English summary is given below:

1. After the budget setting I feel tense, because I have not been able to get a good budget.
2. After the budget setting I feel tense, because with this information system it is like I have no control over where to set the budget.
3. I feel like I have a great degree of control over the budget.

The other instrument measured job tension after reception of the actual product mix; this measure is an assessment of job tension induced by both the type of budget system and the level of job difficulty (complexity of the actual mix). This measure would be used to test hypothesis 5. Answers are given on a 7-point Likert scale from Strongly Agree (1) to Strongly Disagree (7). In order to get a high score with high tension, all items were reversed. Cronbach's Alpha was .878. The Dutch measure is in Appendix 13; an English summary is given below:

1. Given my budget objective, I experienced a great deal of tension in performing the task.

2. While performing the task, I was nervous because I thought I would not attain my budget.
3. While performing the task, I felt tense because my budget was set pretty tight.

6.5 (Need for) Dysfunctional behavior

Four questions were asked to assess the need for dysfunctional behaviors (other than slack creation). Answers are given on a 7-point scale from Strongly Agree (1) to Strongly Disagree (7). Again, all items were reversed. Cronbach's Alpha was not assessed because each question was relevant on its own. The Dutch questions are in Appendix 13; an English summary is presented below:

1. In order to meet my production goal I have sometimes reduced quality (or at least I have considered it).
2. In order to meet my production goal I have considered skipping a difficult order.
3. I would like to convince my boss that his information system leads to goals that are set way too high.
4. If this were a real company I would probably protest against this way of budgeting.

Also, the actual occurrence of dysfunctional behavior was measured, specifically quality reduction. An independent person compared the way labels were stuck on the envelopes from the actual mix with an ideal example. Penalty points were assigned to subjects according to the degree of quality reduction. The quality assessment focused on the degree to which the labels were stuck nicely in the appropriate columns on the envelope, whether labels touched each other, or were stuck on top of each other.

6.6 Risk Attitude

Selto & Cooper (1990) have indicated that the use of binary outcome lotteries with independent, certain outcomes is seldomly a reliable method for risk attitude measurement. They argue that reliability of risk measurement may be improved by framing the measure in the same context as the experimental setting. Therefore, a "contextual" measure of risk attitude was developed; the Dutch version is in the Appendix 13, and the English translation is presented below. The instruments required the subjects to make exactly the same choice as in the real budget setting. Subjects who chose the first alternative were called risk averse; the others were called non-risk averse (either neutral or seeking). In each group, 13 subjects were classified as risk averse, while 27 subjects were classified as non-risk averse (mostly risk

neutral). The measure was presented to the subjects just after the budget negotiation, but before reception and production of the actual product mix (see procedures). This contextual measure of risk attitude predicted slightly better than Young's (1985) measure which was presented in the check-out questions. More explanation about this contextual measure of risk attitude will be given after the presentation of the measure below:

Now that you know what the pay scheme is, where would you set your budget in the following situation? Suppose you have evaluated the expected product mix from the marketing department, and you concluded that your department can make the first ***13*** *orders. To how many orders would you responsibly commit yourself, considering that the actual mix is like expected 50% of the times, it is easier 25% of the times (you can make* ***16*** *orders with that mix), and it is more difficult the other 25% of the times (you can only make* ***10*** *orders in that case)? The following table shows the effects on your pay:*

	First Alternative: You set the budget on 10 orders.	***Second Alternative: You set the budget on 13 orders.***	***Third Alternative: You set the budget on 16 orders.***
Actual mix is like exp. (P=50%) *(You make 13 orders)*	*Your pay would be 500 Fr.*	*Your pay would be 650 Fr.*	*Your pay would be 500 Fr.*
Actual is more difficult (P=25%) *(You make 10 orders)*	*Your pay would be 500 Fr.*	*Your pay would be 350 Fr.*	*Your pay would be 200 Fr.*
Actual is easier (P=25%) *(You make 16 orders)*	*Your pay would be 500 Fr.*	*Your pay would be 650 Fr.*	*Your pay would be 800 Fr.*

With these scenarios and their expectations, circle below to how many orders you would responsibly commit yourself in your budget?

I would commit to making 10 orders

I would commit to making 13 orders

I would commit to making 16 orders

More explanation about this measure and about risk attitudes in general may be necessary. Basically, there are three strategies a researcher can follow relating to risk attitudes: subjects' risk attitude can be either assumed, measured, or induced. Assuming risk attitude really means that the researcher is not going to control for risk; he just assumes that people have some average risk preference that should not be better specified. Selto & Cooper (1990, p.234) argued that this is not an optimal alternative when theoretically *"risk attitude is critical to predicting behavior, such as in accounting studies involving state uncertainty and information asymmetry. In these cases,...knowledge of subjects' risk attitude is essential to predicting subject behavior. To assume risk attitudes here is to deliberately allow error variance that might be reduced by risk attitude control."* Therefore it is better to measure or induce risk attitudes.

Selto & Cooper (1990) have indicated that measuring risk attitudes using binary outcome lotteries with independent, certain outcomes is seldom reliable. Rarely do subjects perceive risk in the lottery in the same way as in the experimental context. Reliability of risk attitude measurement may be improved by framing the measures in the same context as the experimental task (Selto & Cooper, 1990). This is what I have tried to do in the measure I developed. The measure is reliable if subjects classified as risk averse behave accordingly in the experimental task. Obviously, subjects who chose the first alternative (10 orders) took the safest option; there was no risk involved in this alternative. Consequently, subjects in this category can be called "Risk Averse". The other two alternatives (13 orders or 16 orders) clearly involve some degree of risk. Subjects in either one of these two categories can be called at least "Non-Risk Averse". Furthermore, subjects choosing to set the budget on 16 appear to be taking more risk than those who set it on 13 orders.

These statements about the perceived risk of the choices imply the assumption of a theory of risk. There exist several theories that have tried to describe the way people make these risky choices; I will elaborate on some of these theories in order to provide theoretical support for the way the measure is designed. The first of these theories is Expected Utility Theory (see e.g. Schoemaker, 1982), which states that risk attitude is determined by the shape of the utility function over outcomes. Expected Utility Theory assumes first of all that there exists such a thing as 'utility', that it can be defined and measured. Also it assumes that in order to evaluate the utility of an alternative, people can assess the objective risk of the alternative. This assessment of risk is supposed to be free of subjective perception; risk is absolute and objective. Finally the theory assumes that people choose the alternative that maximizes utility or well-being, which for economic decisions usually means financial well-being. The Neumann-Morgenstein (NM) variant of Expected Utility Theory defines a utility with cardinal properties, although this should be interpreted with caution (Schoemaker, 1982,

p.533). The NM theorem is only cardinal in the sense that people can rank order different alternatives in terms of their utility, and that the underlying scale has interval properties. But the NM utility theorem is not cardinal for the measurement of the strength of preference under certainty. This is because NM utility is really a mixture of two things: 1/ a strength of preference if there were no risk involved (= condition of certainty), and 2/ attitude toward risk. Consequently, people's assessment of utility in an uncertain situation always involves some evaluation of risk. Schoemaker (1982) maintains that it is very important to distinguish between a measure of utility under certainty (called v(x)) and one under risk (called u(x), because it helps to see the relation between utility and risk preference. What people really maximize when they choose a specific alternative is Sum p*u(x), the sum of the products of the probabilities of each outcome times the perception of the utility of that outcome under risk. People do not maximize Sum p*v(x), which is the sum of the products of the probabilities times the objective utility under certainty. For some people Sum p*u(x) may be equal to Sum p*v(x) for a specific alternative, which means that the person is neutral towards the risk included in the alternative. For other people however Sum p*u(x) may be greater than the Sum p*v(x) for that alternative. Consider for example the table in the above risk measure, and suppose that utility can be measured by the Expected Monetary Value (EMV) which is Sum p*x. For the first alternative (budget on 10) the EMV is 500 Fr.; for the second (budget on 13) EMV is 575 Fr.; and for the third alternative (budget on 16) it is again 500 Fr.. People who are neutral towards risk would probably select the second alternative which has the highest EMV, or Sum p*v(x) or Sum p*u(x). People who are risk averse however, according to this theory, will select the first alternative because the utility derived from it is greater than its EMV, or Sum p*u(x) > Sum p*v(x). Risk seeking people finally will select the third alternative because for them Sum p*u(x) > Sum p*v(x) for that alternative.

Although Expected Utility Theory seems very insightful in describing and predicting peoples' behavior in evaluating risky choices, it has not been so successful when tested empirically. It has been argued that people may lack the mental capacity needed to abide by Expected Utility Theory. Alternative theories have been developed that use simpler heuristics to assess preferences. Some maintain that risk is perceived by looking at the outcome distributions characterized by mean and variance; greater risk is signaled by more extreme outcomes (Coombs & Huang, 1970). In my example this implies that alternative 3 is most risky, alternative 2 is intermediate, and 1 is risk free. Others found that one should consider especially the skewness of the distribution (Pollatsek & Tversky, 1970). Still others looked at a cumulative distribution (Lopez, 1984). Slovic & Lichtenstein (1968) finally considered the outcome dimensions of each alternative: probability of winning (Pw), probability of losing (Pl), amount to win ($w), and amount to lose ($l). Application of these

dimensions on the above measure shows that the third alternative (budget on 16) is indeed the riskiest option[32].

An alternative to risk measurement would have been to induce risk attitude rather than to measure it (Selto & Cooper, 1990; Cooper & Selto, 1993). This is done by organizing experimental rewards so that the risk averse group is best off when it behaves that way, and the non-risk averse group is best off when it behaves accordingly. However, since this induction may come in the way of the other manipulations in the experiment, and since there is no evidence showing that a contextual measurement of risk attitudes is less reliable than risk attitude inducement, I have no reason to prefer the latter method. Furthermore, Beck, Davis & Jung (1989) pointed out that risk attitude inducement increases the cognitive complexity of the experimental task, and consequently may increase error variance. For all these reasons I have opted to measure risk preferences.

7 Experimental Design

The experiment had a 2*2*2 factorial design: Type of Budget System * Job difficulty * Risk Attitude. The first two factors were assigned, the third was measured. Each of these factors will be explained below. Figure 16 shows the design and the number of subjects in each cell.

[32] In addition to this theoretical validation of the measure, an empirical validation was also performed. 12 people had been asked first to make the choice on the hypothetical example, and then to indicate on a scale how much risk they had taken. It turned out that all the people who chose the first alternative indicated low perceived risk on the scale, while those who chose the third alternative indicated the highest perceived risk, and those who chose the second alternative were in between.

Figure 16: Experimental Design

Factor 1	*Factor 2*	*Factor 3*	
Type of Budget System	**Level of Job difficulty**	**Risk Attitude**	**Subjects**
Activity-based	High	Risk averse	n=6
	n=21	Non-risk averse	n=15
n=40	Low	Risk averse	n=7
	n=19	Non-risk averse	n=12
Unit-based	High	Risk averse	n=9
	n=25	Non-risk averse	n=16
n=40	Low	Risk averse	n=4
	n=15	Non-risk averse	n=11

7.1 Type of Budget Setting

Subjects were randomly assigned to the activity-based condition (group 1) or the unit-based condition (group 2). The only difference between the groups was in one sheet of paper on which the budget-meeting was printed (see Appendix 14). In the activity-based condition the superior suggested to produce 12 to 13 orders, given the expected product mix for next period (Schedule 1). The superior showed a detailed argumentation with a description of the different activities in the task and cost driver information. Based on the standards assessed in the Test 1, the activity-based system resulted in a budget suggestion of 12 to 13 orders, given the level of complexity of the expected product mix. Subsequently, on the same sheet of paper, the subjects were asked to give their budget suggestion (SUBJ_SUG). Suggestions lower than 12 orders were later adjusted to 12; suggestion of 12 orders or more were not adjusted. This simulated the superior's active use of the activity-based information, in a way to achieve optimal performance. The way this adjustment was operationalized can be read in the procedures (see below).

In the Unit-based condition on the other hand, the superior's argumentation was much less detailed (see Appendix 14). The superior mentioned a production time per average order, based on the same data from the pre-experiment. This information, however, resulted in the same budget suggestion by the superior: 12 to 13 orders.[33] Subsequently, the subjects were

[33] It is important to note that in both conditions the superior's argumentation resulted in the same budget suggestion from his side, so that the conditions did not differ in terms of the anchor point received by the subjects. Cervone & Peake (1986) demonstrated that when people estimate their potential on a task, those who receive a high anchor point set higher estimates than those who receive a low anchor point. In order to avoid potential distortion from different anchor points, both anchors were put the same.

asked to give their own budget suggestion (SUBJ_SUG). Finally the superior adjusted the subject's suggestion by adding one order, except when the budget was already set at 12 orders or more. This adjustment simulated a situation in which the superior has no detailed information about potential performance.

In both conditions the subjects knew that there was going to be an adjustment, but they did not know how the adjustment was going to be.

7.2 Level of Job difficulty.

The actual production schedule contained either more (Schedule 2) or less (Schedule 3) complex orders than the expected schedule. The actual schedules were assigned to the subjects using a lottery system which made subjects believe that there was a 50% chance that the actual mix was going to be like the expected mix, 25% chance that it was going to be easier than the expected mix, and 25% chance that it was going to be more difficult than the expected mix (see explanation of environmental uncertainty). In reality, however, only easier or more complex schedules were assigned; I was not interested in the condition of equal complexity. At the time of the distribution of the actual product schedules, the assistants gave a red mix to somebody who had drawn a red color, a blue mix to a blue color, etc. The blue and the red mixes were the same however (more difficult = Schedule 2), as were the yellow and the green mix (easier = Schedule 3). 46 people received a more difficult schedule, 34 received an easier one.

7.3 Risk Attitudes.

Risk attitudes were measured with the contextual measure described earlier. In each group 13 subjects were classified as risk averse, while 27 subjects were classified as non-risk averse.

It should be noted that although there are three factors involved in the experiment, I'm not interested in three-way interactions (there are no three-factor hypotheses). This means that only one- or two-factor ANOVA's will be used to test the hypotheses.

8 Experimental procedures.

The experiment was run with all the subjects at the same time. I was the experimenter who explained and guided the experiment, and there were eight assistants and one administrator. Each assistant "controlled" 10 subjects (distributing and collecting material, measurement scales, etc.); the administrator calculated pay and bonuses, based on information collected by the assistants. The experimenter followed a detailed script at all times (see Appendix 15). Also the assistants had a checklist with their tasks at every stage of the experiment (Appendix 16). The experimenter and the assistants took great care to keep everything running smoothly, keep communication between subjects to a minimum, and maintain control. Everybody agreed afterwards that this goal (maintaining control) had been achieved. Every subject was seated at a desk, on which all the material was prepared in advance. The subjects received a "handbook" in which the production schedules for use in the practice session were displayed (Appendix 17). The following paragraphs present a summary of the procedures.

*1/ **Welcome and random assignment**.* Forty subjects were assigned to each condition. Upon arrival subjects drew a color from a bag; this color would later determine the complexity of the actual mix.

*2/ **Demonstration and Practice Session**.* Thirty five minutes were spent practicing with the experimental task. The objective of the practice session was both to get familiar with the task and to find a way for every subject to produce as fast as possible, without giving in on quality. The proceedings of the practice session was described in the subject's handbook (Appendix 17).

*3/ **Production of the Expected Product Mix**.* At the end of the practice session, all the subjects received the production schedule 1, and they got five minutes to produce as many orders as possible without giving in on quality. In order to stimulate motivation and effort, an effort-stimulating pay scheme was used: the best 10 performers in each group would receive 100 Belgian Francs extra ($2 to $3). The subjects were not told yet that the received production schedule contained the expected product mix for next period.

*4/ **Explanation of Uncertainty**.* Subjects received the explanation of uncertainty on one page (see Appendix 12).

*5/ **Explanation of Pay Scheme**.* The pay scheme was the same as in Young (1985). Subjects received one page on which the pay scheme was explained (Appendix 11). Additional verbal explanation was provided.

*6/ **Budget Setting**.* The subjects were told that they were going to negotiate a budget now. It was explained that their suggestion would not automatically be accepted, and that the superior might adjust it. Subjects in group 1 received a page with the activity-based budget setting; those in group 2 received the unit-based budget setting (see Appendix 14). After the subjects had given their budget suggestion (SUBJ_SUG), the assistants made the adjustment.

*7/ **Measurement**.* At this time Perceived Information Asymmetry was measured, as well as Pressure not to Misrepresent, Job Tension induced by the type of control system, and Risk Attitude.

*8/ **Actual Production**.* At this time the actual production mix was distributed according to the color the subjects had drawn at the beginning of the experiment. 46 people received a more difficult mix (Schedule 2), 34 received an easier mix (Schedule 3). The production session lasted 5 minutes.

*9/ **Measurement**.* Measures of Job Tension induced by the control system and the Job difficulty were distributed, and Need for Dysfunctional Behavior.

*10/ **Check Out Questions**.*

*11/ **Pay**.*

9 Results

In this section the results of the manipulation checks (Appendix 18) and the hypotheses testing will be shown. Discussion of these results will be the focus of another section.

9.1 Descriptive statistics and manipulation checks

There was no difference between the groups in terms of subjects' age and sex. All the subjects reported that they had understood the task, and 74 subjects said that they had understood the superior's talk during the budget meeting. Four people didn't understand the activity-based budget talk, and two didn't understand the unit-based talk. There was no significant difference between the number of people who said that they had accepted the final

budget in the activity-based condition and the unit-based condition (p = .11). The final budget was accepted by 69 people in total, which may indicate that the final budget (after adjustment) was not set unreasonably high (Locke, 1968; Ashton, 1990). Almost everybody (78 people) had understood the pay scheme, and 73 people were indeed able to identify a situation in which compensation would be highest. 60 people said that they were motivated by the bonus system to do their very best on the expected mix (Schedule 1); there was no significant difference between groups (p = .60). There was no difference between the groups in terms of the mean production on the expected mix (p = .526), which indicates that both groups had the same capacities. 69 people said that they had not encountered any significant stapler problems. All subjects thought that the experiment was well-organized, and only 3 subjects found the experiment rather boring; the others found it OK (39) or rather fun (39). This may give an idea of experimental realism: the degree to which the experimental procedures were meaningful to the subjects (Swieringa & Weick, 1982).

9.2 Tests of hypotheses[34]

The results of the ANOVA's (or t-tests) are presented for each of the hypotheses. Tests are performed using SPSS for Windows. The reported F (or t)-statistics are those generated by general factorial ANOVA (or t-test) procedures in SPSS, which assume a two-tailed test. The p-values reported below, however, are one-tailed because all hypotheses are directional, based on theory. Means and standard deviations for all the dependent measures used in the tests of hypotheses appear in Figure 17.

[34] Although several dependent variables were measured, the design did not require a simulaneous multivariate analysis since each of the dependent variables was of interest in its own right (specific hypotheses are developed with the individual variables). For these kinds of "multiple univariate research questions" multiple univariate tests are appropriate (Hand & Taylor, 1987, p.47; p.82).

Figure 17: Summary of Means (m) and Standard Deviations (s)

	Activity-based condition	**Unit-based condition**
Perceived Information Asymmetry	m = 30.4 s = 5.24	m = 29.1 s = 5.74
Slack 1	m = -.3 s = 1.13	m = -.17 s = .78
Slack 2	m = 3.4 s = .95	m = 3.7 s = 1.18
SUBJ_SUG	m = 8.57 s = .95	m = 8.3 s = 1.18
Pressure not to misrepresent	m = 16 s = 4.5	m = 16.7 s = 4.8
Job Tension from control system	m = 14.6 s = 2.74	m = 11.27 s = 3.9
Job Tension from control system and Job difficulty	m = 16.4 s = 4.5	m = 14.3 s = 4.9
Need for Dysfunctional Behavior	m = 17.25 s = 3.2	m = 13.17 s = 4.2
Actual Dysfunctional Behavior (reduced quality)	m = 220.3 s = 112.8	m = 176.8 s = 90.2

9.2.1 Hypothesis 1

Hypothesis 1 predicted that the subjects in the activity-based condition would perceive less information asymmetry than those in the unit-based condition. This hypothesis, surprisingly, was not confirmed (t = 1.08; one-tailed p = .142)[35]. This may be attributed to a disbelieve in the superior's quantitative information about standard times per unit cost driver. The standard times used in the activity-based system, despite their being based on an elaborate test (Test 1), seemed to be too sharp for these subjects. In Test 1 60% of the subjects met the standards or did better. The superior's budget suggestion of 12 orders was within 1 standard deviation from the score of 60% of the subjects in the test (s = 1.97). In the experiment however, the superior's suggestion of 12 orders was 2 to 3 standard deviations away for 10% of the subjects, and about 4 standard deviations away for another 40% of the subjects (s = 1.048). Since the measure of information asymmetry focused strongly on the quantitative information about the subordinates' potential performance (the correctness of the superior's suggestion), the subjects in the activity-based condition must have perceived that they knew

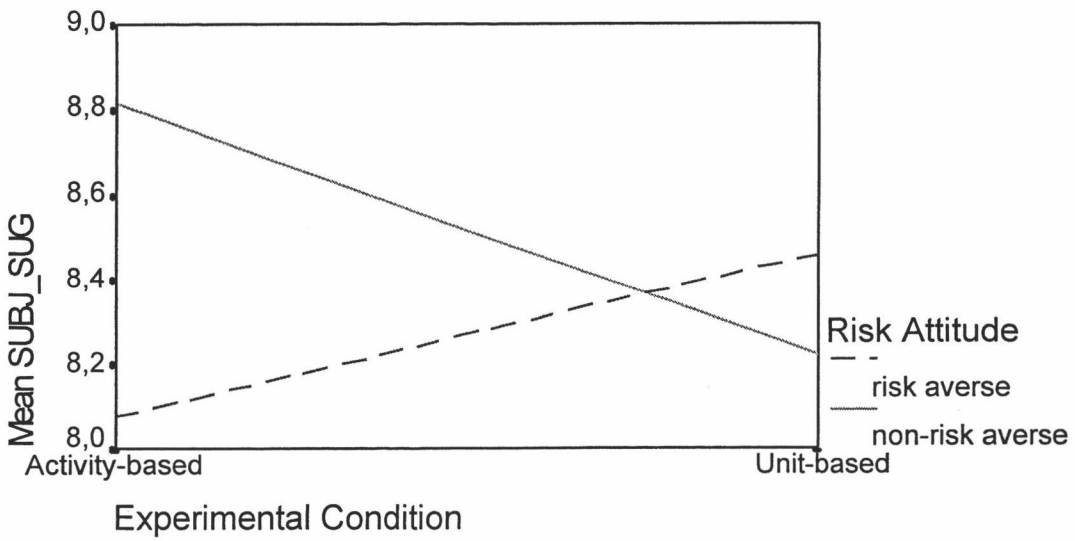
[35] The assumptions of the t-test were satisfied, specifically there was homogeneity of variance (Levene: F = .326, p = .570; Cochrans' C = .545, p = .573; Bartlett-Box' F = .317, p = .573) and the observations are independent. Plots show that the residuals are normally distributed.

better than the superior what their potential was. I'll come back to this point in the discussion section.

9.2.2 Hypothesis 2

This hypothesis expected to see an interaction effect for Risk Attitude and Type of Budget System on slack. Slack creation was hypothesized to be smaller in the activity-based setting, especially for non-risk averse subjects. This hypothesis was confirmed. Non-risk averse subjects put their budget (SUBJ_SUG) significantly higher in the activity-based condition than did those in the unit-based setting (F = 3.75, one-tailed p = .025)[36] - see Figure 18.

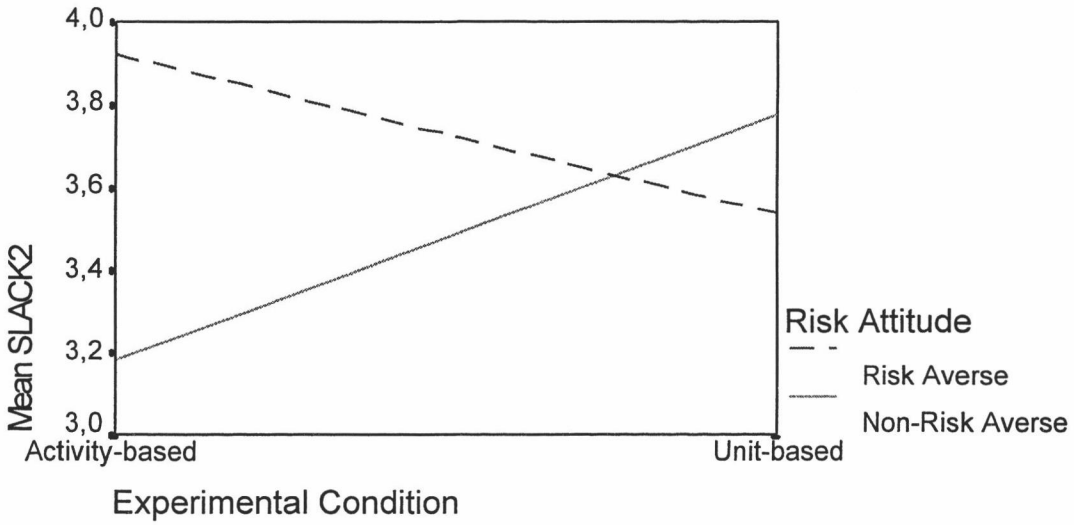
Figure 18: Interaction of Type of Budget System and Risk Attitude on Subj_Sug



Slack measured by SLACK2, for non-risk averse subjects, was significantly lower in the activity-based condition (F = 3.75, one-tailed p = .028) - see Figure 19. The effect size measured by eta^2 was about 5%.

[36] The homogeneity of variance assumption was satisfied (Cochran's C = .375, p = .181; Bartlett-Box' F = 1.368, p = .251).

Figure 19: Interaction of Type of Budget System and Risk Attitude on SLACK2



The interaction effect measured by SLACK1 was marginally significant (F = 1.95, one-tailed p = .083)[37]. The effects of the treatment on the level of the budget suggestion and slack was not influenced by the superior's budget adjustment, because this adjustment came after the subjects suggested their budget.

9.2.3 Hypothesis 3

This hypothesis stated that pressure not to misrepresent was going to be higher in the activity-based condition than in the unit-based one. The tests did not confirm this hypothesis (t = .67, one-tailed p = .25)[38]. Again this may be attributed to a disbelieve in the superior's quantitative information.

9.2.4 Hypothesis 4

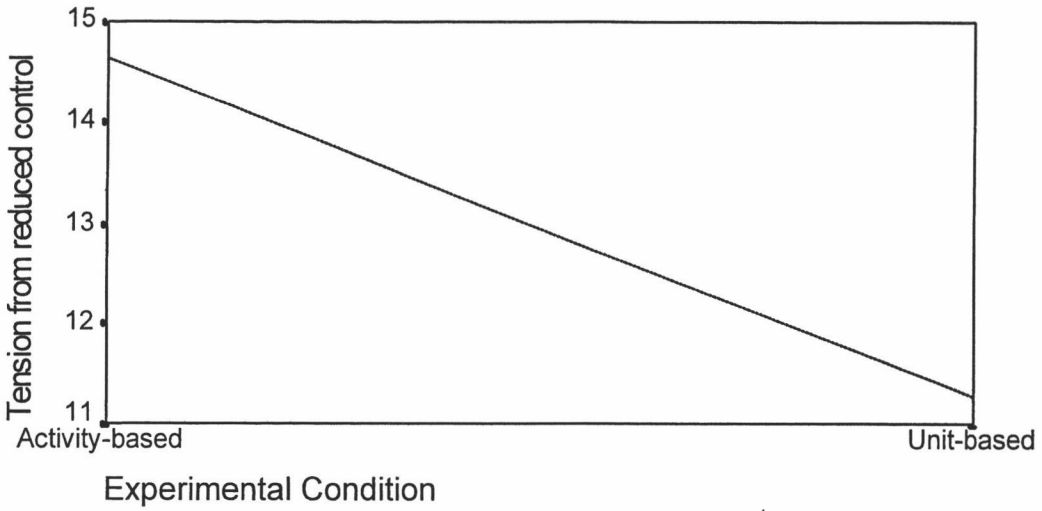
This hypothesis expected a main effect from Type of Budget System on Job Tension induced by the budgeting context. Since variances on this variable, tested with the Levene test, were significantly different (F = 3.29, p = .073), a t-test for unequal variances was used. The test was significant (t = 4.48, p = .000), indicating that the subjects in the activity-based

[37] The homogeneity of variance assumption was satisfied measured by Cochran's C (C = .328, p = .539); with Bartlett-Box F was 2.160 (p = .09).

[38] The homogeneity of variance assumption was met: Levene's F was .044 (p = .834), Cochran's C was .533 (p = .681), and Bartlett-Box' F was .169 (p = .681).

condition suffered from more job tension than did those in the unit-based condition (see Figure 20). This effect should be attributed to the treatment as a whole (effect size Eta^2 was 20%).

Figure 20: Main effect of Type of Budget System on Job Tension from reduced Job Control

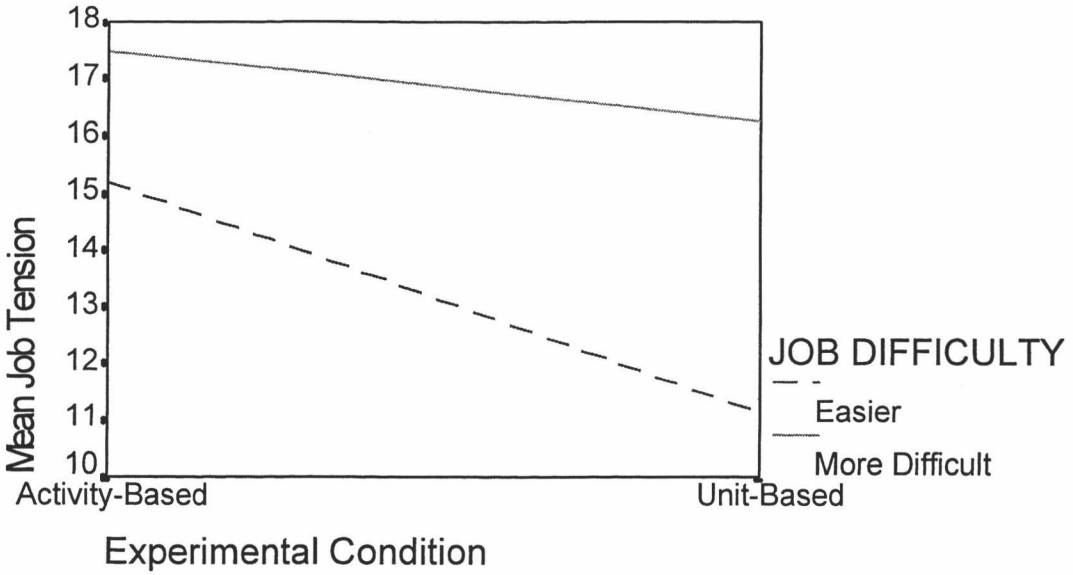


9.2.5 Hypothesis 5

This hypothesis stated that the combination of Type of Budget System with High Job difficulty would induce more job tension in the activity-based setting than in the unit-based one. This hypothesis was marginally significant ($F = 2.08$, one-tailed $p = .075$)[39], which implies that most tension was experienced when low job control was combined with high job difficulty (Karasek, 1979). Figure 21 illustrates this interaction (effect size was about 3%).

[39] The homogeneity of variance assumption was satisfied; Cochran's C was .359 ($p = .268$) and Bartlett-Box' F was 1.62 ($p = .181$).

Figure 21: Interaction of Type of Budget System and Job difficulty on Tension



There was also a significant main effect for Type of Budget System (F = 6.97, one-tailed p = .005) and for Level of Job difficulty (F = 13.77, one-tailed p = .000).

9.2.6 Hypothesis 6

This hypothesis predicted that there would be more (Need for) Dysfunctional Behavior in the activity-based condition than in the unit-based one. This hypothesis was confirmed both with the measure of Need for Dysfunctional Behavior (F = 23.06, one-tailed p = .000)[40] and with the measure of actual Reduction of Quality (F = 4.72, one-tailed p = .015)[41]. The effect sizes were 22% and about 5% respectively.

10 Discussion of the results

In this experiment the 6 hypotheses developed in chapter 2 and 3 were tested. The results support four of the six hypotheses. More explanation is needed though, to validate the results and to point to potential weaknesses.

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[40] The homogeneity of variance assumption was satisfied: Levene'F was 2.71 (p = .104), Cochran's C was .622 (p = .121), and Bartlett-Box' F was 2.4 (p = .121).

[41] The homogeneity of variance assumption was satisfied: Cochran's C was .609 (p = .167), Bartlett-Box' F was 1.9 (p = .167).

Surprisingly, the hypothesis that subjects would perceive less information asymmetry in the activity-based context than in the unit-based situation was not confirmed. This result may have two causes:

1/ there is no effect of activity-based information on perceived information asymmetry, or

2/ there is an effect but it has not been measured.

After examining the measure of information asymmetry, I believe that it is the second cause that is at play here. Remember that, in the theory development (chapter 2 and 3) I indicated that little is known about what types of information are meant in the construct of information asymmetry. The measure I used was based on similar measures by Jaworski & Young (1992) and Dunk (1993). The items used in these measures focus especially on the superior's knowledge of the subordinate's productive capacities, and not (e.g.) on the detail of the information system. Also in my measure, I overstressed this one dimension of information asymmetry: the superior's quantitative knowledge about the subordinates' capacities[42]. In hindsight, there are two reasons why this measure found no effect of the difference in information system:

1/ The standards with which the activity-based system worked were perceived as too sharp and thus unrealistic. The superior's suggestion of 12 orders was unachievable for the majority of subjects, and thus perceived as based on incorrect information. Consequently, the subjects in the activity-based condition must have thought that they had better information than their superior about their productive capacities.

2/ Even if the information of the superior had been correct, the measure would not have found any differences between the two conditions. That is because the superior's budget suggestion was the same in both conditions, and thus if it was wrong it was wrong in both conditions; if it were right, it would have been right in both conditions.

It was important to have the same budget suggestion in both conditions, in order to have the same anchor point for both groups (footnote 30 - Cervone & Peake, 1986). But it was overseen that this would hinder measurement of information asymmetry, especially since the measure focused on the correctness of the superior's information. Any existing measure of

[42] A statistical validation for the assertion that the measure of information asymmetry focused on one dimension of the construct, may be inferred from the high reliability coefficient (Cronbach's Alpha was .77) and from the result of a factor analysis on the six items. Two factors were extracted, one of which explained already about half of the variance (47.4%), the other explained another 18%. If the measure were more heterogenous, probably more factors would have been extracted.

information asymmetry would not have found an effect if the information is equally correct or equally incorrect in both conditions. Although this explanation seems so obvious now, it could hardly be foreseen since it was not known in the literature that there might be more than one dimension of information asymmetry. Correctness of information is only one dimension, another might be detail or completeness of information. A new measure of information asymmetry should have at least these two dimensions. I consider this as a new insight more than as a major flaw of the experiment. The identification of the multidimensionality of the construct of information asymmetry is a contribution to the general budgeting theory. In a subsequent experiment, these two dimensions will be better separated.

The reasons why the activity-based system was not perceived realistic remain unclear. The subjects in the Test 1 had about the same age and education as those in the experiment, and they were stimulated by the same bonus system. It may be that the groups differed in terms of their objectives to participate in the tests: subjects for the Test 1 were recruited to test the usefulness of a production task, while the subjects for the experiment were recruited to participate in an exercise on budget setting. Anyway, despite efforts to assess realistic standards for this task in Test 1, the standards have been perceived as very sharp and the superior's adjustment in the ABC condition as very high. This may have driven some of the results, although it should be stressed that the effects on slack were not influenced by the adjustment. A subsequent experiment will take even more care to assess activity-based standards that are perceived as more correct.

Hypothesis 2 about an interaction effect of Type of Budget System and Risk Preference on slack creation has been confirmed. This effect is a pure effect of the detail of the superior's argumentation, and is not confounded by the superior's budget adjustment (since that happened after the slack creation). Non-risk averse subjects set a higher goal and created less slack in the activity-based condition than did those in the unit-based situation. Risk averse subjects, on the other hand, continued to create slack in the activity-based context because they needed it as a buffer against uncertainty. They created even slightly more slack in the activity-based condition than in the unit-based one, but that may just be statistical random variation (after all, the slope of the line representing risk averse subjects in Figure 19 is rather flat). The contextual measure of risk attitude seemed to have served well in

predicting effects on slack. It predicted slightly better than Young's (1985) lottery-based measure, presented in the check-out questions. The hypothesis that the effects on slack would be intervened by a pressure not to misrepresent one's potential was not confirmed.

The hypotheses that subjects in the activity-based condition would experience more job tension (Hypothesis 4), especially with high Job difficulty (Hypothesis 5), and therefore would engage in more dysfunctional behavior (Hypothesis 6), were confirmed. These effects should be attributed both to the detail of the activity-based system and to the high goals to which the system led. The superior's adjustment to a relatively slack-free production goal was congruent with the idea of continuous improvement, which is often advocated in an activity-based management context (see chapter 3, e.g. Turney, 1991). Measuring the effects of the treatment as a whole, that is after adjustment, can be justified based on the philosophy of continuous improvement and activity-based budgeting as explained in chapter 3, but still it would be interesting to measure some effects before adjustment. For example, in a subsequent experiment, the measures of perceived information asymmetry, pressure not to misrepresent, and job tension from reduced job control could be presented to the subjects after they gave their budget suggestion but before the superior's adjustment. These and other changes to the experiment could produce a study in which the effects of the detail of the superior's argumentation can be better distinguished from effects of standard tightness. These changes will be implemented in a subsequent experiment.

Summarizing, I believe that this experiment has been successful in terms of measuring the effects of activity-based budgeting on budget level and slack creation. An interesting finding was also the multi-dimensionality of information asymmetry. Finally, the effects of activity-based budgeting on job tension and dysfunctional behavior were confirmed, but since these variables were measured after adjustment it remains unclear to what extent these effects should be attributed to the detail of the information system and the superior's adjustment, respectively.

A subsequent experiment was designed to overcome some of the above shortcomings. In addition to these points, the new experiment also worked with a new experimental task (Task 2). The catalog-making task basically served well, but it takes a lot of time for

practicing, and it is rather cumbersome. Therefore, a new task was developed that is simpler and needs less practicing. This task will be explained and tested in the next chapter.

CHAPTER 8: DEVELOPING AND TESTING TASK 2

1 Introduction

When it was decided to do another experiment, I wanted to do it with a new experimental task. The main reason was to save on practicing time, and to get a less cumbersome task. The new task had to be simple and easy to learn, but still it needed to be relevant in a context of activity-based budgeting. That is, it needed to have different activities and at least one complexity driver. TASK 2 was designed more as an administrative task than as a production task, but again it was "generic": the task is an abstraction from any natural task in which different activities can be distinguished, driven by different cost drivers, and in which complexity plays. By keeping the task very simple it was hoped that variation due to differences in subjects' abilities were better controlled. In this very short chapter, I will describe the task, and explain how it was tested and how realistic standard times were set.

2 Description of TASK 2

The task was to fill out sales invoices based on customer orders, in a company in the computer business. The subjects received the customer orders on numbered order forms (Appendix 19) containing the name and address of the customer, the quantity and the types of items ordered, the unit price per item and the total price per item. For every customer order the subjects had to make an invoice (Appendix 20): This task consisted of the following activities:

1/ fill out the name and the complete address of the customer from the order form on the invoice;

2/ copy the information about the ordered items, and calculate the total bill;

3/ staple the order form and the invoice together.

Basically this task was nothing but copying the information from the order form on the sales invoice, and calculating the total bill with an electronic calculator. Complexity, in terms of the time needed to finish an invoice, was introduced in two ways:

1/ By distinguishing between new and old customers. For old customers the name and the address was already preprinted on the invoice, while for new customers the name and

the address had to be copied from the order form. In other words, the number of new customers was a complexity driver for the first activity: for old customers this activity could be skipped.

2/ By varying the number of different items on the order form from one to three, which corresponded with one to three orderlines on the invoice. The number of orderlines was a complexity driver for the second activity: the more orderlines, the longer it takes to copy the lines on the invoice and to calculate a total bill.

The third activity (stapling the order form and the invoice together) was not driven by complexity: the time required to do this activity was the same for every invoice.

This task was chosen because of its simplicity, without losing its relevance in terms of ABC. The task has three separate activities, and there are cost drivers that represent complexity. Tests were organized (TEST 2) to evaluate the usefulness of the task and to assess standard times per unit cost driver for each activity. The following sections describe the objectives, the subjects, and the results of the TEST 2.

3 Objectives of TEST 2

The objectives of the test were the following:

1/ Evaluate the usefulness of the task for the new experiment.

2/ Assess standard times per activity and per unit cost driver, assuming high effort and average ability. Standard times should be relatively slack-free, since they simulate standards that are assessed after a thorough operational analysis carried out during the installation of an activity-based information system (chapter 3). This time, even more attention than in TEST 1 was paid to assuring that the standards were high but achievable for the majority of people.

4 Subjects

Subjects were 10 volunteers, non-students, with an educational background and age similar to that of the subjects for the new experiment. They were asked to participate in a short test of a new experimental task. They were told that the test would not take more than

20 minutes of their time. They could do the test individually at any time they liked. All the subjects participated on a pure voluntary basis; they were not paid for their effort (in fact, most of them even refused to get paid). They all knew about the objectives of the test, including that the results would be used to set relatively slack-free standards. They were intrinsically motivated to do their very best on the test. In six of the ten cases I was present when the subjects performed the test.

5 Overview of the test

For practicing, subjects got a set of 6 order forms of different levels of complexity; that is: old customer with one order line (simplest order form), new customer with one order line, old customer and two order lines, new customer and two order lines, old customer with three order lines, and finally a new customer with three order lines (most complex order form). They were asked to complete the invoices for these order forms, to concentrate on speed without sacrificing on quality, and to try to get acquainted with the task. They were allowed to use their own electronic calculator.

After the practice session, and whenever the subjects were ready, the subjects had to work on a given mix of order forms (MIX 1 - see Appendix 21: to safe pages, the actual order forms and invoices are not included in the Appendix; instead a list of the type of orders is included). They were given 10 minutes to finish as many invoices as possible, in the sequence of the order forms. Subjects who performed this test alone (without my presence) used a stopwatch to verify their time.

After making MIX 1 the subjects were asked to fill out a questionnaire with 5 questions (Appendix 22). The objective of this questionnaire was to assess whether a goal of 10 invoices on MIX 1 in 10 minutes would be reasonable and achievable. This goal of 10 invoices was based on my own practicing with the task.

The test as described above did not measure the standard times per activity and per unit cost driver directly. The standard times were later derived, based on the observations in the test, so that they led to an achievable production goal.

6 Results

Of the 10 subjects, one succeeded in making 11 invoices, four finished 10 invoices, three made 9 invoices, and two made 8 invoices of MIX 1 in 10 minutes. The questionnaire indicated that an objective of 10 invoices would certainly be perceived as achievable, but only with relatively high effort. Therefore, it was decided to take 10 invoices as the production goal in the new experiment.

Given this goal of 10 invoices, standard times were assessed based on my own measurements, so that the new activity-based information system would lead to a budget suggestion of 10 invoices. Figure 22 lists the standard times per cost driver for each activity.

Figure 22: Standard times per cost driver for each activity

Activity	**Standard time per unit cost driver (in seconds)**
Copy customer's name and address	24 seconds per new customer
Copy order items and calculate order total	21 seconds per order line
Staple order form and invoice together	6 seconds per invoice

With these standards the activity-based information system calculated that one should be able to make the first 10 invoices of MIX 1 in 10 minutes, as is illustrated in Figure 23:

Figure 23: Activity-based potential performance on MIX 1 in 10 minutes

Activity	**Number of driver for first 10 invoices**	**Time needed per activity**
Copy new customer	6 new customers	6 * 24 = 144 seconds
Copy order items and calculate total	18 order lines	18 * 21 = 378 seconds
Staple order form and invoice together	10 invoices	10 * 6 = 60 seconds
	Total Time Needed:	**582 seconds**

The correctness of the standard times was tested with other combinations of orders (MIX 2 = more complex orders, and MIX 3 = less complex orders; Appendix 21), produced

by four other volunteers. The activity-based suggestions for these mixes were 7 and 13 invoices, respectively. These suggestions never differed more than one invoice from what the volunteers produced, which confirmed the correctness and usefulness of the standard times. In the unit-based condition, a standard time of 60 seconds per average invoice would be used.

7 Global evaluation of the usefulness of Task 2

The general impression from the results was that the task was useful and could effectively be used in the new experiment. The task required little learning or practicing, and abilities on the task seemed not to differ very much. The standard times that were assessed appeared achievable to most subjects, without being too easy.

The task might be somewhat less "enjoyable" than Task 1, but since the practicing time could be drastically reduced the subjects did not have to produce for long periods of time.

For these reasons I concluded that Task 2 could be used, and that the standards assessed in the tests could be used in the activity-based information system. In the next chapter I describe the design, the procedures, and the results of a third experiment designed to test the hypotheses.

CHAPTER 9: EXPERIMENT THREE - DISENTANGLING THE TREATMENT

1 Introduction

In this chapter I will describe the last experiment that was done in Belgium. This experiment was designed, again, to test all of the 6 hypotheses. The general procedure required the subjects, again, to set a goal about the number of invoices they were going to finish. Also, similar to the previous experiments, the superior would suggest a budget level, based on either a detailed activity-based or unit-based information system. And again, the superior would adjust the subordinate's suggestion according to his information system. The crucial distinction with Experiment 2, however, was that the treatment was considered less as a package deal of detail of information system and adjustment of budgets. Although this package could be defended based on the theory explained in chapter 2 and 3, it remains interesting to see the pure effects of the detail of the superior's information system (before adjustment). Therefore, this time, the measures of perceived information asymmetry and pressure not to misrepresent will be presented to the subjects before the superior's adjustment. Other measures, such as job tension induced by the control system, will be presented after the budget adjustment but before the production of the actual mix. Finally, in the same way as in Experiment 2, some measures will be presented after production of the actual mix.

Another major change in this experiment is a new measure of information asymmetry. Experiment 2 suggested that there were at least two dimension of the construct of information asymmetry, relevant to the process of slack creation. There is a dimension that can be called "correctness of the information", and another that has more to do with "detail or completeness of information". In the previous experiment the correctness dimension was overstressed; in the new experiment 6 items are added to the measure that deal more with the completeness of the superior's information.

Finally, of course, this experiment has another task than Experiment 2. Basically, this change is nothing more than a technical modification of a "generic" task, and it should not be considered a methodological change. Task 1 served perfectly well, but, as I said before, it took too long to practice. Task 2 isn't that much different from Task 1, conceptually; it is just simpler, and easier to organize.

In the following sections I will describe the subjects, the incentives, the measures, the design, the manipulations, the procedures, and the results of the experiment. The sections are more or less organized as in a paper presented at the Second International Seminar on Manufacturing Accounting Research, June 1995, in Bruges. Again, most appendices relating to this experiment are added in Dutch; the English version can be found in the paper.

2 Experimental task

The task was TASK 2, which was explained in chapter 8. Summarizing, the task consisted of three activities:

1/ Copy the customer's name and address from the order form on the invoice. This activity should be performed only for new customers.

2/ Copy the ordered items and calculate the order total. Driver of this activity is the number of order lines.

3/ Staple the order form and the invoice together. Driver of this activity is the number of invoices.

This task was tested in Test 2 (chapter 8), and was found to be useful for the purposes of the experiment.

3 Subjects

Subjects were 65 undergraduate students who voluntary participated in the experiment. They were recruited from a group of about 200 third- and fourth-year students of the School of Economics at the University of Ghent, Belgium. These students had received a letter in which the experiment was presented as a voluntary exercise in the context of the courses cost accounting and management control (Professor Dr. Werner Bruggeman). The letter (in Dutch) is included in Appendix 23. The initiative had been approved of by the dean of the school. In the letter the objectives of the exercise were explained in general wordings, the potential earnings were stressed, as well as the other benefits from participation (e.g. a new experience about budgeting). It was explained that the exercise was about budgeting, that it would take about 1.5 hours of the student's time, and that they were going to be rewarded between 300 and 800 Francs (about $10 to $25). A date was communicated on which I was

going to give additional information about the exercise. On the day of the experiment, 65 students showed up to participate. The experiment took place in room 1 of the School of Economics. Subject's mean age was 21.6 years (s = 1.5). None of the subjects was dropped from the analysis. They had not received any lessons on ABC or related topics. Most students were familiar with budgeting, however.

4 Incentives

The subjects were paid according to their actual performance (in terms of the number of invoices made). The incentive system was the same as in Experiment 2:

Pay Received = (K * actual number of invoices made) - K * |(budgeted number of invoices - actual number of invoices made)|

K was again 50 Belgian Francs. All the explanation about the pay scheme in Experiment 2 applies here as well. The subjects received a written description and explanation of the pay scheme (Appendix 24) at the right time during the experiment (see procedures). Additional verbal explanation was also provided.

5 Simulation of environmental uncertainty

Like in the previous experiments, the budget setting required the subjects to set a goal about the number of invoices they were going to finish in the next budget period, based on the mix expectations for that period. The expected mix (MIX 1) was a set of 15 expected customer orders with a medium level of complexity, in terms of the proportion of new customers in the set and the number of lines per order (see Appendix 21). The subjects had already gotten the chance to produce the expected mix after the practice session. They were told that the actual set of orders they were going to receive after the budget setting (and on which they were going to be evaluated) could differ from the expected set. The actual set of orders could contain the same, a higher, or a lower proportion of new customers, and the same, more, or less lines per order. It was explained that there was a 50% chance that the actual set was like expected, 25% chance that it was easier than expected, and 25% chance

that it was more difficult than expected. Appendix 25 shows the explanation of uncertainty the subjects received.

The way this manipulation of uncertainty was operationalized was similar to the way it was done in Experiment 2; that is, colored cards were given to the subjects upon arrival, that would later determine the nature of the actual mix. Differently from the previous experiment however, the cards were distributed in such a way that an equal number of people got an easier mix than a more difficult mix. Still, the subjects needed to feel that the assignment of actual mixes was done by chance, with the probabilities described above. This was done as follows: upon arrival, subjects received a colored card (green, blue, red, or yellow) in a fixed order. The first person who showed up got a green card and was assigned to group one; the second person got green too, and was assigned to the second group. The third and the fourth person got blue, and were assigned to group one and two, respectively. Person five and six got red, and seven and eight got yellow for group one and two, respectively. All other subjects received a color and were assigned to a group in the same way. At the right time in the experiment (see procedures) the subjects were told that two of the four colors stood for a set of orders equally difficult as the expected mix, while the other colors stood for an easier or a more complex set, respectively. Also the subjects were explained that their color was determined by the random order in which they appeared at the subscription desk.

6 Measurement of the variables[43]

The variables are the same as in Experiment 2, although they are sometimes measured somewhat differently. The measure of perceived information asymmetry got 6 additional items about the "detail of the information system", bringing its total length on 12 items. The measure of pressure not to misrepresent has 8 items, which is four more than in the previous experiment. And the measure of job tension from reduced job control has 7 items instead of 3. Longer measures were used in order to increase their reliability. All the measures - in Dutch - are in Appendix 26. Below, the items are listed in English.

[43] In order to get an idea of the discriminant validity of the measures, a factor analysis was performed on all 34 items of the variables Perceived Information Asymmetry, Pressure not to misrepresent, the two Job Tension measures, and (need for) Dysfunctional Behaviors. A total of 12 factors were distinguished. Only 5 items loaded on a factor that was not unique to the construct it was supposed to measure.

6.1 Perceived information asymmetry

This instrument had 12 items, partially based on Jaworski & Young (1992) and Dunk (1993); these instruments could not be used, however, because they were developed for field studies and have case-specific terminology. Furthermore, this measure wanted to include items about the detail, volume, or completeness of the superior's information, in addition to items about the correctness of the information. Factor analysis on all 12 items confirmed that items 1,2,3,5,6, and 7 loaded on one factor that could be called "volume of information" (eigenvalue = 3.59; explained variance is 30%), and items 4, 9, 10, and 11 loaded on another factor that could be called "correctness of information" (eigenvalue = 1.57; explained variance is 13.1%). Items 8 and 12 loaded on a third factor (eigenvalue 1.4; explained variance is 11.7%); no obvious name could be found for this factor. Responses were given on a 7-point scale from Strongly Agree (1) to Strongly Disagree (7). After reversing items 5 and 8, a high score on this measure means high information asymmetry. Cronbach's Alpha for the complete measure (12 items) was .75, and .78 when the third factor was excluded. The measurement of perceived information asymmetry was presented to the subjects before the superior's adjustment. The scales are in Appendix 26; below is an English listing of the items:

1. In the budget negotiation, the boss seems to have a lot of information about this task.
2. In the budget negotiation, the boss seems to have a lot of information about the subactivities of which this task consists.
3. In the budget negotiation, the boss seems to have a lot of information about the factors that determine how long it will take to produce a particular invoice.
4. In the budget negotiation, the boss seems to be well informed about the complexity of the expected mix.
5. Since I've already made several invoices now, I know better than the boss how this task works.
6. The boss' information about this task is pretty complete.
7. The boss' information about this task is pretty detailed.
8. In the budget negotiation, I know better than the boss how many invoices I should be able to do on the expected mix.

9. The boss' argumentation in the budget negotiation is pretty convincing.
10. The boss' argumentation in the budget negotiation seems to be based on a pretty detailed analysis of the task.
11. The standard times used by the boss, on average, seem to be pretty credible.
12. In comparison with the boss, I have little additional knowledge and trumps to negotiate a good budget.

6.2 Budget slack

This variable was measured in the same three ways as in Experiment 2. SLACK1 is the difference between the subject's individual performance on a pre-test and his/her budget suggestion before adjustment (SUBJ_SUG). The budget is stated in terms of the number of invoices to be made. SLACK2 is the difference between the theoretical level of slack-free performance and the subject's budget suggestion before adjustment (SUBJ_SUG). This theoretical level of slack-free performance is the number of invoices suggested by the activity-based system, given the complexity of the expected set of orders. Remember that this activity-based system worked with relatively slack-free standards assessed in prior tests. On the set of expected orders (MIX 1) the theoretically slack-free performance was 10 invoices. Finally, the level of the subjects' budget suggestion before adjustment (SUBJ_SUG) is on itself an interesting variable closely related to slack.

6.3 Pressure not to misrepresent

This measure had more items than the one in Experiment 2. An 8-items instrument was used, specifically designed for the experimental setting. Responses are given on a 7-point Likert scale from Strongly Agree (1) to Strongly Disagree (7). When all items are reversed, except items 7 and 8, a high score on this measure means high pressure. Cronbach's Alpha was .67. The measure was presented to the subjects before the superior's adjustment. Factor analysis on the measure identified four factors: 1/ items 3 and 4 (eigenvalue 2.52; explained variance 31.6%), 2/ items 7 and 8 (eigenvalue 1.41; explained variance 17.7%), 3/ items 1 and 2 (eigenvalue 1.19; explained variance 15%), and 4/ items 5 and 6 (eigenvalue 1.04; explained variance 13.1%). The complete scales are in Appendix 26; below is a list of the items in English:

1. When I gave my budget suggestion, I had the feeling that the boss knew exactly what he wanted me to suggest.
2. When I gave my budget suggestion, I had the feeling I had little choice about what to write down.
3. When I gave my budget suggestion, I had the feeling I should not underestimate my potential.
4. When I gave my budget suggestion, I felt a pressure not to give too low a suggestion.
5. Given the boss' information, he can easily find out when a budget is set too low.
6. The budget negotiation gives me a pressure not to misrepresent myself.
7. The boss' argumentation had no influence on me at all.
8. I set my budget suggestion totally independent of the boss.

6.4 Job tension

The same two concepts of job tension as in Experiment 2 were used, except that the first had more items. Job tension induced by the type of control system was measured with a 7-items measure. It was presented to the subjects before the superior's adjustment. Answers are given on a 7-point Likert scale from Strongly Agree (1) to Strongly Disagree (7). When all items except 3 and 4 are reversed, a high score on this measure means high pressure. Cronbach's Alpha was .70. Items 5, 6, and 7 loaded on one factor with eigenvalue 2.68 and explained variance 38.3%; items 1, 2, 3, and 4 loaded on a second factor with eigenvalue 1.36 and explained variance 19.4%. The complete scales are in Appendix 26; below is a list of the items in English:

1. After the budget setting I feel somewhat tense, because I've not been able to set a good budget.
2. The budget setting gives me little control over my final budget.
3. I think that the final budget should be attainable.
4. The final budget doesn't differ a lot from my real potential.
5. The way the budget was set leaves me no margin.
6. I feel somewhat tense, because I don't know whether the final budget will be attainable.
7. I feel somewhat tense, because I had preferred the final budget differently.

The other instrument measured job tension after reception of the set of actual orders; this measure is an assessment of job tension induced by both the type of budget system and the level of job difficulty. This measure was presented to the subjects after production of the set of actual orders. Answers are given on a 7-point Likert scale from Strongly Agree (1) to Strongly Disagree (7). Cronbach's Alpha is .90. All items loaded on a single factor with eigenvalue 1.87 and explained variance 46.8%. The complete scales are in Appendix 26; below is a list of the items in English:

1. Given my budget objective, I experienced a great deal of tension in performing the task.
2. While performing the task, I was nervous because I thought I would not attain my budget.
3. While performing the task, I felt tense because my budget was set pretty tight.

6.5 (Need for) Dysfunctional behavior

Four questions were asked to assess the need for dysfunctional behavior (other than slack creation). The questions were about the same as in Experiment 2. Therefore, they are not repeated here. Cronbach's Alpha was not assessed because each question was relevant on its own.

6.6 Risk Attitude

The measure of risk attitude was about the same as in Experiment 2, except for some minor differences. Therefore this measure is not repeated here. The choice was between a budget of 10, 13, or 16 invoices. Subjects who chose the first alternative were risk averse; the others were called non-risk averse (either neutral or seeking). The measure was presented to the subjects after having set their budget suggestion, but before adjustment. This contextual measure predicted slightly better than Young's (1985) measure that was presented in the check-out questions. In each group 19 subjects were classified as risk averse, while 13 and 14 subjects were classified as non-risk averse in group one and two respectively.

7 Experimental design

Like Experiment 2, Experiment 3 had a 2*2*2 factorial design: Type of Budget System * Job difficulty * Risk Attitude. The first two factors were assigned, the third was measured. Figure 24 shows the design and the number of subjects in each cell.

Figure 24: Experimental Design

Factor 1	*Factor 2*	*Factor 3*	
Type of Budget System	**Level of Job difficulty**	**Risk Attitude**	**Subjects**
Activity-based	High	Risk averse	n=9
	n=16	Non-risk averse	n=7
n=32	Low	Risk averse	n=10
	n=16	Non-risk averse	n=6
Unit-based	High	Risk averse	n=8
	n=16	Non-risk averse	n=8
n=33	Low	Risk averse	n=11
	n=17	Non-risk averse	n=6

7.1 Type of Budget Setting.

Subjects were randomly assigned to the activity-based condition (group 1) or the unit-based condition (group 2). The only difference between the groups was in one sheet of paper on which the budget-meeting was printed (see Appendix 27). In the activity-based condition the superior suggested to produce 10 invoices, given the expected mix of orders and customers for next period. The superior showed a detailed argumentation with a description of the different activities in the task and cost driver information. Based on the standards assessed in Test 2 (chapter 8), the activity-based system resulted in a budget suggestion of 10 invoices, given the level of complexity of the expected mix (MIX 1). Subsequently, on the same sheet of paper, the subjects were asked to give their budget suggestion (SUBJ_SUG). Suggestions lower than 9 invoices were later (see procedures) adjusted to 9; suggestions of 9 invoices or more were not adjusted. This simulated the superior's active use of the activity-based information, in a way to achieve optimal performance.

In the Unit-based condition on the other hand, the superior's argumentation was much less detailed (see Appendix 27). The superior mentioned a production time per average invoice, based on the same data from the prior tests. This information resulted in the same

budget suggestion by the superior: 10 invoices (note that, like in Experiment 2, both information systems led to the same budget suggestion again). Subsequently, the subjects were asked to give their own budget suggestion (SUBJ_SUG). Later (see procedures), the superior adjusted the subject's suggestion by adding one invoice, except when the budget was already set at 9 orders or more. This adjustment simulates a situation in which the superior has no detailed information about potential performance.

In both conditions the subjects knew that there was going to be an adjustment, but they did not know how the adjustment was going to be.[44]

7.2 Level of Job difficulty.

The set of orders the subjects actually received after having set their goal contained either more (MIX 2) or less (MIX 3) complex orders than the expected set (MIX 1) they had received before the budget setting (these mixes are in Appendix 21). The actual set was assigned to the subjects in a way which made them believe that there was a 50% chance that the actual mix was going to be like the expected mix, 25% chance that it was going to be easier than the expected mix, and 25% chance that it was going to be more difficult than the expected mix (see explanation of environmental uncertainty). In reality, however, only easier or more complex mixes were assigned. At the time of the distribution of the actual mix, the assistants gave a red mix to somebody who had drawn a red color at the beginning of the experiment, a blue mix to a blue color, etc. The blue and the red mixes were the same however (MIX 2 = more difficult), as were the yellow and the green mix (MIX 3 = easier). 32 people received a more difficult schedule, 33 received an easier one.

7.3 Risk Attitudes.

Risk attitudes were measured with the contextual measure described earlier. In each group 19 subjects were classified as risk averse, while 13 and 14 subjects were classified as non-risk averse in group one and two respectively.

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[44] The treatment is a combination of detail of argumentation and budget tightness, and thus it should be interpreted as a package deal. However, the effects on Perceived Information Asymmetry, Pressure not to Misrepresent, and the Slack variables are measured before adjustment, and thus are pure effects of the detail of the argumentation.

Again it should be noted that none of the analyses involved more than two factors simultaneously.

8 Experimental Procedures.

The experiment was run with all the subjects at the same time. I was the experimenter who explained and guided the experiment, and there were four assistants and an administrator. Each assistant "controlled" about 15 subjects (distributing and collecting material, measurement scales, etc.); the administrator calculated pay and bonuses, based on information collected by the assistants. The experimenter followed a detailed script at all times (see procedures in Appendix 28). Also the assistants had a checklist with their tasks at every stage of the experiment (Appendix 29). The experimenter and the assistants took great care to keep everything running smoothly, keep communication between subjects to a minimum, and maintain control. Everybody agreed afterwards that this goal (maintaining control) had been achieved. Every subject was seated at a desk, on which an envelope was put in advance containing the sets of orders and invoices for the practice session and the set with the expected mix (MIX 1), a stapler, and a pen. An electronic calculator was supplied to those subjects who had forgotten to bring their own (which was the case for only one subject). The following paragraphs present a summary of the procedures.

*1/ **Welcome and random assignment.*** Subjects were randomly assigned to the two experimental conditions. Upon arrival subjects received a colored card; this color would later determine the complexity of the set of actual orders.

*2/ **Demonstration and Practice Session.*** About 15 minutes were spent practicing with the experimental task. The objective of the practice session was both to get familiar with the task and to find a way for every subject to produce as fast as possible, without reducing quality. The experimenter never told the subjects what complexity was; the practice session was designed to let the subjects discover it for themselves. Therefor, the subjects received a set of orders in which there was one order of every type of complexity: an old customer and one order line, a new customer and one order line, an old customer and two order lines, etc. (six orders in total). At the end of the practice session, the subjects put the practice material back in the envelope and took the next set (MIX 1) out of it (15 orders and invoices).

*3/ **Production of the Expected Product Mix.*** All the subjects had the same set of orders (MIX 1), and they got 10 minutes to make as many invoices as possible without reducing quality. The subjects were not told yet that this set contained the expected mix of orders. In order to stimulate motivation and effort, an effort-stimulating pay scheme was used: the best 10 performers in each group would receive 100 Belgian Francs extra ($2 to $3). Production on this mix was not collected nor controlled until after the production of the actual product mix.

*4/ **Explanation of Uncertainty.*** Subjects received the explanation of uncertainty on one page (see Appendix 25). They were asked whether everything was clear before we proceeded.

*5/ **Explanation of Pay Scheme.*** The pay scheme was the same as in Young (1985). Subjects received one page on which the pay scheme was explained. This explanation was virtually the same as in Young (1985), except that more examples were added. Additional verbal explanation was offered as well.

*6/ **Budget Setting before Adjustment.*** The subjects were told that they were going to negotiate a budget now. It was explained that their suggestion would not automatically be accepted, and that the superior might adjust it. Subjects in group 1 received a page with the activity-based budget setting; those in group 2 received the unit-based budget setting (see Appendix 27). Then the subjects got the time to write down their budget suggestion (SUBJ_SUG) on the page.

*7/ **Measurement.*** At this time Perceived Information Asymmetry was measured, as well as Pressure not to Misrepresent and Risk Attitude. Afterwards, the subjects put the measurement forms in their envelope.

*8/ **Budget Adjustment.*** The assistants adjusted the budget suggestions in their group. In both conditions, suggestions of 9 invoices or more were accepted without adjustment. In the activity-based group, suggestions lower than 9 were adjusted to 9 invoices; in the unit-based group, suggestions were simply increased with one invoice. The assistants collected the budget papers, and left a note with the final goal.

*9/ **Measurement.*** At this time Job tension induced by the type of control system was measured. Afterwards, the subjects put the measurement form in their envelope.

*10/ **Actual Production.*** At this time the sets of actual orders (MIXES 2 & 3) were distributed according to the color the subjects had received at the beginning of the

experiment. 32 people received a more difficult mix (MIX 2), 33 received an easier mix (MIX 3). The production session lasted 10 minutes. At the end of the production session, finished invoices were counted and verified. All completely finished invoices were accepted; there was no quality check.

11/ Measurement. Measures of Job Tension induced by Job difficulty and (need for) Dysfunctional Behavior were distributed. After completion, the subjects put the measures in their envelope.

12/ Check Out Questions.

13/ Pay.

9 Results

In this section the results of the manipulation checks (Appendix 30) and the hypotheses testing will be shown. Discussion of these results will be the focus of another section.

9.1 Descriptive statistics and manipulation checks

There was no difference between the groups in terms of subjects' age and sex. All the subjects reported that they had understood the task, and 62 subjects said that they had understood the superior's talk during the budget meeting. Two persons didn't understand the activity-based budget talk, and one didn't understand the unit-based talk. There was no significant difference between the number of people who said that they had accepted the final budget in the activity-based condition and the unit-based condition ($p = .98$). The final budget was accepted by 63 people in total, which may indicate that the final budget (after adjustment) was not set unreasonably high (Locke, 1969; Ashton, 1990). Almost everybody (64 people) had understood the pay scheme, and 60 people were indeed able to identify a situation in which compensation would be highest. 57 people said that they were motivated by the bonus system to do their very best on the expected mix; there was no significant difference between groups ($p = .96$). There was no difference between the groups in terms of the mean production on the expected mix ($t = .42$; $p = .672$), which indicates that both groups had the same capacities. 49 subjects said that they had not encountered any significant stapler problems. All subjects thought that the experiment was well-organized, and only 1 subject in every group found the experiment rather boring; the others found it OK (33) or rather fun

(30). This may give an idea of experimental realism: the degree to which the experimental procedures were meaningful to the subjects (Swieringa & Weick, 1982).

9.2 Tests of hypotheses[45]

The results of the ANOVA's (or t-tests) are presented for each of the six hypotheses. Tests are performed using SPSS for Windows. The reported F (or t)-statistics are those generated by the general factorial ANOVA (or t-test) procedures in SPSS, which assume a two-tailed test. Where possible, the p-values reported below are one-tailed because all hypotheses are directional, based on theory. Means and standard deviations for all the dependent variables used in the tests are summarized in Figure 25.

Figure 25: Summary of Means (m) and Standard Deviations (s)

	Activity-based condition	**Unit-based condition**
Perceived Information Asymmetry	m = 38.09 s = 6.2	m = 43.84 s = 10.6
Slack 1	m = .31 s = 1.03	m = .12 s = 1.02
Slack 2	m = .18 s = .78	m = -.09 s = 1.04
SUBJ_SUG	m = 9.81 s = .78	m = 10.09 s = 1.04
Pressure not to misrepresent	m = 38.37 s = 6.2	m = 38.33 s = 7.9
Job Tension from Control System	m = 21.93 s = 5.26	m = 19.36 s = 5.83
Job Tension from Control System and Job difficulty	m = 12.37 s = 6.07	m = 11.27 s = 5.49
Need for Dysfunctional Behavior	m = 15.21 s = 4.5	m = 13.21 s = 4.9

9.2.1 Hypothesis 1

Hypothesis 1 predicted that subjects in the activity-based condition would perceive less information asymmetry than those in the unit-based condition. Since the variances on this

[45] Like in Experiment 2, the hypotheses testing did not require a simultaneous multivariate analysis since each of the dependent variables was of interest in its own right (specific hypotheses were developed for the individual variables). For these kinds of "multiple univariate research questions", multiple univariate tests are appropriate (Hand & Taylor, 1987, p.47; p.82). Nevertheless an overall MANOVA analysis was performed on the DV's (taken together): Hotellings F was 37.44; p was < .000.

variable were significantly different (Levene test: F = 5.115; p = .027), a t-test for unequal variances was performed. This test was highly significant (t = 2.68; one-tailed p = .005), which confirmed hypothesis 1. Effect size measured by Eta^2 was about 10%. Two separate t-tests were performed on the summed items of Factor 1 (Volume of Information) and Factor 2 (Correctness of Information). The t-test for unequal variances (Levene test: F = 8.21; p = .006) on Factor 1 was highly significant (t = 4.27; one-tailed p < .000). The t-test for Factor 2 was not significant (t = .08; one-tailed p = .467). These findings confirm the idea that a measure of Perceived Information Asymmetry should distinguish between these dimensions, and that a measure that only focuses on the correctness dimension may not identify information (a)symmetry. Recall that this was the problem in Experiment 2, in which the measure of Perceived Information Asymmetry overstressed the correctness dimension. When the superior's information is perceived as realistic (or unrealistic) in both groups, the measure may not identify any effect.

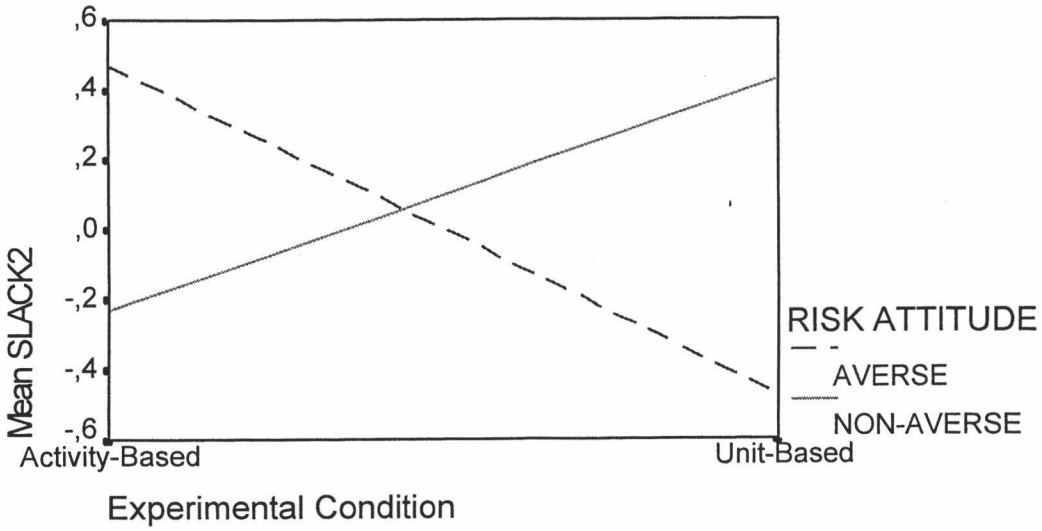
9.2.2 Hypothesis 2

This hypothesis expected to see an interaction effect for Risk Attitude and Type of Budget System on slack. Slack creation was hypothesized to be smaller in activity-based setting, especially for non-risk averse subjects. Or formulated differently, non-risk averse subjects were expected to set their budget (SUBJ_SUG) higher in the activity-based condition than in the unit-based one. This hypothesis was confirmed. The interaction effect on SLACK2 is shown in Figure 26 (F = 14.37; p < .000)[46] - the effect size was about 19%. The interaction effect on SUBJ_SUG was equally significant since both measures are linearly linked: SLACK2 = (10 - SUBJ_SUG). The interaction effect on SLACK1 was marginally significant: F = 2.43 (one-tailed p = .06)[47] - effect size about 4%.

[46] The homogeneity of variance assumption was satisfied with the Bartlett-Box measure (F = 1.68; p = .169); Cochran's C was .45 (p = .036). The design was reasonably balanced: cell sizes were 19, 19, 13, 14 in cell 1 to 4 respectively, therefore there is no problem with the homogeneity of variance assumption.

[47] The homogeneity of variance assumption was met: C = .275 (p = 1), F = .065 (p = .978).

Figure 26: Interaction effect of Risk Attitude and Type of Budget System on SLACK2



Further examination of the interaction effect should focus on the slope of the line of the risk averse subjects. It seems like those subjects create more slack in the activity-based condition than in the unit-based one. A more horizontal slope would have seemed more logic. A similar remark should be made for the difference in slack creation between the risk averse and non-risk averse subjects in the unit-based condition. A smaller difference would have seemed more understandable. Two explanations for these observations may be given:

1. They should be attributed to chance. Experiment 2 showed an equally significant interaction effect, but with lines that were easier to interpret (see Figure 19). The slope of the line of risk averse subjects is smaller, as is the difference between the mean for risk averse versus non-risk averse subjects in the unit-based condition.
2. The steepness of the slope for the risk averse subjects may mean that those subjects will actually create more slack in the activity-based condition. It may be that the detailed argumentation of the superior creates more awareness of the factors that can go wrong in an uncertain environment. Therefore, risk averse subjects may have a feeling of increased subjective uncertainty, against which they buffer by creating slack. In the unit-based condition, on the other hand, they may have the opposite feeling.

9.2.3 Hypothesis 3

This hypothesis stated that Pressure not to Misrepresent was going to be higher in the activity-based condition than in the unit-based one. The t-test did not confirm this hypothesis ($t = -.02$; one-tailed $p = .490$) - the homogeneity of variance assumptions were met. For none of the four factors identified in the factor analysis there was a significant difference between the groups, and none of the individual items discriminated between the groups. This hypothesis hadn't been confirmed in Experiment 2 either. It should be added, however, that even though the means for Pressure not to Misrepresent were not significantly different, additional correlation analyses provided some support for the theory. Pearson's correlation (r) between Perceived Information Asymmetry and Pressure not to Misrepresent was -.27 (two-tailed $p = .032$), meaning that this Pressure is low when Asymmetry is high. Furthermore, as predicted by the theory, SLACK2 is high when Pressure not to Misrepresent is low and Perceived Information Asymmetry is high ($r = -.26$, two-tailed $p = .033$; and $r = .35$, two-tailed $p = .004$, respectively).

9.2.4 Hypothesis 4

This hypothesis expected a main effect of Type of Budget System on Job Tension induced by the control system. This hypothesis was confirmed ($t = -1.87$; one-tailed $p = .033$)[48] - effect size was about 5%. Subjects in the activity-based condition had more of this tension than subjects in the unit-based group had. According to the theory this effect should be attributed to reduced job control in the activity-based context, due to the superior's increased knowledge. Since the measurement of this type of tension happened before the superior's adjustment, it is not influenced by this adjustment.

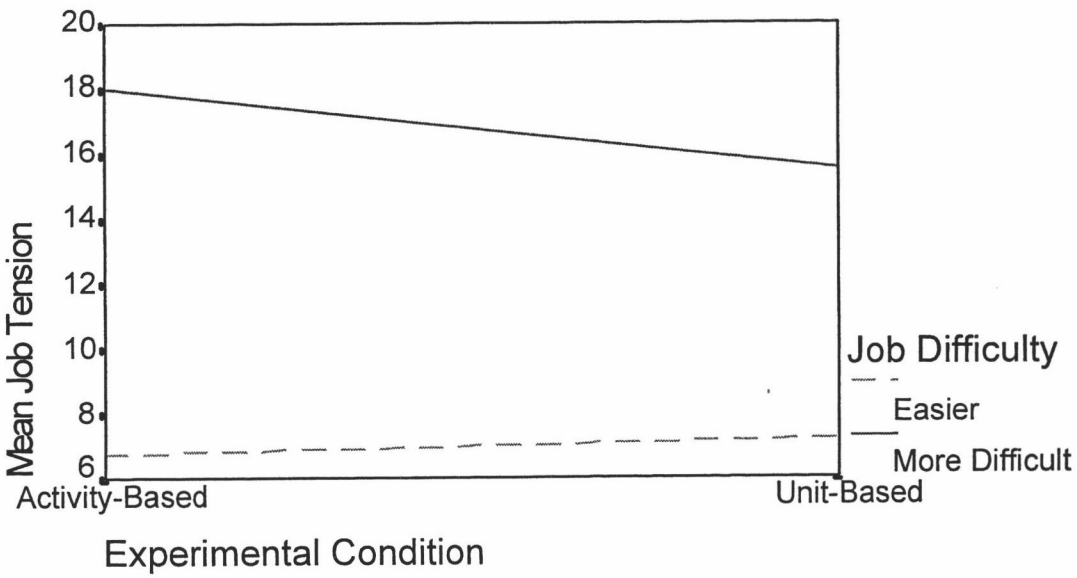
9.2.5 Hypothesis 5

This hypothesis stated the combination of Type of Budget System with High Job difficulty would induce more Job Tension in the activity-based setting than in the unit-based one, since in the former high job difficulty are combined with low job control. This

[48] The homogeneity of variance assumption was met: $C = .550$ ($p = .569$), $F = .319$ ($p = .572$).

hypothesis was confirmed (F = 4.04; two-tailed p = .049)[49] - effect size was about 6%. People who received a difficult mix of orders reported more of this tension in the activity-based condition than they did in the unit-based condition. Additionally, there was a main effect of Level of Job difficulty on this variable (F = 181.13; p < .000). Figure 27 illustrates the nature of the effects.

Figure 27: Interaction of Type of Budget System and Job difficulty on Job Tension induced by the Type of Control System and Job difficulty



9.2.6 Hypothesis 6

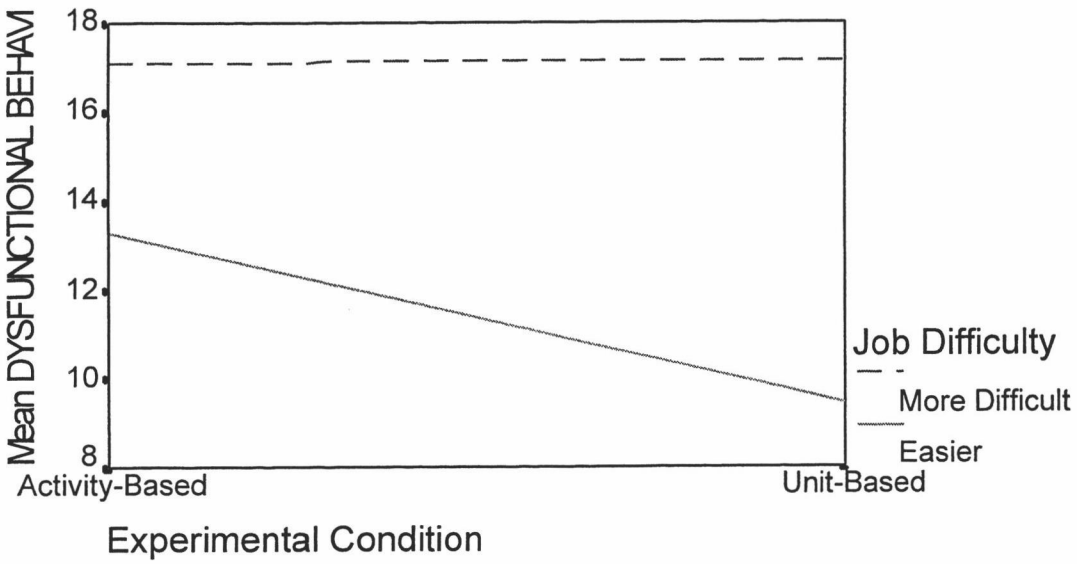
This hypothesis predicted that there would be more (Need for) Dysfunctional Behavior in the activity-based condition than in the unit-based one. Results of the ANOVA[50] show both a significant main effect of Type of Budget System (F = 4.33; two-tailed p = .042) - effect size is about 7% - and an interaction effect with Job difficulty (F = 4.62; two-tailed p = .036). This main effect implies that people in the activity-based condition feel more need for Dysfunctional Behavior regardless of the level of Job difficulty. This conclusion is confirmed by an ANCOVA, in which the effect of Type of Budget System on Need for Dysfunctional

[49] The homogeneity of variance assumption was not met: C = .478 (p = .018) and F = 4.59 (p = .003). However, since the design is perfectly balanced (cell sizes are 16, 16, 16, 17 in cells 1 to 4 respectively) there is no problem.

[50] Cochran's C was .423 (p = .083), and Bartlett-Box' F was 1.5847 (p = .19). Since the design is perfectly balanced there is no problem with this assumption.

Behavior is analyzed, controlling for Job difficulty (F = 4.21; two-tailed p = .044). Theoretically this can be explained by reduced job control in the activity-based context. Additionally there was a significant main effect of Level of Job difficulty on need for Dysfunctional Behavior (F = 40.25; p < .000). Figure 28 shows the nature of the effects.

Figure 28: Effects of Type of Budget System on (Need for) Dysfunctional Behavior



The nature of the interaction effect needs some further examination. It appears like those people who received a more difficult mix have about the same need for dysfunctional behavior in both conditions. The effect of Job difficulty is bigger than the effect of the Type of Budget System. For the subjects who received an easier mix however, the effect of the Type of Budget System is bigger: the negative effect of the activity-based budget system is not compensated by the positive effect of the easy job.

10 Discussion of the results

In this experiment 6 hypotheses were tested about information asymmetry and subjects' budget behavior in an activity-based versus unit-based budgeting context. The results support 5 of the six hypotheses.

Perceived Information Asymmetry is lower in an activity-based budgeting context than in a unit-based one. Factor analysis on the measure confirmed that there were at least two concepts of information asymmetry between which one should distinguish: one is "Volume of Information" (or Completeness, or Detail), and the other is "Correctness of Information" (or Realism). Since the conditions did not differ in terms of the "Realism" of the superior's budget suggestion, the significant difference stemmed from the Volume-dimension. If unit-based information systems, in the real world, often provide inaccurate information about resource consumption of products and activities (see chapter three), it may be expected that Perceived Information Asymmetry will be even greater. There were two reasons why it was chosen not to differ the conditions in terms of the Correctness-dimension:

1/ If the superior had given another budget suggestion in the activity-based condition than in the unit-based condition, any measured difference could be attributed to different anchor points (Cervone & Peake, 1986). This would have raised concerns on the internal validity of the findings: should they be attributed to the types of information system or to the differences in anchor points?

2/ The treatment should not be simplified to comparing a correct information system (one leading to a realistic budget suggestion) with a misstated one. Scientifically this would not be an interesting research question. What is more interesting about activity-based information is to see the effect of its detail and formulation in terms of activities and cost drivers on information asymmetry and other variables.

It is the first time that Perceived Information Asymmetry has been used in a context of activity-based budgeting; the conclusion is that activity-based information does indeed mitigate information asymmetry between the superior and the subordinate. This in turn results in less budget slack especially for non-risk averse subjects. This was a finding in both Experiment 2 and 3. Further research is needed, though, to evaluate whether risk averse subjects, on the contrary, will create more slack in the activity-based setting because of increased awareness of subjective uncertainty. This result was completely unexpected, but it offers an interesting new direction of research. The idea is that the explicit listing of the expected volume of every cost driver for next budget period, makes the subordinate more aware of the effect on uncertainty on each of the cost drivers: the number of new customers may change, the number of order lines, and the number of invoices. It is possible that this

increased perceived uncertainty against which risk averse subjects will buffer by creating more slack in the activity-based budget. A new experiment, with a completely different design, will be developed to test this potential effect of activity-based information on perceived environmental uncertainty. Theoretical support for the hypotheses will be based on the literature of subjective risk, uncertainty, and utility.

The hypothesis that Pressure not to Misrepresent is higher in the activity-based context could not be confirmed. This may be attributed to a measurement problem, or alternatively, to a failure to induce this pressure in the experimental procedures. Maybe this pressure not to misrepresent would have been easier to measure if the budget meeting had involved a person to person negotiation (rather than a negotiation on paper). However, the correlation analyses did provide support for the theory: Pressure not to Misrepresent was high when Perceived Information Asymmetry was low. Also the correlation with slack was significant and in the hypothesized direction: slack is high when Pressure not to Misrepresent is low.

It was confirmed that the activity-based budget setting induces more job tension because of reduced job control, due to the superior's increased knowledge of the subordinates' work environment. Also, it was confirmed that the combination of Type of Budget System with high Job difficulty will cause more tension in the activity-based condition than in the unit-based one. Finally, as predicted by the theory, it was confirmed that subjects in the activity-based condition will feel more need for dysfunctional behavior (such as reducing quality and protesting) than those in the unit-based one, because of the job tension which is higher in the former.

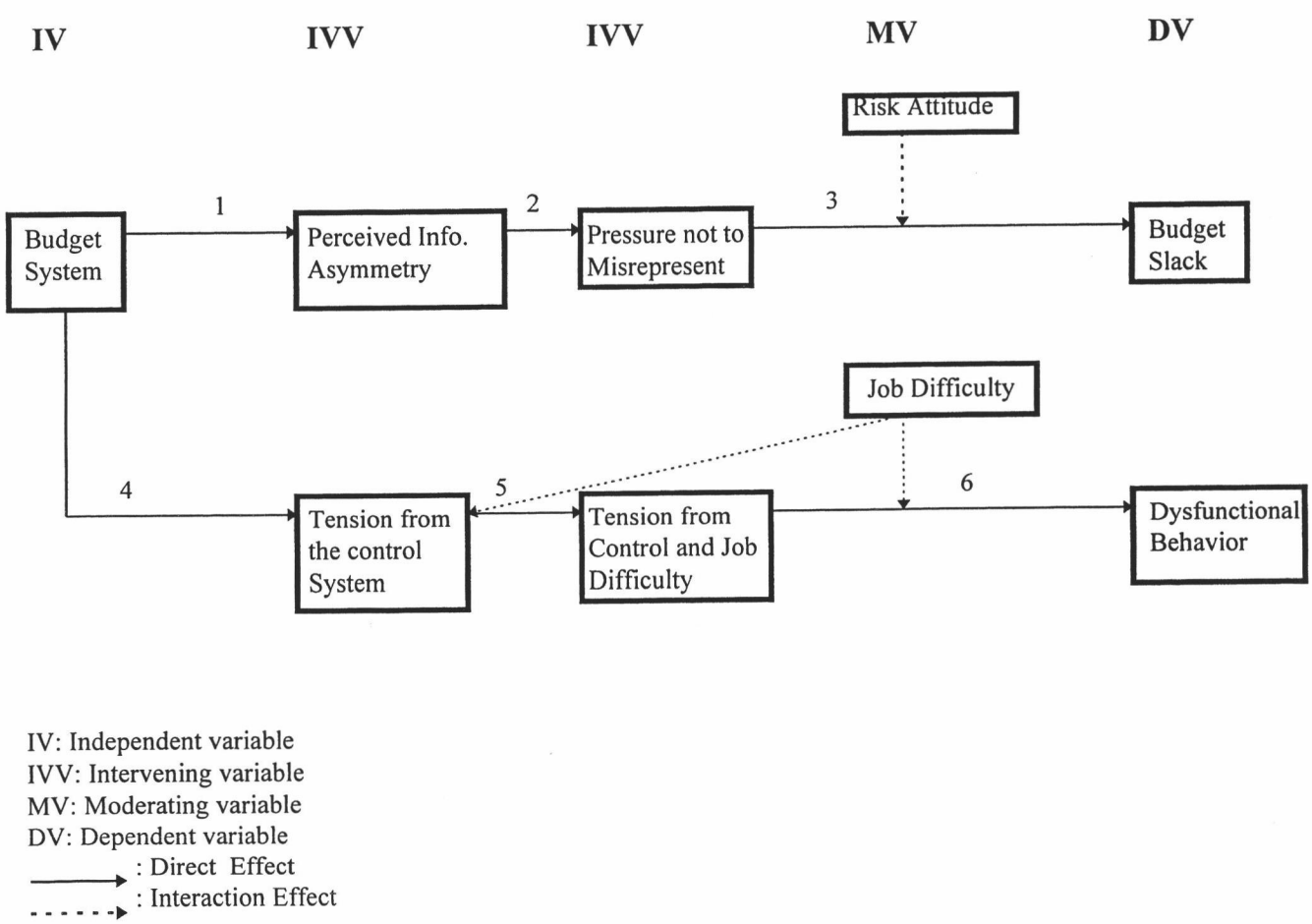
I believe the conclusions of experiment 2 and 3 generally confirm the theory as it was developed from the literature. The effect of activity-based budgeting on budget slack, for non-risk averse subjects, was as predicted by the theory. For all subjects this effect was due to a perception of increased information symmetry between the superior and the subordinate. Also, as was predicted in the theory, the more information the superior has, the more pressure the subordinate will feel not to misrepresent his potential in the budget meeting. Finally, the effects on the dysfunctional behavior variable was also as predicted. It was confirmed that tension both from reduced job control and from high job difficulty intervene between the

budget system and its effect on dysfunctional behavior. The experimental design allows us to formulate the conclusions in terms of causal effects. Overall, the results support the theory as a whole. However, the theory was tested with factorial ANOVA's and t-tests, which are techniques to study the relationships between individual variables. They are not techniques to study whether the data fits a model that represents the theory. It can be argued that if the data didn't fit the theory not that many hypotheses would have been confirmed. This is certainly true. Nevertheless, specific techniques exist to evaluate whether the data fit the theory as a whole. Therefore, I performed some additional analyses to test a model that was based on the theory. I consider these analyses as confirmatory, not as exploratory.

11 Testing the model

The theory described and tested above can best be represented in the following model (Figure 29).

Figure 29: Model of relationships as predicted in the theory



The first arrow in the model depicts hypothesis one: the Type of Budget system influences Perceived Information Asymmetry, as was confirmed in the hypothesis testing. The second arrow represents the intervening effect on Pressure not to Misrepresent. This effect goes through Perceived Information Asymmetry, and thus does not come directly from Type of Budget System. Subsequently, the third arrow shows the effect on Slack, moderated by Risk Attitude. In the bottom part of the model, arrow 4 represents hypothesis four about the effect of Type of Budget System on Tension from reduced Job Control. Arrow 5 indicates that if reduced job control is combined with high Job Difficulty, Tension from reduced Job Control and Job Difficulty will rise. Finally this will affect (Need for) Dysfunctional Behavior, which is also moderated by Job Difficulty. The effect on Dysfunctional Behavior is not assumed to come directly from Type of Budget System.

The techniques used to test this model are based on correlation analysis, Simon-Blalock, and Path Analysis. With correlation analysis it was simply checked whether the observed correlations between the variables in the model were in the hypothesized direction and significant. I will present the results of this analysis below. Additionally I performed the Simon-Blalock technique (Asher, 1990) to evaluate whether omitted arrows in the model may or may not actually be omitted. This technique is based on partial correlations[51]. "*In short, in using the Simon-Blalock technique, one looks for pairs of variables between which linkages have been omitted and generates predictions that the correlations between those pairs of variables controlling for appropriate other variables should be zero. According to Blalock, one controls for all those variables prior to or intervening between the two variables in question*" (Asher, 1990, p.23). Asher continues, however, that a linkage should not automatically be included if a partial correlation is significantly different from zero, "*particularly if its inclusion seriously violates an underlying theory in which we have substantial confidence.... The point is that decisions about model construction must involve an*

[51] The assumptions of the Simon-Blalock technique are the same as those of regression analysis. That is: the data should be interval level, there should be homoscedasticity, the error terms should be randomly distributed, and there is no measurement error and no specification error. Obviously these are very stringent assumptions that should not be taken lightly. However, Bohrnstedt & Carter (1971, p.142) have indicated that "... there is ample evidence to suggest that regression analysis is adequately robust except in the presence of measurement and specification error. It has been shown that the problems of heteroscedasticity and nonnormality do not, in fact, generally cause serious distortions." The assumption of interval measurement shouldn't be interpreted overrestrictively either. Asher (1990, p.27; p.90) provides discussions suggesting that the use of ordinal data should not be an argument to stop using regression-based techniques.

interplay of theory and data; where confidence in one's theory is high, theoretical considerations should probably be given greater weight in the model testing" (Asher, 1990, p.23).

Also I performed Path Analysis (Asher, 1990) to study the effects of variables, where some variables are viewed as causes of other variables which are viewed as effects. Path Analysis is a technique to test whether a theory-based model fits the observed data. It is not meant in the first place to test causal relationships. As Wright has stated (1934, p.193), "... *the method of path coefficients is not intended to accomplish the impossible task of deducing causal relations from the values of correlation coefficients. It is intended to combine the quantitative information given by the correlations with such qualitative information as may be at hand on causal relations to give a quantitative interpretation*". If the assumptions of Path Analysis are met[52], the path coefficients p_{ij} represent the fraction of the standard deviation of the effect variable (i) for which the designated cause variable (j) is directly responsible, holding all other variables in the model constant. Path coefficients are equivalent to regression weights, and can be derived from the regression coefficients (Beta-weights) of the standardized regression line. In the analysis below, I derived the path coefficients from several multiple regressions in SPSS for Windows. The number of regression equations, in a just-identified model, is equal to the number of endogenous variables in the model; these are the variables which cause lies within the model (exogenous variables, on the other hand, have a cause outside of the model).

I performed these analyses on the top- and the bottom-part of the model in Figure 29 separately, because these parts represent two different sections of the theory; the first has Slack as a dependent variable, and the second focuses on Dysfunctional Behavior. These two sections will be referred to below as Model 1 and Model 2, respectively. For each model I performed an analysis on the global data, disregarding interactions with Risk Attitude and Job Difficulty. In Path Analysis interaction effects can not be appropriately represented and

[52] Path Analysis assumes that the relationships among the variables are linear and additive, all error terms are uncorrelated with each other, there is no reciprocal causation between variables (only "recursive" models are considered), the endogenous variables have at least interval scale properties, there is no measurement error, and all causal determinants have been properly included in the model.

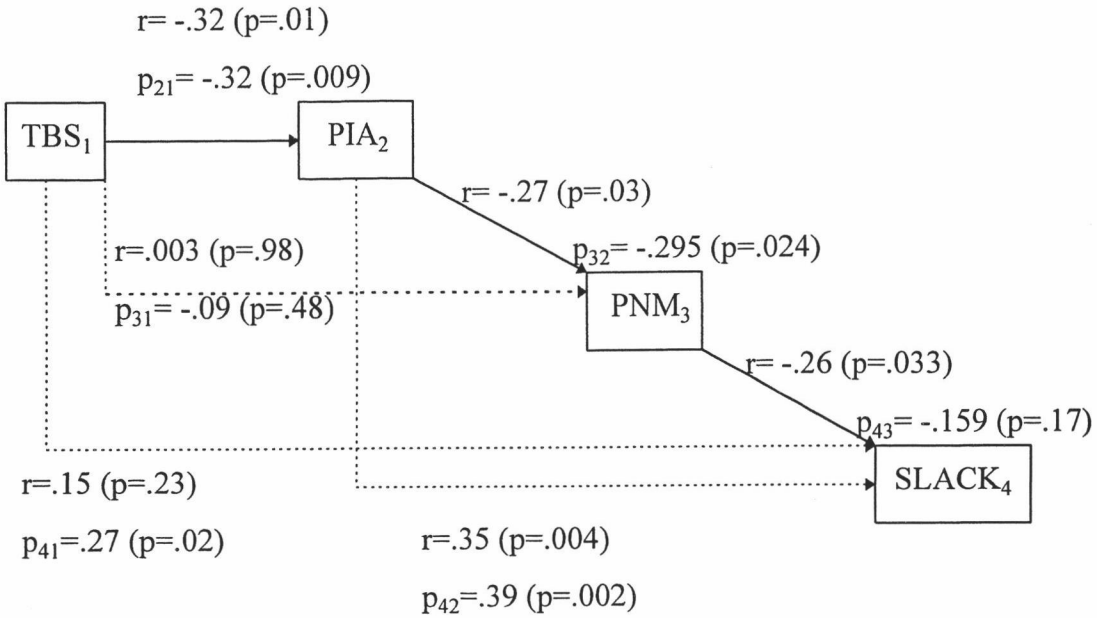
estimated[53]. The only way interaction effects can be represented is by making two models, e.g. one for risk averse people and one for non-risk averse (Jaccard, Turrisi & Wan, 1974, p.64). The same would have to be done for different levels of job difficulty. The downside of splitting the data is that the number of observations per model halves each time, which reduces the power of the significance tests. I have split the data anyway, and performed the Path Analyses on Risk Averse subjects and Non-Risk Averse subjects separately. I did the same with High and Low Job Difficulty. The results of these partial analyses should be interpreted carefully.

11.1 Model 1 - Global Analysis

Figure 30 presents this part of the model with the observed correlations, path coefficients, and significance levels (two-tailed). A solid line is drawn for a hypothesized path, and a dotted line for the paths that were assumed to be zero. The following abbreviations were used: TBS (Type of Budget System), PIA (Perceived Information Asymmetry), and PNM (Pressure not to Misrepresent). The used measure of Slack was SLACK2. In the analyses below it is helpful to know that the unit-based group was number 1 and the activity-based group number 2.

[53] The term "interaction" is meant here in the ANOVA-way: an effect between the IV and the DV exists for one group, but not for another. The interaction factor can be included in the model as a control variable, which means splitting the model.

Figure 30: Model 1 - Global Analysis



The partial correlations used in the Simon-Blalock technique are shown in Figure 31. They are the partial correlations of the omitted linkages (dotted lines), controlling for all prior or intervening variables.

Figure 31: Partial Correlations of Omitted linkages (Model 1 - Global Analysis)

1/ Between Budget System and Pressure not to Misrepresent controlling for Perceived Information Asymmetry.	-.089 (p = .482)
2/ Between Budget System and Slack, controlling for Perceived Information Asymmetry and Pressure not to Misrepresent.	.28 (p = .024)
3/ Between Perceived Information Asymmetry and Slack, controlling for Pressure not to Misrepresent and Type of Budget System	.37 (p = .002)

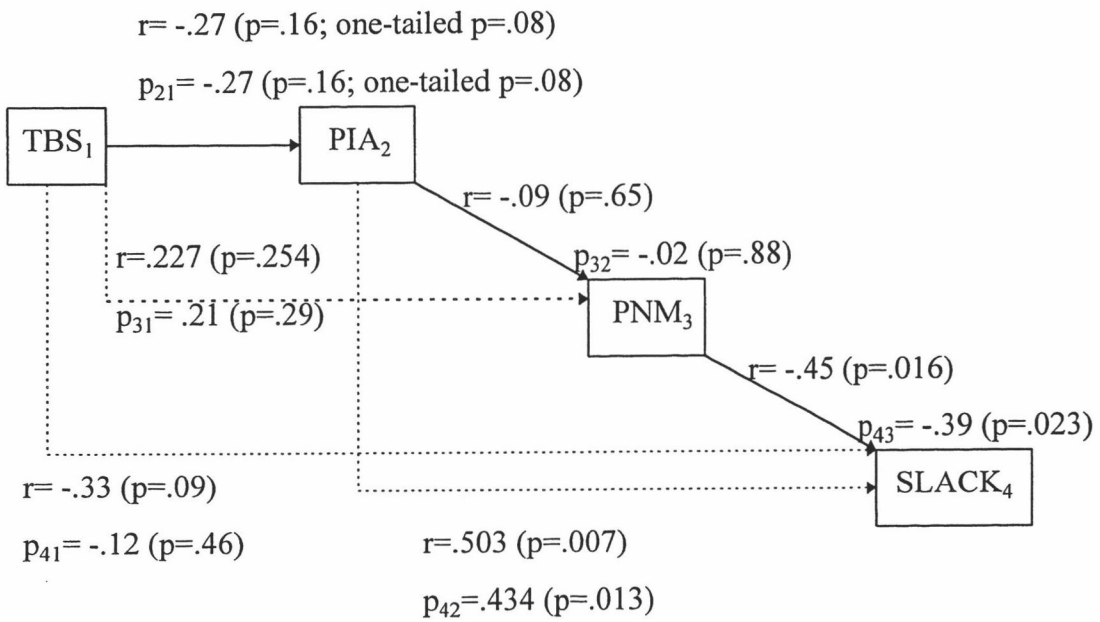
The correlation analysis on the solid lines confirms the hypotheses: all the correlations are in the right direction and significant. However, the analysis suggests that an arrow should be included between PIA and Slack. Simon-Blalock confirms this arrow: when the influences of PNM and TBS are controlled, PIA is still correlated with Slack. Finally, path p_{42} is substantial and significant, arguing again for the inclusion of the path. Simon-Blalock and Path Analysis also suggest that an arrow should be included between TBS and Slack, but the direction of the effect is opposite to the hypothesized one. Therefore, this arrow is not included (the data should not dictate the theory); it will be shown that this direct effect

disappears anyway when the interaction with Risk Attitude is taken into account. Overall, the data fits the theory reasonably well: the solid paths are significant and/or substantial, path p_{31} is not substantial nor significant, and path p_{41} can be omitted based on theory. Path p_{42} between PIA and Slack should be included though.

11.1.1 Model 1 - Non-Risk Averse subjects

For the non-risk averse subjects (n = 27) the correlations and paths look as in Figure 32.

Figure 32: Model 1 - Non-Risk Averse Subjects



The partial correlations used in Simon-Blalock technique are shown in Figure 33.

Figure 33: Partial Correlations of Omitted Linkages (Model 1 - Non-Risk Averse Subjects)

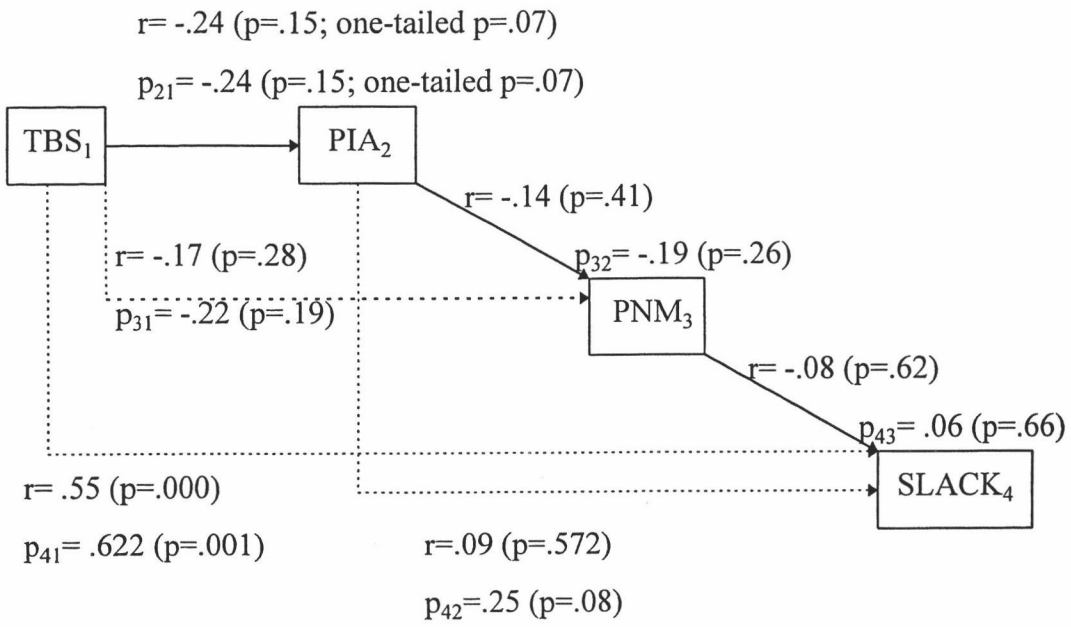
1/ Between Budget System and Pressure not to Misrepresent controlling for Perceived Information Asymmetry.	.21 (p = .3)
2/ Between Budget System and Slack, controlling for Perceived Information Asymmetry and Pressure not to Misrepresent.	.15 (p = .46)
3/ Between Perceived Information Asymmetry and Slack, controlling for Pressure not to Misrepresent and Type of Budget System	.48 (p = .006)

The correlation analysis on the solid lines shows correlations in the hypothesized directions, but not always significant. In some cases this may be attributed to the decreased sample size (n = 27), which reduces power. Furthermore, the p-values should be halved since the tests are one-tailed. This makes the correlation tests satisfactory, except for the relationship between PIA and PNM. It should be added though that a multiple regression of TBS, PIA, and PNM on Slack performs better when PNM is included than when it is omitted (with PNM: F = 5.97, p = .003, Multiple R = .66, R^2 = .43; without PNM: F = 4.9, p = .015, Multiple R = .54, R^2 = .29). The correlation analyses also suggest that a linkage should be included between PIA and Slack, just like in the global analysis. This is also confirmed by Simon-Blalock. Both Simon-Blalock and Path Analysis indicate that no link should be included between TBS and Slack, meaning that all effects on slack, for non-risk averse people, go through the intervening variables PIA and PNM. Also there is no path between TBS and PNM, which again confirms the theory. According to these analyses the data fits the theory reasonably well (taking into account the loss of power from reduced sample size). Most effects follow the arrows in the model, provided that an arrow is included between PIA and Slack.

11.1.2 Model 1 - Risk Averse Subjects

For the risk averse subjects (n = 38) the correlations and paths look as in Figure 34.

Figure 34: Model 1 - Risk Averse Subjects



The partial correlation analysis used in Simon-Blalock are shown in Figure 35.

Figure 35: Partial Correlations of Omitted Linkages (Model 1 - Risk Averse Subjects)

1/ Between Budget System and Pressure not to Misrepresent controlling for Perceived Information Asymmetry.	-.21 (p = .19)
2/ Between Budget System and Slack, controlling for Perceived Information Asymmetry and Pressure not to Misrepresent.	.59 (p = .000)
3/ Between Perceived Information Asymmetry and Slack, controlling for Pressure not to Misrepresent and Type of Budget System	.08 (p = .62)

These analyses basically confirm the findings of the ANOVA tests: it seems like risk averse people will create more slack in the activity-based setting than in the unit-based one (the sign of the path coefficient p_{41} is positive), and this effect does not seem to go through PIA or PNM. It may be that an intervening variable on the path between TBS and Slack is perceived uncertainty, signifying that risk averse people feel more uncertainty in activity-based budgeting than in unit-based budgeting. This would explain the positive sign of p_{41}. Path p_{42} suggests that there is some effect from PIA to Slack, in the hypothesized directions, but apparently this effect is completely offset by the TBS. Risk Averse subjects do feel that

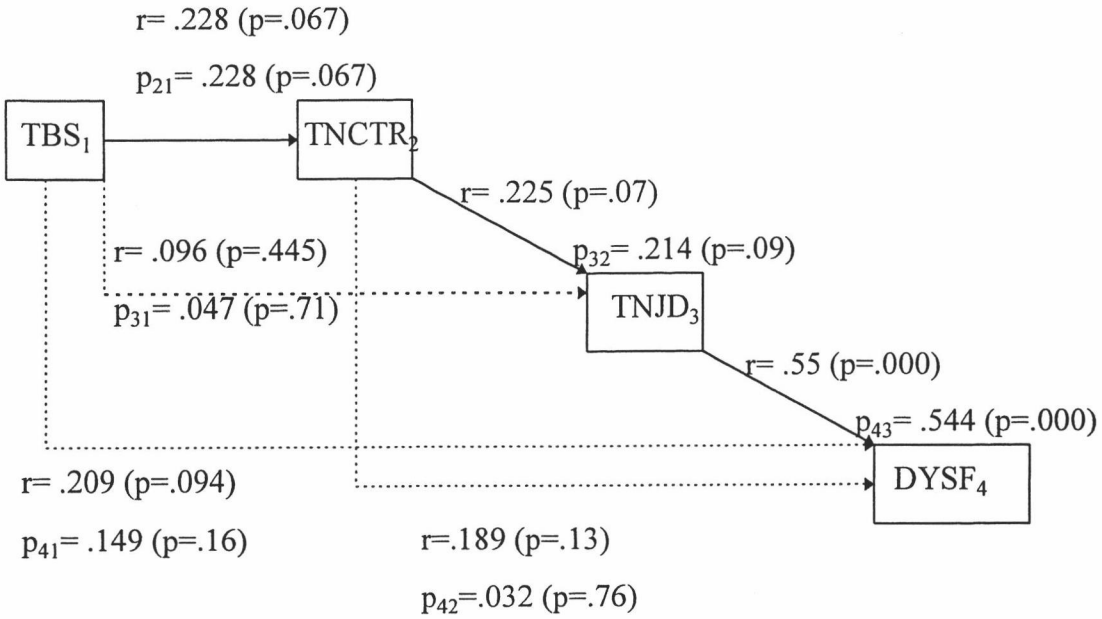
the superior is well-informed in the activity-based budget (path p_{21}), and the more information symmetry they perceive the less slack they will create (path p_{42}). In this sense the general theory holds. Apperently, however, there is an other effect coming from the budget system that has an opposite and bigger impact on slack (path p_{41}). This effect may be due to increased uncertainty perceived in the activity-based setting.

Summarizing the findings for Model 1, one can say that the Global Model performs reasonably well when an arrow is included between PIA and Slack. There is a problem with the link between TBS and Slack, but this is due to the interaction with Risk Attitude. This link disappears, as was hypothesized, for Non-Risk Averse subjects. For those people the data almost perfectly fits the model (considering the loss of power from reduced sample size). For Risk Averse people, on the other hand, the data doesn't support the model, a finding that is similar to the results of the ANOVA tests. For those subjects other variables (e.g. perceived uncertainty) may improve the predictive performance of the model.

11.2 Model 2 - Global Analysis

Figure 36 presents this part of the model with the observed correlations, path coefficients, and significance levels (two-tailed). A solid line is drawn for a hypothesized path, and a dotted line for the paths that were assumed to be zero. The following abbreviations were used: TBS (Type of Budget System), TNCTR (Tension from reduced Control), TNJD (Tension from reduced control and Job Difficulty), and DYSF (Dysfunctional Behavior).

Figure 36: Model 2 - Global Analysis



The partial correlations used in the Simon-Blalock technique are presented in Figure 37.

Figure 37: Partial Correlations of Omitted Linkages (Model 2 - Global Analysis)

4/ Between Budget System and Dysfunctional Behavior, controlling for Tension from reduced Job Control, and Tension from reduced Job Control and high Job Difficulty	.17 (p = .165)
5/ Between Budget System and Tension from reduced Job Control and high Job Difficulty, controlling for Tension from reduced Job Control.	.04 (p = .711)
6/ Between Tension from Reduced Job Control and Dysfunctional Behavior, controlling for Tension from Reduced Control and high Job Difficulty, and Budget System	.038 (p = .766)

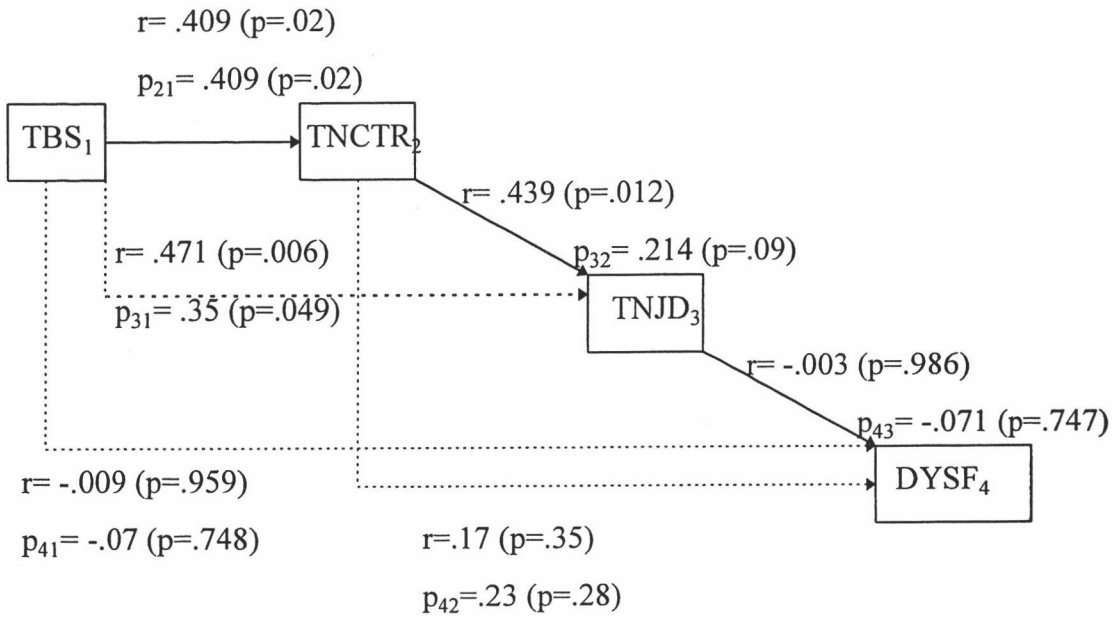
The correlation analysis on the solid lines confirms all the hypotheses: all the correlations are in the right direction and significant. On the dotted lines the correlations are not significant, except marginally for TBS-DYSF. Simon-Blalock and Path Analysis, however, indicate that no paths should be included other than the solid lines. Only the hypothesized paths are substantial and significant, confirming the theory perfectly. Overall, the tension variable is a relevant mechanism intervening between TBS and DYSF. People in the activity-based setting have a feeling of reduced job control, which gives them tension.

When this tension combines with tension from job difficulty they will feel a need for dysfunctional behavior. In this global model all the effects follow the solid paths, as was predicted in the theory. For reasons of completeness I have split this global analysis just like I did in Model 1. This time the interaction was with Job Difficulty. It should be kept in mind that in the following analyses power is reduced because of smaller sample sizes.

11.2.1 Model 2 - High Job Difficulty

For the subjects who received a more difficult mix on the actual production (n = 32) the correlations and paths look as in Figure 38.

Figure 38: Model 2 - High Job Difficulty



The partial correlations used in Simon-Blalock are shown in Figure 39.

Figure 39: Partial Correlations of Omitted Linkages (Model 2 - High Job Difficulty)

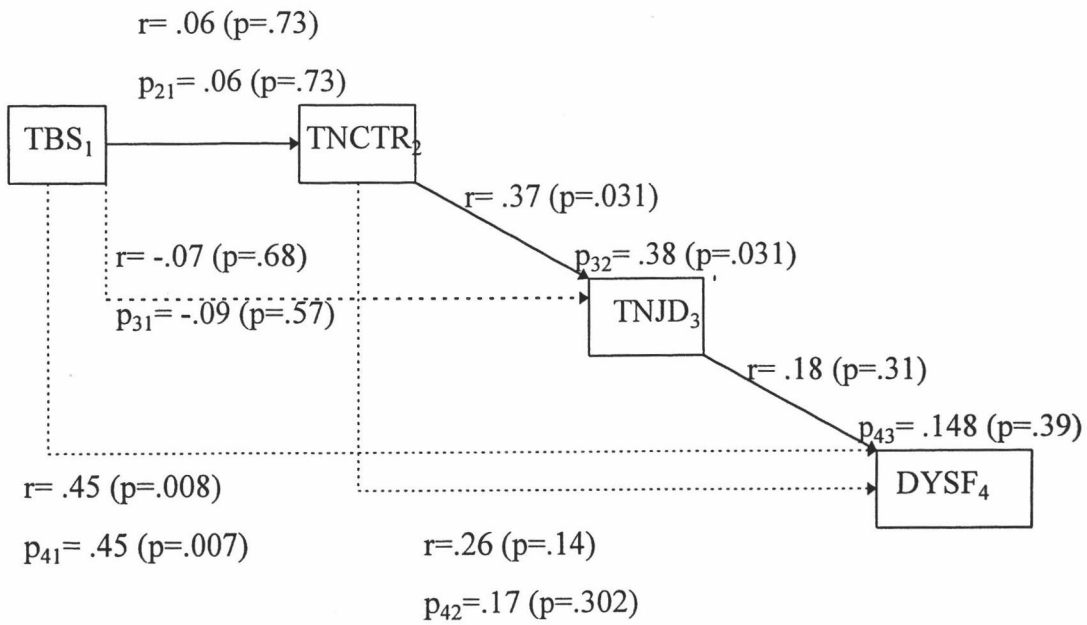
4/ Between Budget System and Dysfunctional Behavior, controlling for Tension from reduced Job Control, and Tension from reduced Job Control and high Job Difficulty	-.061 (p = .748)
5/ Between Budget System and Tension from reduced Job Control and high Job Difficulty, controlling for Tension from reduced Job Control.	.35 (p = .049)
6/ Between Tension from Reduced Job Control and Dysfunctional Behavior, controlling for Tension from Reduced Control and high Job Difficulty, and Budget System	.20 (p = .28)

These analyses confirm the solid paths from TBS through TNCTR to TNJD; however that path doesn't lead to DYSF (p_{43} = -.071). People in the activity-based setting did feel more tension from reduced job control (path p_{21}), as was predicted by the theory. Also they felt more tension from reduced job control and high job difficulty (both paths p_{31} and p_{32}). The effect on DYSF seems to go through TNCTR and then to DYSF (the insignificance of the path p_{42} may be attributed to the reduced sample size). All the effects are in the hypothesized direction and compatible with the ANOVA tests. The general theory continues to hold: in the activity-based setting people feel more tension which will ultimately lead to more dysfunctional behavior. The path analysis is less clear than in the global analysis, but the results do not fundamentally contradict the theory.

11.2.2 Model 2 - Low Job Difficulty

For the subjects who received an easier mix on the actual production the correlations and path coefficients look as in Figure 40.

Figure 40: Model 2 - Low Job Difficulty



The partial correlations used in Simon-Blalock are shown in Figure 41.

Figure 41: Partial Correlations of Omitted Linkages (Model 2 - Low Job Difficulty)

4/ Between Budget System and Dysfunctional Behavior, controlling for Tension from reduced Job Control, and Tension from reduced Job Control and high Job Difficulty	.46 (p = .008)
5/ Between Budget System and Tension from reduced Job Control and high Job Difficulty, controlling for Tension from reduced Job Control.	-.104 (p = .57)
6/ Between Tension from Reduced Job Control and Dysfunctional Behavior, controlling for Tension from Reduced Control and high Job Difficulty, and Budget System	.19 (p = .303)

The data in this model suggest that the effect of TBS on DYSF did not go through the hypothesized lines, but rather goes directly from TBS to DYSF. The effect means that people with low job difficulty in the activity-based setting feel more need for dysfunctional behavior than people with the same job difficulty in the unit-based setting. This effect was predicted, and is similar to the results from the ANOVA tests. The results confirm that the effect on dysfunctional behavior can be safely attributed to the type of budget system, and not to the

job difficulty. However, the data for these people does not really confirm the causal paths as they were hypothesized in the theory, even though for Model 2 as a whole the data fit the theory perfectly well.

Overall, I believe that the results from the ANOVA tests in conjunction with the Path Analyses provide sufficient support for the theory. In terms of the outcome variable Slack the effect of the budget system is as predicted for non-risk averse subjects. In model 1 the role of the intervening variables Perceived Information Asymmetry and Pressure not to Misrepresent was confirmed for all subjects. When Risk Attitude was controlled, the model performed best with non-risk averse subjects. In terms of outcome variable Dysfunctional Behavior the effect of the budget system is as predicted for all subjects. In model 2 the role of the tension variables was confirmed averaging over different levels of Job Difficulty (Model 2 - Global Analysis). When Job Difficulty was controlled, the model performed best with high Job Difficulty. The results of the path analyses should be interpreted carefully, especially in the light of the assumptions of the technique (e.g. absence of measurement error). In the next chapter I will formulate the general conclusions of the research.

CHAPTER 10: GENERAL CONCLUSIONS

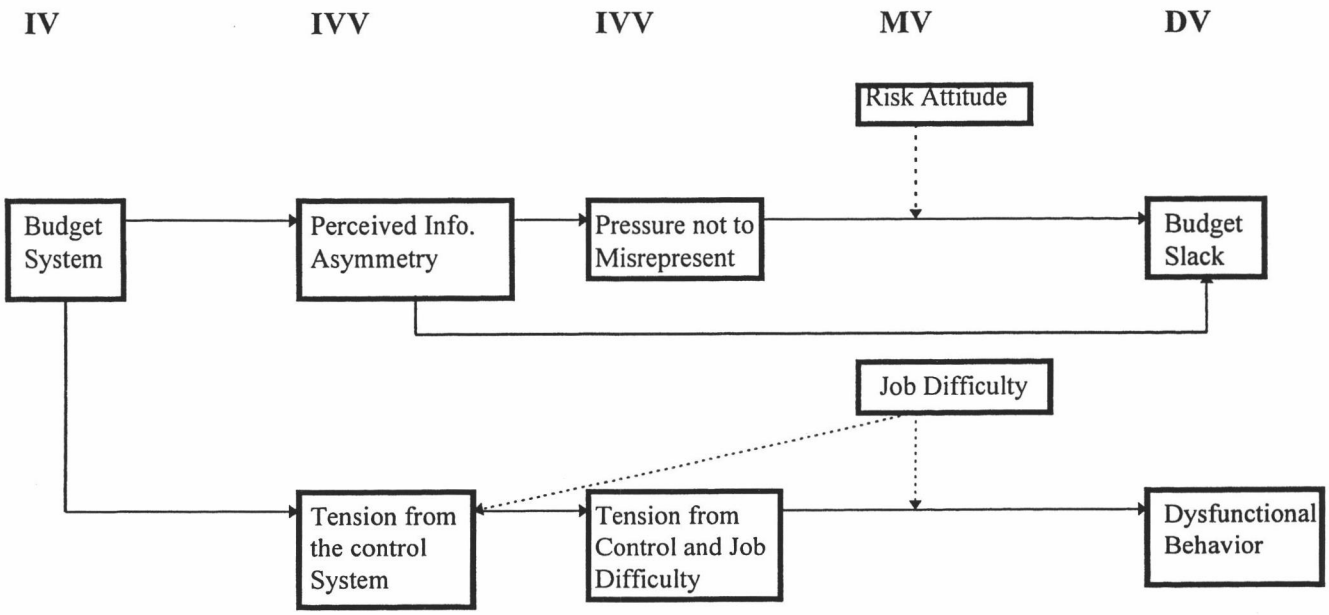
1 Introduction

The objective of this research was to study the behavioral effects of activity-based budgeting, specifically on slack creation and related dysfunctional behaviors. Following a research process outlined by Simon (1978) and Kinney (1986) a theory was developed based on the general relationships among variables described in the traditional budgeting literature. The academic relevance of the theory is that it contributes both to the budgeting literature and to the literature on activity-based costing and -management, two streams of literature that have evolved separately and independently. The theory contributes to the budgeting literature by extending it to budgeting with activity-based cost information, and by improving our understanding of the construct of information asymmetry. Also it contributes to the literature of activity-based costing and -management by applying a rigorous theoretical model of budget control to activity-based budgeting. Several tests and experiments were designed to test the hypotheses specified in the theory. The conclusions and the implications will be summarized below.

2 The theory

The theory that was developed and tested in this study is represented in the following model (Figure 42). The individual linkages in this model have been tested with Factorial ANOVA, and the strength of the causal paths has been assessed with Path Analysis. Five of the six hypotheses have been confirmed, and for the other hypothesis correlation analysis confirmed the expectations. The results from the Path Analysis generally confirm the linkages between the variables. In the global analyses the data fit the theory reasonably well, and when only Non-Risk Averse subjects were considered the fit was even better. In the bottom part of the model the data fit best in the global analysis (not controlling for Job Difficulty).

Figure 42: Model of Behavioral Effects of Activity-based Budgeting



IV: Independent variable
IVV: Intervening variable
MV: Moderating variable
DV: Dependent variable
——→ : Direct Effect
- - - - - → : Interaction Effect

This theory can be formulated as follows:

1/ The use of activity-based information in budgeting reduces perceived information asymmetry between the superior and the subordinate. Both the detail of these systems and the fact that they are usually more correct than traditional unit-based information systems account for this changed perception of information asymmetry. The activity analysis preceding the implementation of activity-based costing, and the focus on continuous improvement in the activity-based management process make that the superior is well-informed about the potential capacities of the subordinates. In the participative budget meeting this causes a pressure felt by the subordinate not to misrepresent his potential to the superior; the higher the perception of information asymmetry reduction the higher the pressure not to misrepresent one's potential. Subsequently, subordinates will introduce less budget slack in the activity-based budget, especially when they are non-risk averse; that is, they will set their budget suggestion

higher than they would have done in a unit-based budget. Risk averse subjects, on the other hand, will continue to create slack in the activity-based budget, possibly even more than in the unit-based one.

2/ Because of the superior's increased knowledge of the subordinate's work environment, the latter experiences a feeling of reduced job control which leads to increased job tension. When this feeling of reduced job control is combined with high job difficulty, the subordinate feels more job tension in the activity-based setting than in the unit-based one. This will ultimately lead to a higher need for dysfunctional behaviors (other than slack creation) in the activity-based setting, as compared to the unit-based one.

3 Assumptions

This theory assumes a participative budget meeting that does not completely mitigate the subordinate's need to negotiate a safe budget. The subordinate is self-interested, work-averse, behaves rationally, and has certain risk attitudes. The superior's leadership style is budget constrained, characterized by high budget emphasis. In line with the philosophy of activity-based management, the superior is seeking continuous improvement. His activity-based information system is detailed, reliable and accurate, and the standards with which the system works are sharp but attainable. The subordinate commits to the budget objective; his pay is dependent on budget achievement. The environment is characterized by uncertainty.

These conditions limit the range to which the findings are generalizable. However, the assumptions should not be interpreted more restrictive than needed. In fact, some assumptions, probably, may be loosened a bit.

1/ First of all, the pay scheme does not have to be exactly the same as in the experiments. The pay scheme was designed the way it was to limit the possibility of setting a very low budget that would always be achieved and collecting bonuses for overachieving the understated budget. In the real world it may be assumed that the subordinate will not grossly underestimate his potential because of social pressure and comparisons with peers. In other words, while in the experiments it was necessary to limit the range of plausible budget levels by the pay scheme, in the real world this may be accomplished by other (e.g. social) mechanisms.

2/ Secondly, in the real world it may not be essential that one commits to the budget level even when the actual situation is more difficult than the expected one. For example, when peers are compared relative to each other there will always be a pressure to perform maximally, even when the budget is flexibly adapted to the changed situation. In that case, people in the activity-based context will continue to feel tension from reduced job control which they will try to mitigate by engaging in other types of dysfunctional behaviors.

3/ Thirdly, the leadership style may be loosened a bit; the superior may tolerate a couple of budget underachievements in the short run, but in the long run underachievements will not transmit a positive idea about the subordinate. So, even when the superior's leadership style is not heavily budget-constrained in the short run, the subordinate may feel that in the long run he is still better off by negotiating an achievable budget.

4/ Finally, the assumptions about the subordinate's work averseness may be loosened. For example, motivational factors may cause the subordinate to set a hard budget level. It can be argued, however, that this would only imply a transformation of the effort scale as compared to a lower level of intrinsic motivation, and that this would not fundamentally alter the conclusions. In other words, it is not necessary for the agents to be lazy in order to see the problem of "moral hazard" (of which slack creation is an example) occur (Milgrom & Roberts, 1992).

4 Limitations

There are several limitations to the study, though. First of all, all the limitations of lab experiments apply. Even though attempts have been made to overcome most of the shortcomings of experimental research, one can never exclude potential distortions coming from the artificiality of the lab. The lab's artificiality is its biggest advantage (in terms of control), but at the same time it is its major weakness. This should not mean, however, that the lab experiments per definition are weak on external validity. Generalization of the results should be done within the scope conditions specified above. Secondly, also problems of internal validity may continue to exist in the experiments. Although the subjects were generally very motivated and perceived the experimental settings as meaningful (experimental realism), it remains possible that some subjects behaved in a way to satisfy the researcher's

expectations. No evidence of this phenomenon has been found (for example, the subjects did not know the objectives of the experiments, as was confirmed in the check-out questions), but the possibility remains. Finally, other variables omitted from the model could account for the incidence of slack and dysfunctional behavior (for example some personality variables). While I acknowledge this problem, my reading of the literature led me to develop the model with the variables that seemed to account in various ways for slack creation and related dysfunctional behaviors.

5 Managerial implications

The implications of the study for management accountants, controllers, and those responsible for management information systems, are first of all that the installation of an activity-based information system will change the information relations in an organization. An information transfer will take place between subordinates and superiors (assisted by the accounting staff). And since control of information is an important source of power in an organization (particularly in a budgeting situation), it follows that activity-based systems cause a power transfer from the subordinate to the superior. The good side of this, from the organizational point of view, is that slack creation is likely to decrease because of the superior's increased possibility to detect it and the subordinate's feeling of a pressure not to misrepresent his potential; this will lead to a more efficient use of resources. The bad side, however, is that the subordinate will try to regain control over his environment (and his pay) by engaging in other types of dysfunctional behavior (e.g. quality reduction). It is possible that good management can avoid these countereffects by motivating the employees and accomplishing more worker involvement in decision making and control. On the other hand, if the assumption of people's self-interest are correct, there are limits to the degree of control subordinates are willing to give up in an uncertain world.

With these insights managers should approach the adoption of activity-based information system less as a technical change process, but more as a total change process affecting people in various ways. A concern for the behavioral reactions to changes in management accounting and control systems is at the heart of behavioral accounting research and the subjectivist approach to research in the social sciences. This concern, however, is

often neglected in mainstream accounting research (Bhimani, 1993), which is usually very technically oriented. The literature on activity-based information is no exception on this rule. It may be that the overemphasis on the technical aspects of ABC accounts for the many problems encountered in ABC and ABM implementations (Cooper, Kaplan et al., 1992; Waeytens & Bruggeman, 1994). My research may shed more light on these problems by providing a theoretical explanation of the behavioral implications of activity-based information and its use in budgeting.

At the same time this study is relevant as a theory-based test of the effectiveness of activity-based information in budgeting. It has been demonstrated that activity-based budgeting reduces budget slack with non-risk averse subordinates. It is the first time that the effectiveness of activity-based budgeting has been tested, based on theory. This answers a call for more research on the effectiveness of new cost management methods (such as activity-based budgeting) by Young & Selto (1991), and may increase the credibility of the technique to practitioners.

6 Academic contribution

This study is one of the first to test the effectiveness of activity-based information in budgeting, using lab experiments. To management accounting researchers this may be interesting because of its content, while experimenters in general may be more interested in the experimental design and procedures. With sufficient imagination and creativity from the part of the researcher, lab experiments have high potential for testing causal theories in management. It was found crucial, however, that the right incentives could be given to the subjects, so as to stimulate motivation and to increase experimental realism. Also it is essential that the experimental procedures are rigorously prepared. Contentwise the experiments had a number of features that distinguished them from previous experimental research in management accounting and control. It was the first time that information asymmetry was manipulated between conditions by using a real information system developed in prior tests. Most experiments that used this mechanism of information asymmetry reduction *assumed* that an information system existed in the symmetry condition by letting the superior simply observe the subjects' performance on the pre-test. By using a

real information system in my experiments I was able to detect two dimensions of the information asymmetry construct: the detail of the information ("How much information does the superior have?") versus the correctness (or realism, accuracy) of the information ("How correct is his information? How well does it reflect reality?). The manipulation in my experiments basically was one of detailed versus aggregate information, and thus only the first dimension of information asymmetry differed between the groups. Another feature of the experiments was that they used a contextual measure of risk attitude. Selto & Cooper (1990) have argued that contextual measures can be expected to predict better than lottery-based measures. In my experiments the contextual measure indeed predicted slightly better than the lottery-based one. Finally, for management accounting researchers the experiments may be interesting because they contribute both to the budgeting literature and to the cost management literature. The first stream of literature has a long theoretical tradition but lacks insight from newly developed information and control systems such as activity-based costing. The second stream of literature is very much oriented towards practitioners and lacks theoretical rigor. It is hoped that my research can be a bridge between these streams of literature, and will stimulate more theory-based research in modern cost management and control.

7 Directions for further research

A number of studies may be undertaken to extend the findings of this research.

1/ Firstly, a new (set of) lab experiment(s) will be designed to study the possibility that people in activity-based budgeting have a perception of increased subjective uncertainty when they are faced with all the factors (cost drivers) that may be influenced by uncertainty. This possibility was only found for risk averse subjects. Therefore, in the experiment designed to study this phenomenon all subjects could be induced to behave risk aversely. The number of cost drivers may be varied from one condition to another, hypothesizing that perceived subjective uncertainty may be higher when more cost drivers are subject to uncertainty. A measurement scale would have to be developed for this variable of perceived subjective uncertainty. In this experiment it would not be necessary to let the subjects produce the actual mix after the budget setting; the experiment could be ended just after the budget setting.

2/ More research needs to be done on the construct of information asymmetry. This study identified at least two dimensions of information asymmetry that account for effects on slack, but there may be more. Also it is not clear which dimensions are important for which variables. For example, how detailed should the information system be in order to influence perceived information asymmetry? What type of information should be captured by the information system? How frequently should the information be updated in order to sustain the effect on slack?

3/ In field research, the features of different types of information systems (activity-based or not) and their effect on information asymmetry and other variables of interest could be studied. For example, are all non-activity-based systems characterized by more information asymmetry? If not, what are their characteristics that affect information asymmetry?

4/ Descriptive studies could focus on the degree to which companies have implemented activity-based systems (or other management accounting information systems) in Belgium, and what they are doing with it. Linking adoption rate to variables such as company size, sector, degree of competition, etc... could identify the types of companies that are most likely to benefit from activity-based applications.

5/ Case study research could focus on the budgeting process, and on how slack is introduced in these processes. Are companies aware of this problem? What do they do about it? Are they willing to accept some degree of slack? Why? Have superiors good procedures to estimate the true potential of subordinate managers (e.g. division managers)? How do superiors learn about subordinates' potential based on previous periods? How much flexibility is allowed in the budget? Are budgets adjusted to changing situations? Is the controllability principle applied? If not, why? Is there a difference in budget use between Belgian companies and subsidiaries from foreign companies?

6/ How and why is slack introduced in budgets in government organizations? How big a problem is information asymmetry in those organizations? How do attitudes towards the budget change after reorganizing and divisionalizing government organizations in responsibility centers? How does that affect budget slack? Job satisfaction? Job tension? Dysfunctional behavior?

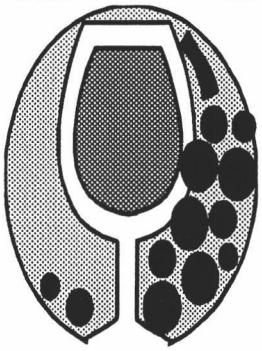
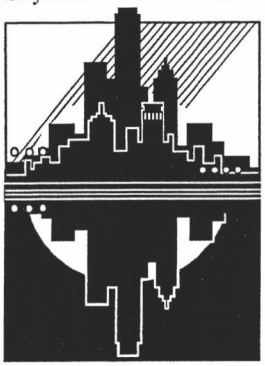
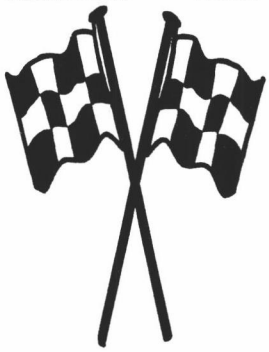
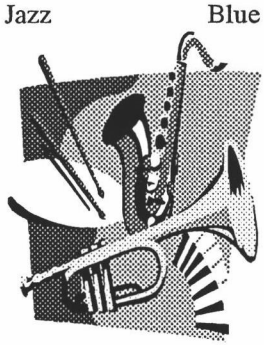
The opportunities for research in the area of budgeting, information asymmetry and slack are numerous. It would be interesting to design a whole research program around this topic. This dissertation, in any case, was the first step in this research program.

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Appendix 1: Categories and Logos - Task 1

PARTY	WILDLIFE	TRAVEL	SPORTS
Greenglow	Orange	Redglow	Yellow
Wine Blue	Elephant White	Skyline White	Golf Red
			
Hats Blue	Horse Red	Luggage White	Motorcross White
			
Dancers Blue	Bear Green	Continent White	Sports Red
			
Jazz Blue	Bull Green	Jet White	Tennis White
			

Appendix 2: Production Schedule 1 (Medium Complexity)

1	Wine	Hats	Dancers	Jazz		1	1	2
2	Luggage	Continent	Jet	Skyline		1	1	2
3	Elephant	Motorcross	Continent	Wine		4	2	6
4	Elephant	Horse	Bull	Bear		1	3	4
5	Sports	Continent	Bear	Hats		4	4	8
6	Skyline	Elephant	Wine	Tennis		4	2	6
7	Bear	Bull	Elephant	Horse		1	3	4
8	Golf	Luggage	Bear	Dancers		4	4	8
9	Dancers	Wine	Jazz	Hats		1	1	2
10	Dancers	Bull	Jet	Sports		4	4	8
11	Continent	Luggage	Skyline	Jet		1	1	2
12	Bull	Jet	Golf	Dancers		4	4	8
13	Wine	Dancers	Hats	Jazz		1	1	2
14	Bull	Jet	Golf	Hats		4	4	8
15	Continent	Sports	Bear	Hats		4	4	8
16	Hats	Wine	Dancers	Jazz		1	1	2
17	Sports	Continent	Bear	Dancers		4	4	8
18	Jazz	Dancers	Hats	Wine		1	1	2
19	Luggage	Continent	Jet	Skyline		1	1	2
20	Skyline	Elephant	Wine	Tennis		4	2	6

Appendix 2: Production Schedule 2 (High Complexity)

1	Wine				Hats				Dancers				Jazz				1	1	2
2		Bull				Jet				Golf				Hats			4	4	8
3	Sports				Continent				Bear				Hats				4	4	8
4		Golf				Hats				Jet				Bull			4	4	8
5	Sports				Luggage				Bull				Wine				4	4	8
6		Hats				Bull				Jet				Golf			4	4	8
7	Golf				Skyline				Bear				Jazz				4	4	8
8		Bull				Jet				Golf				Hats			4	4	8
9	Dancers				Sports				Bull				Jet				4	4	8
10		Hats				Bull				Jet				Sports			4	4	8
11	Golf				Luggage				Bear				Dancers				4	4	8
12		Horse				Bull				Elephant				Bear			1	3	4
13	Sports				Continent				Bear				Hats				4	4	8
14		Horse				Bull				Elephant				Bear			1	3	4
15	Sports				Continent				Bear				Hats				4	4	8
16		Hats				Wine				Dancers				Jazz			1	1	2
17	Sports				Continent				Bear				Hats				4	4	8
18		Jazz				Dancers				Hats				Wine			1	1	2
19	Hats				Bull				Jet				Sports				4	4	8
20		Skyline				Elephant				Wine				Tennis			4	2	6

Appendix 2: Production Schedule 3 (Low Complexity)

1	Wine	Hats	Dancers	Jazz		1	1	2
2	Luggage	Continent	Jet	Skyline		1	1	2
3	Elephant	Motorcross	Continent	Wine		4	2	6
4	Wine	Hats	Dancers	Jazz		1	1	2
5	Golf	Luggage	Bull	Dancers		4	4	8
6	Jet	Luggage	Skyline	Continent		1	1	2
7	Bear	Bull	Elephant	Horse		1	3	4
8	Skyline	Jet	Luggage	Continent		1	1	2
9	Dancers	Wine	Jazz	Hats		1	1	2
10	Skyline	Elephant	Tennis	Wine		4	2	6
11	Continent	Luggage	Skyline	Jet		1	1	2
12	Luggage	Skyline	Jet	Continent		1	1	2
13	Wine	Dancers	Hats	Jazz		1	1	2
14	Horse	Bull	Elephant	Bear		1	3	4
15	Continent	Jet	Luggage	Skyline		1	1	2
16	Hats	Wine	Dancers	Jazz		1	1	2
17	Sports	Continent	Bear	Hats		4	4	8
18	Golf	Luggage	Bear	Dancers		4	4	8
19	Skyline	Elephant	Wine	Tennis		4	2	6
20	Skyline	Elephant	Wine	Tennis		4	2	6

Appendix 3: Informed Consent Form

Informed Consent Form for a test of an experimental task

You are being invited to participate in a test conducted by Dominique Waeytens, a graduate student in the University of Colorado's Department of Accounting and Information Systems. This project is conducted under the direction of Professor Frank Selto, Business 486, Campus Box 419, Phone 492-1549. Dominique Waeytens can be reached on the same address, or at home (303) 447-2328.

You are invited to participate in a test of an experimental task. You will be asked to produce different types of "catalogs" according to specifications on a production list. The objective of the test is, among other things to assess standard times for specific activities within the task. The whole process will take about 1.5 hours of your time.

We will ask you to come to room 301 in the business building, on Friday September 30, at 2:30 PM. Please come early, so that we can start on time.

There are no specific risks associated with this study. You will be paid a fixed wage of $12. Additionally you have the chance to earn bonuses. A softdrink will be provided during a short break.

If you have decided to participate in this project, please understand that your participation is voluntary and you have the right to withdraw your consent or discontinue participation at any time. You have the right to refuse to answer any question(s) for any reason.

In addition, your individual privacy will be maintained in all published and written data resulting from this study. Your name will only serve administrative purposes, no experimental purposes. Your name will not be used in any final research document. No use will be made of audio and/or video tape-recording.

If you have questions regarding your rights as a subject, any concerns regarding this project or any dissatisfaction with any aspect of the study, you may report them to -- confidentially, if you whish -- the Executive Secretary, Human Research Committee, Graduate School, Campus Box 26, Regent 308, University of Colorado-Boulder, Boulder, CO 80309-0026 or by telephone to (303) 492-7401. Copies of the University of Colorado Assurance of Compliance to the federal government regarding human subject research are available upon request from the Graduate School address listed above.

A signed copy of this consent form will be provided to you before the day of the test.

I understand the above information and voluntary consent to participate in this project.

Signature of Subject Date

Appendix 4: Procedures Test 1

Procedure	Logistics	Text	Duration
1. Welcome and random assignment of subjects to two groups.	One room is needed (301). Students belonging to group 1 will take place on the first rows; students from group 2 take place on the back rows. All seats will show a number (1-30). I will have a list with 30 numbers (1-30) in random order. Subjects, showing up one by one, are assigned to a seat (and thus to a group). Assistants lead the subjects to their place. All material will be installed in advance. I will lead the experiment. Lieve is administrator and treasurer. Four assistants assume the roles of material providers and "operations controllers". Assistants lead the subjects to their place. Each assistant takes care of 7-8 subjects.		
2. Demonstration of the experimental task and practice session.	I will explain and demonstrate task MATERIAL: 2 staplers per subject; 1 pile of envelopes per subject; 1 box per subject; 1 plastic sheet with cards and labels per subject. ASSISTANTS: during test, please prepare a stapler to replace the used one; at end of test, change used stapler; assist with removing sheet and labels, and with placing new one*; empty box; renew envelopes SCHEDULES: subjects have the first part of a "handbook" with all the catalogs & schedules to produce in the practice session. * All sheets will be sitting on the chair next to the subjects. Subjects will be asked to renew the sheets themselves. Please assist in case of problems.	Thanks for showing up today to participate in this test of an experimental task. Each experiment needs a task, just like every job in an organization. Since we couldn't bring machines to this room, we have designed a task that could exist in the real world. Today we will test several aspects of this task. First we will let you practice with the task, so that you can get acquainted with it, and then we will assess average performance, standard times, etc.... The task is to make different types of catalogs. In front of you, you see a plastic sheet with all kinds of cards in it. A catalog is a collection of 4 of those cards, stapled together with one staple. You should take the cards in the order appearing on your list. SHOW: Travel catalog. SUBJECTS MAKE: Skyline, Luggage, Continent, Jet + Wine, Hats, Jazz, Dancers. (Remark that in case of stapler problems, subjects can take another one.) You just made a catalog from the Travel-line and one from the Party-line. Every catalog should be put in an envelope, and the envelope should be labeled so that you know what kind of catalog is inside. On the envelope you see a column marked "Type" and one marked "Colors".	30 minutes

		The labels to stick in the "Type" column are those on top of the plastic sheet; the labels to put in the "Colors" column are those down on the sheet. For example the Travel catalog you just made, needs a RedGlow label in the "Type" column, and one white label in the "Colors" column (because all the cards in the Travel catalog are white). SHOW: Envelope and Label Travel catalog. Ask to do this for both catalogs subjects just made. SUBJECTS ENVELOPE AND LABEL: Travel catalog + Party catalog. (Remark that subjects should try to keep the stapler in their hand while enveloping and labeling.) After you labeled the envelope, you put it in the box. SHOW + SUBJECTS PUT ENVELOPES IN BOX Another type of catalog our customers usually ask for is the Wildlife catalog. Please make, envelope, label, and store this catalog, as indicated in your "Handbook". SUBJECTS MAKE, ENVELOPE, LABEL, & STORE: Bull, Horse, Elephant, Bear. (4 labels) Another type of catalog takes cards from different series. For example, a catalog with Elephant, Motorcross, Continent, & Wine, needs four labels in the "Type" column (GreenGlow for Party, Orange for Wildlife, RedGlow for Wildlife, and Yellow for Sports), and two labels in the "Colors" column (white and blue). SHOW: make, envelope, label and store this catalog SUBJECTS: do the same + also Skyline, Elephant, Wine, Tennis (same type). Finally there is this type of catalog: Sports, Continent, Bear, Hats. This catalog needs 4 labels in the "Type" column, and 4 in the "Colors" column. SHOW: make, envelope, label and store this catalog SUBJECTS: do the same + also Golf, Luggage, Bear, Dancers (same type).	

		So, basically there are four types of orders, with respectively 2, 4, 6, or 8 labels. SHOW: hold example of each type Do you have questions about this task? In your "Handbook" you find a list of orders you can practice with. Please make, envelope, label and store those catalogs. Try to concentrate on speed. You can practice on this for about 10 to 15 minutes.	
3. Test A. Both groups are asked to produce catalogs according to production schedule 1. Group 1 will not be financially stimulated to show maximum effort. Group 2 will be told that the 4 best performers get a bonus of $2 (this stimulator is printed as a message on top of the production schedule for this test). Results of this test will show whether or not this pay scheme stimulates effort.	At the end of the test, subjects are asked to write their performance down in their handbook. MATERIAL: 1 plastic sheet and labels (put in place at end of 2.); checked and refilled staplers; empty box; new envelopes. ASSISTANTS: at end of this session, don't remove sheets (can be used for another test); write down each subject's performance on this test's form. Give form to Lieve. Empty box; renew envelopes; check staplers for next test. Lieve will provide the subjects with the second part of the handbooks.	For the first test we would like you to work on schedule 1 for 5 minutes. Please concentrate on speed, and make as much orders as possible. Only completely finished orders, stored in the box will count. Consider the message on top of the production schedule. (For group 1, this message is to produce as much orders as possible; for group 2 it is that the four best performers of group 2 will get a bonus of $2). (At the end:) Please write down your performance in your handbook.	5 minutes
4. Test B. Both groups are asked to produce catalogs according to a variant of production schedule 1, with the same complexity. Group 1 will be told that the 4 best performers get a bonus of $2. Subjects in group 2 will be challenged to beat their own	MATERIAL: 1 plastic sheet and labels (same sheet as in 3.); checked and refilled staplers; empty box; new envelopes. ASSISTANTS: assist with removing and renewing sheets and labels; check and refill staplers; remove and renew envelopes; empty box; note performances on this test's form; give forms to Lieve.	Next we want you to work on schedule 2 for 5 minutes. Again, concentrate on speed, and make as much orders as possible. Only completely finished orders will count. Again, read the message on top of your production schedule. (In group 1 this message is that the four best performers of group 1 get a bonus of $2; in group 2 it is that everybody who beats his/her previous performance gets a bonus of $2.) (At the end:)	5 minutes

performance of the previous test. Those who succeed get a bonus of $2. Results of this test will show whether the effort-stimulating pay scheme maximizes effort. Also it will show whether or not there are still differences in ability, assuming maximum effort.		Please write down your performance in your handbook.	
5. Both groups are asked to produce catalogs according to production schedule 2 (test 5.1). Then they are asked to make the easier schedule 3 (test 5.2). These tests are performed under the effort stimulating pay-scheme. Performance on these tests will be used to evaluate the usefulness of the activity-based standards.	MATERIAL: for each test, subjects get a new sheet and labels (these will be put in place at the end of 4. and at the end of 5.1); empty box for each test; checked staplers; new envelopes for each test. ASSISTANTS: remove sheet and labels after first test and after second one; verify performances after each test; note subjects' performance on these tests' forms; give them to Lieve; empty box after each test.	(5.1) We have two more sessions before we pause. First we want you to work on schedule 3 for 5 minutes. Concentrate on speed again. The four best performers in each group will get $2 extra. (5.2) For the final test before the break, we like you to work on schedule 4 for 5 minutes. Concentrate on speed again. The four best performers in each group get $2 extra. (At the end of each test:) Please write down your performance in your handbook.	10 minutes
6. PAUSE	MATERIAL: softdrinks ASSISTANTS: provide stopwatches; provide schedules (in handbook) for next test; assist with sheets for next test (no labels); no envelopes	Next tests involve the use of stopwatches to measure the time you spend on specific activities. You only need the right button to start or stop the time, and the left button to reset the watches. SHOW: start and stop time; reset watch. SUBJECTS: start and stop time; reset watch.	Time in between tests+ pause:20 minutes
7. Test C. Group 1 makes 5 of the simplest catalogs; group 2 makes 5 of the most difficult. All subjects record their time	MATERIAL: stopwatches; schedules (in handbook); sheets (no labels; no envelopes); checked staplers. ASSISTANTS: do not remove sheets at the end; provide envelopes at the end; verify watches; note subjects' time on this test's form; give forms to Lieve.	You have received a list of catalogs to make. We want you to make these catalogs as fast as possible, and to measure your time. You start the watch at the beginning of the job (make sure to begin immediately after you've started the time), and you stop the time after completion of the 5th catalog. The 4 fastest producers in each group will get $2 extra. Note that we ask only to	5 minutes

needed to produce the catalogs with stopwatches. These times are verified by assistants. The effort-stimulating pay scheme is used.		produce the catalogs, not to envelope them or to label them. Also, do not store them in the box; just keep the catalogs wherever it is most convenient for you. At the end you don't reset the watch until after we tell you; Watches reset before our verification will not be considered for bonuses; you write your time in your handbook. You may begin when you're ready.	
8. Test D. Group 1 makes and envelopes 5 of the most difficult catalogs; group 2 makes and envelopes 5 of the simplest. All subjects record their time needed for the whole task with stopwatches. These times are verified by assistants. The effort-stimulating pay scheme is used.	MATERIAL: stopwatches; schedules (in handbook); sheets (same as in 7.); envelopes; checked staplers. ASSISTANTS: do not remove sheets at end of test; remove finished orders; provide schedule (in handbook); verify times; note subjects' time on this test's form and give it to Lieve.	Now we want you to produce and envelope the catalogs on the list. Again you will measure your time to complete the 5 orders. You start the watch at the beginning of the job, and you stop the time after enveloping the 5th catalog. The 4 fastest performers in each group will get $2 extra. Note that you don't need to label the envelopes or store them. Just keep the envelopes wherever is most convenient for you. At the end you don't reset the watch until after we tell you; Watches reset before our verification will not be considered for bonuses; you write your time in your handbook. You may begin when you're ready.	5 minutes
9. Test E. Group 1 makes, envelopes and labels 5 of the simplest catalogs; group 2 does the same for 5 of the most difficult. All subjects record their time needed for the whole task with stopwatches. This is verified by assistants. The effort-stimulating pay scheme is used.	MATERIAL: stopwatches; schedules (in handbook); same sheets and labels; checked staplers. ASSISTANTS: do not remove sheets at end of test; remove finished orders; provide next schedule; verify times; note subjects' time on this test's form, and give it to Lieve.	This time we want you to produce, envelope and label the 5 catalogs on the list. Again you will measure your time to complete the orders. Note that this time you should label the envelopes too, but don't store them. The four fastest performers in each group will get $2 extra. At the end you don't reset the watch until after we tell you; Watches reset before our verification will not be considered for bonuses; you write your time in your handbook. You may begin when you're ready.	5 minutes
10. Test F. Group 1 makes, envelopes, labels and stores 5 of the most difficult catalogs; group 2 does the same for 5 of the simplest. All subjects	MATERIAL: same sheets and labels; checked staplers; empty box; schedules (in handbook). ASSISTANTS: verify times at end of test; note subjects' time on this test's form, and give it to Lieve.	On this final test, you will make, envelope, label and store the 5 catalogs on your list. Again you will measure your time to complete the whole job. This time you do everything, including storing the envelopes in the boxes. The four fastest performers in each group get $2 extra. Don't reset the watch until after we tell you; Watches reset before our verification will not be considered for bonuses; you write your time in your	5 minutes

record their time needed for the whole task with stopwatches. This is verified by assistants. The effort-stimulating pay scheme is used.		handbook. You may begin when you're ready.	
	ASSISTANTS: distribute manipulation checks		Time in between tests:5 minutes
11. Payment of subjects: all the subjects get a fixed pay of $12 for the whole duration of the tests, plus eventually bonuses from the effort-stimulating pay scheme.			

Appendix 5: Checklist for Assistants Test 1

1. Welcome and random assignment to two groups.

Room 301 is reserved from 2 till 5 PM. We will prepare the room before the students arrive (there should be six of us to do this). We will seat 4 to 5 students per row. Subject numbers will be marked on the table. We leave a chair open left of the seat occupied by the subject. We put 4 sheets on that chair for later tests. We attach one sheet to the table in front of the chair on which the subject will take place. Left of that sheet we lay the first part of the subject's handbook and a pile of 30 envelopes. Right of the sheet we put a box. Also we provide the student with two (checked) staplers. We shoot some staples (2) to test each of the staplers (be sure there remain enough staples in the staplers). Everybody tries to prepare the rows for which he/she is responsible. Close to the location where every assistant is operating there will be a box to pile finished orders (keep them together with a rubber band; write subject number on first envelope), and a box with material (envelopes, staplers and staples, stopwatches) needed for further tests.

A table will be set just outside the room. This is where I will welcome the students, and assign them a subjectnumber (they will receive a little paper, with the number on it). Students enter the room and are guided to their places by the assistants.

2. Demonstration of experimental task and practice session.

The Beginning: All material should be in place. Everything should be ready.

Duration: 30 minutes. Assistants, please watch your students discretely from beside. Assist in case of difficulties. Prepare one new stapler per student, to replace the used one after this test.

Procedure: see table (Appendix 4)

At the end: students will be asked to change the sheet themselves. They put the old sheet under the chair next to them, and put a new sheet in place. Assistants replace the used stapler

with a new (checked) one. Also empty the boxes (keep envelopes together with a rubber band; write subject number on first envelope) and provide a new pile of envelopes. Students are asked to turn to the next page of their handbook.

3. Test A

At the beginning: All material should be in place. Everything should be ready.

Duration: 5 minutes. Assistants, please prepare a new stapler per subject and check it.

Procedure: see table (Appendix 4).

At the end: subjects are asked not to remove sheets. Provide a new (checked) stapler, empty box, and provide a new pile of envelopes. Also, note subject's performance on Form C[54], and give form to Lieve. Subjects turn to next page in their handbook. Lieve provides the subjects with the second part of the handbooks.

4. Test B

At the beginning: all material should be in place. Everything should be ready.

Duration: 5 minutes. Assistants, please prepare one new (checked) stapler per subject to replace the used one at the end of this test.

Procedure: see table (Appendix 4).

At the end: subjects are asked to remove old sheet (put under chair) and replace it with a new one. Assistants empty box, note subject's performance on FORM D, provide a new stapler and a new pile of envelopes. Please give form to Lieve. Subjects turn to next page in handbook.

[54] Forms are not included here.

5.1 Test 5.1

At the beginning: all material should be in place. Everything should be ready.

Duration: 5 minutes. Assistants please prepare a new stapler per subject.

Procedure: see table (Appendix 4).

At the end: subjects are asked to remove old sheet (put it under chair) and put a new one in place. Assistants, please empty box, note performances on FORM E1, provide new stapler and a new pile of envelopes. Give form to Lieve. Subjects turn to next page in handbook.

5.2 Test 5.2

At the beginning: All material should be in place. Everything should be ready.

Duration: 5 minutes. Assistants, please prepare a new stapler per subject.

Procedure: see table (Appendix 4).

At the end: Subjects are asked to remove old sheet (put in under chair), and place a new one. For the next test they should not unfold the labels. Assistants, please empty boxes, note performances on FORM E2, replace used stapler. Do not provide envelopes. Give form to Lieve. Subjects turn to next page in handbook.

6. PAUSE

Subjects should remain seated. Assistants, please provide softdrinks (take one yourself too). Also, provide stopwatches.

Duration: Flexible. Depends on time spent on previous tests.

Procedure: see table (Appendix 4).

At the end: Please remove empty cans, or put cans out of the way.

7. Standard Setting for Making Catalogs: Test C

At the beginning: all material should be ready.

Duration: 5 minutes. Assistants, please watch subjects using stopwatches: don't they stop it too early? Staplers should not be renewed after this test.

Procedure: see table (Appendix 4).

At the end: Subjects are asked not to remove sheets. Assistants, please note subject's time on FORM F + verify watches. Also provide envelopes for next tests. Give form to Lieve. Staplers should not be renewed. Subjects reset watches and turn attention to next test in handbook.

8. Standard Setting for Enveloping: Test D

At the beginning: all material should be ready.

Duration: 5 minutes. Staplers should not be renewed. Assistants, please watch the subjects using the stopwatch: don't they stop it too early?

Procedure: see table (Appendix 4)

At the end: Subjects should not remove sheet. Also remaining envelopes should not be removed. Used envelopes are removed. Staplers can be used again, but may be replaced if necessary. Please note subject's time on FORM G, and verify stopwatches. Subjects are

asked to reset stopwatch, and to turn attention to next test. Also subjects are asked to unfold labels. Please give form to Lieve.

9. Standard Setting for Labeling: Test E

At the beginning: all material should be ready.

Duration: 5 minutes. Assistants, please watch the subjects using the stopwatches.

Procedure: see table (Appendix 4).

At the end: Sheets should not be removed. Also unused envelopes stay in place. Used envelopes are removed. Subjects will be asked to take other stapler if necessary. Please verify watches and note time on FORM H. Give this form to Lieve. Subjects are asked to reset watches and turn attention to next test.

10. Standard Setting for Storage: Test F

At the beginning: all material should be ready.

Duration: 5 minutes. Assistants, please check use of stopwatches.

Procedure: see table (Appendix 4).

At the end: Assistants, please verify watches and note time of FORM I. Give form to Lieve. Distribute manipulation checks. Be happy, it's over.

Appendix 6: Subjects' "handbook" (part 1) for group 1 - Test 1

1. PRACTICE SESSION

* **Make** following catalogs:

No.					Types	Colors
1	Skyline	Luggage	Continent	Jet	1	1
2	Wine	Hats	Jazz	Dancers	1	1

* **Envelope** and **Label** these catalogs

* **Store** these catalogs

* **Make**, **Envelope**, **Label** and **Store** Wildlife catalog:

3	Bull	Horse	Elephant	Bear	1	3

* **Make**, **Envelope**, **Label** and **Store** following catalogs:

4	Elephant	Motorcross	Continent	Wine	4	2
5	Skyline	Elephant	Wine	Tennis	4	2

* **Make**, **Envelope**, **Label** and **Store** following catalogs:

6	Sports	Continent	Bear	Hats	4	4
7	Golf	Luggage	Bear	Dancers	4	4

* **Make**, **Envelope**, **Label** and **Store** following catalogs (**concentrate on speed**):

1	Wine	Hats	Dancers	Jazz		1	1	2
2	Continent	Luggage	Jet	Skyline		1	1	2
3	Motorcross	Elephant	Continent	Wine		4	2	6
4	Dancers	Hats	Wine	Jazz		1	1	2
5	Sports	Continent	Bear	Jazz		4	4	8
6	Jet	Luggage	Skyline	Continent		1	1	2
7	Bear	Bull	Elephant	Horse		1	3	4
8	Skyline	Jet	Luggage	Continent		1	1	2
9	Hats	Wine	Jazz	Dancers		1	1	2
10	Luggage	Elephant	Tennis	Hats		4	2	6
11	Continent	Luggage	Skyline	Jet		1	1	2
12	Luggage	Skyline	Jet	Continent		1	1	2
13	Wine	Dancers	Hats	Jazz		1	1	2
14	Horse	Bull	Elephant	Bear		1	3	4
15	Continent	Jet	Luggage	Skyline		1	1	2
16	Hats	Wine	Dancers	Jazz		1	1	2
17	Sports	Continent	Bear	Hats		4	4	8
18	Golf	Luggage	Bear	Dancers		4	4	8
19	Skyline	Elephant	Wine	Tennis		4	2	6
20	Skyline	Elephant	Wine	Tennis		4	2	6

2. SCHEDULE 1 PERFORMANCE:

Message: Please concentrate on speed!

(Here, schedule 1 was inserted - see Appendix 2)

Appendix 6: Subjects' "Handbook" (part 2) for group 1 - Test 1

3. SCHEDULE 1-bis PERFORMANCE:

Message: Concentrate on Speed! Four best performers in your group get $2 extra!

(Here, a variant of schedule 1 was inserted, with the same degree of complexity.)

4. SCHEDULE 2 PERFORMANCE:

Message: Concentrate on Speed! Four best performers in your group get $2 extra!

(Here, schedule 2 was inserted - see Appendix 2.)

5. SCHEDULE 3 PERFORMANCE

Message: Concentrate on Speed! Four best performers in your group get $2 extra!

(Here, schedule 3 was inserted - see Appendix 2.)

6. PAUSE!!!

* Enjoy a softdrink
* Check stopwatches

7. TIMING TESTS

* **Make** the following catalogs: TIME:

Message: Concentrate on Speed! Four fastest producers in your group get $2 extra!

No.					Types	Colors
1	Wine	Hats	Dancers	Jazz	1	1
2	Jazz	Dancers	Hats	Wine	1	1
3	Skyline	Luggage	Continent	Jet	1	1
4	Continent	Jet	Luggage	Skyline	1	1
5	Wine	Dancers	Hats	Jazz	1	1

* **Make** and **Envelope** the following catalogs: TIME:

Message: Concentrate on Speed! Four fastest producers in your group get $2 extra!

No.					Types	Colors
1	Sports	Continent	Bear	Jazz	4	4
2	Golf	Luggage	Bear	Dancers	4	4
3	Jet	Bull	Golf	Hats	4	4
4	Hats	Bull	Jet	Sports	4	4
5	Golf	Skyline	Bear	Jazz	4	4

* **Make**, **Envelope** & **Label** the following catalogs: TIME:

Message: Concentrate on Speed! Four fastest producers in your group get $2 extra!

No.					Types	Colors
1	Continent	Luggage	Jet	Skyline	1	1
2	Hats	Wine	Jazz	Dancers	1	1
3	Continent	Jet	Luggage	Skyline	1	1
4	Wine	Dancers	Hats	Jazz	1	1
5	Skyline	Jet	Luggage	Continent	1	1

* **Make**, **Envelope**, **Label** & **Store** the following catalogs: TIME:

Message: Concentrate on Speed! Four fastest producers in your group get $2 extra!

No.					Types	Colors
1	Hats	Bull	Jet	Sports	4	4
2	Jet	Bull	Golf	Hats	4	4
3	Golf	Luggage	Bear	Dancers	4	4
4	Sports	Continent	Bear	Jazz	4	4
5	Skyline	Sports	Wine	Bull	4	4

Appendix 7: Check-out Questions Test 1

9. Manipulation Checks Pre-Experiment.

SUBJECT NUMBER AGE Fout! Bladwijzer niet gedefinieerd.MALE

FEMALE

GRADUATE STUDENT

UNDERGRADUATE STUDENT

MAJOR:_____

1. DID WE EXPLAIN THE TASK WELL?
   YES
   NO
   COMMENTS:

2. DID YOU UNDERSTAND THE TASK SUFFICIENTLY AFTER THE PRACTICE SESSION?
   YES
   NO
   COMMENTS:

3. WAS THE TESTING GENERALLY WELL ORGANIZED?
   YES
   NO
   COMMENTS:

4. DID YOU HAVE STAPLER PROBLEMS THAT SIGNIFICANTLY INFLUENCED YOUR PERFORMANCE?
   YES
   NO
   COMMENTS:

5. GENERALLY SPEAKING, THESE TESTS WERE (check one)

   QUITE BORING
   O.K.
   QUITE ENJOYABLE

6. DID THE BONUS SYSTEM ($2 EXTRA) MOTIVATE YOU TO DO YOUR VERY BEST?
   YES
   NO
   COMMENTS:

7. (Only group 1) DO YOU THINK YOU PERFORMED BETTER WITH THE BONUS SYSTEM THAN WITHOUT IT?

YES
NO
COMMENTS:

8. DO YOU THINK YOU COULD PERFORM THE TASK FASTER TOWARDS THE END OF THE TESTS, THAN RIGHT AFTER THE PRACTICE SESSION? (IN OTHER WORDS, WAS THERE CONSIDERABLE LEARNING AFTER THE PRACTICE SESSION?)

YES
NO
COMMENTS:

9. DO YOU THINK YOU COULD STILL IMPROVE YOUR PERFORMANCE, OR WERE YOU PRETTY MUCH AT YOUR MAXIMUM?

I THINK I COULD STILL IMPROVE
I WAS PRETTY MUCH AT MY MAXIMUM

10. DO YOU THINK THAT SOME OF THE PRODUCTION SCHEDULES WERE MORE DIFFICULT (more complex orders) THAN OTHERS?

YES
NO
COMMENTS:

11. WOULD YOU LIKE TO PARTICIPATE IN THE REAL EXPERIMENT, LATER THIS SEMESTER? (THIS IS NOT A RECRUITMENT, JUST A QUESTION ABOUT YOUR OPINION.)

YES
NO
COMMENTS:

12. DID YOU PARTICIPATE IN EXPERIMENTS BEFORE?

YES
NO

THANK YOU VERY MUCH FOR YOUR PARTICIPATION!

Appendix 8: Situation Description in the Role-Play

THE SITUATION

Imagine yourself being head of the "Catalog Department" of a major Logo Design company. In your department all sorts of catalogs are assembled according to customer specifications. A catalog can be any combination of 4 standard logos from your assortment (see plastic holder). In your department the catalogs are assembled (which is taking the cards out of the holder, and stapling them together), enveloped and labeled. The latter is an activity to identify the type of catalog that is inside the envelope. Labels of all types are attached to the plastic holder (see holder - only two types of labels are attached for illustration).

Some customers want to see what logos you have in the "Party Line" (EXAMPLE ONE); others - like travel agencies - want to know what you have in the "Travel Line" (EXAMPLE TWO). These are the easiest types of orders you produce because they require only 2 labels on the envelope to identify the catalog (1 label for Type - either Party or Travel - and one label for Color -either blue or white). Other customers want to see what logos you have in the "Wildlife Line" (EXAMPLE THREE). These orders are somewhat more difficult because they require more labels on the envelope: 1 for Type (Wildlife) and 3 for Colors (Red, Green, White). Finally there are customers who want a catalog with a combination of logos from all types you carry. These are the most difficult because they require 4 labels for Type (one for each category) and either 2 (EXAMPLE FOUR) or 4 (EXAMPLE FIVE) for Colors. It takes about 16 seconds to finish one of the easiest orders, and 30 seconds to finish the most difficult type of order. Please consider these examples again.

You are head of this department for years already, and you have quite some experience with the tasks being performed. You want your people to produce high quality and to adhere to the priorities of the orders on the production schedules (because you want to have good due date performance). You don't have control over the actual production schedules you will get to produce, but you do have some control over your budget objective for every period. This is an objective about the number of orders your department is going to produce, based on product mix expectations from the marketing department. You negotiate over this objective together with your supervisor, in a budget meeting preceding every production period. This meeting is very important because it determines the standard against which you and your department are going to be evaluated. Your problem is that the business environment is characterized by uncertainty, which makes that the real product mix can differ from the expected mix on which your budget is based. Although the expected mix has the highest probability (50%), the actual mix is more difficult 25% of the times or easier the other 25% of the times. What makes it even worse is that you are evaluated on budget achievement, and penalized for underachievement. You know that top management wants you to work as hard as you can with your department, and to ship as many orders as possible within a budget period.

Appendix 9: Description of Budget Setting in Role-Play

This is the expected product mix for next period (suppose a period is 5 minutes long):

1	Wine	Hats	Jazz	Dancers		1	1	2
2	Continent	Luggage	Jet	Skyline		1	1	2
3	Bull	Horse	Elephant	Bear		1	3	4
4	Elephant	Motocros	Continent	Wine		4	2	6
5	Sports	Continent	Bear	Jazz		4	4	8
6	Skyline	Elephant	Wine	Tennis		4	2	6
7	Bear	Bull	Elephant	Horse		1	3	4
8	Golf	Luggage	Bear	Dancers		4	4	8
9	Dancers	Wine	Jazz	Hats		1	1	2
10	Dancers	Bull	Jet	Sports		4	4	8
11	Continent	Luggage	Skyline	Jet		1	1	2
12	Bull	Jet	Golf	Dancers		4	4	8
13	Wine	Dancers	Hats	Jazz		1	1	2
14	Bull	Jet	Golf	Hats		4	4	8
15	Continent	Sports	Bear	Hats		4	4	8
16	Hats	Wine	Dancers	Jazz		1	1	2
17	Sports	Continent	Bear	Dancers		4	4	8
18	Jazz	Dancers	Hats	Wine		1	1	2
19	Luggage	Continent	Jet	Skyline		1	1	2
20	Skyline	Elephant	Wine	Tennis		4	2	6

You have evaluated this mix, and before you go to the budget meeting you are estimating the number of orders your department can produce in 5 minutes. Especially you are considering the degree of complexity of the mix. You see that there are some difficult orders with logos from all categories (or Types) and of different Colors (orders with 6 or 8 labels). You know that the more labels it takes to identify an order, the longer the production time. With this in mind, and having a good idea about the standard times on different activities, you estimate that your department's maximum performance on this expected mix is to produce the first 12 orders.

Let's go to your supervisor now to negotiate your department's production goal for the next period. This time it's for real. You will be paid according to your budget performance. The actual mix will be determined by the wheel (see WHEEL), after you've negotiated your budget goal. For example, if the wheel stops on 9 it means that the actual mix is more difficult, and you can make only 9; if it stops on 14 it means that the real mix is easier than expected, and you make 14 orders. You don't know the range of possible outcomes; you only know the probabilities: 50% that the actual mix is like expected, 25% that it is easier, and 25% that it is more difficult. **Try to make the best deal for you, your department and your company.**

Appendix 10: Recruitment letter Experiment 2 (in dutch)

Vrijdag 10 februari, 1995

Beste,

Met dit briefje willen wij u op de hoogte brengen van een initiatief dat wordt georganiseerd door de vakgroep Accountancy en Beheerscontrole van de Economische Faculteit.

Prof. Dr. Werner Bruggeman en medewerker Dominique Waeytens hebben een oefening opgesteld waarin u leert werken met budgetten, kostprijsinformatie, en afwijking tussen werkelijke en gebudgetteerde kosten. Deze oefening kadert in een studie die door beide onderzoekers wordt gemaakt over het gebruik van kostprijsinformatie in budgetteren. De resultaten van de oefening moeten helpen om conclusies te formuleren in bovenstaand onderzoek.

Voor deze oefening hebben we een groot aantal mensen nodig, en het is hiervoor dat we ons richten tot de studenten van de tweede kandidatuur Economie. De oefening sluit immers aan bij het vak Analytisch Boekhouden en Kostencalculatie van Prof. Bruggeman. De oefening zal ongeveer 1,5 uur in beslag nemen en zal door iedereen tesamen worden uitgevoerd. Deelname gebeurt uiteraard op vrijwillige basis. Een belangrijke stimulans is echter dat u voor uw moeite zult betaald worden! Uw verdienste zal zeker liggen tussen de 300 BF en 800 BF (onmiddellijk uitbetaald). Is dit niet leuk meegenomen voor anderhalf uur werk? De preciese hoogte van de beloning is afhankelijk van uw prestatie in de oefening, een beetje handigheid, en een beetje geluk. Er zal voor iedereen ook koffie of een drankje zijn achteraf. Het is geen test van kennis, en er is geen enkele specifieke voorkennis vereist.

Wat zal er precies gebeuren? De oefening is eigenlijk een simulatie van een produktiebedrijf in de logo-design industrie. Dit betekent dat we een situatie zullen ensceneren zoals in een werkelijke onderneming in die sector. Meer uitleg zult u natuurlijk krijgen tijdens de oefening zelf, maar ook tijdens de les Analytisch Boekhouden van vrijdag 24 februari door Prof. Bruggeman. Deze brief is bedoeld om u in elk geval al op de hoogte te stellen. Tijdens de les van 24 februari zal een lijst rondgaan waarop u uw naam kunt opgeven. Ook op woensdag 1 maart zult u de gelegenheid krijgen om in te schrijven (ook andere inschrijvingsperiodes zullen waarschijnlijk voorzien worden). De oefening zelf heeft plaats op donderdag 2 maart, om 9.00 uur op de campus van de Vlerick School voor Management in de UCO-toren (de oefeningen voor micro-economie zullen die dag niet doorgaan). De UCO-toren ligt in vogelvlucht op minder dan 500 meter van de Faculteit Economie (zie bijgevoegd plannetje); deze locatie is gekozen omwille van de beter geschikte auditoria. Indien u niet op

voorhand hebt ingeschreven kunt u wel nog meedoen op de dag zelf, tenzij we reeds een voldoende aantal deelnemers hebben.

Wij hopen u op 2 maart op de campus van de Vlerick School te kunnen begroeten. U zult er in elk geval een financiële vergoeding aan over houden, plus ook een werkelijke ervaring over het opstellen van budgetten. Dit kan u helpen bij het begrijpen van bepaalde aspecten van budgetteren, zowel nu als in toekomstige vakken (vb. Management Accounting in eerste Lic. en Beheerscontrole in tweede Lic.).

Bij voorbaat al dank voor uw medewerking!

Prof.Dr. Werner Bruggeman

Dominique Waeytens

Appendix 11: Explanation of Pay Scheme - Experiment 2

HET BELONINGSSYSTEEM IN ONZE ONDERNEMING

Je zult 50 BF krijgen voor elk order dat je afwerkt, maar je wordt beboet als je er minder doet dan je volume-objectief. Bovendien word je er niet beter van door meer orders te maken dan je objectief. Anders gezegd: je krijgt 50 BF per afgewerkt produkt min 50 keer het verschil tussen uw budget en uw produktie. In formulevorm ziet het beloningssysteem er als volgt uit:

Ontvangst =50 BF * (Werkelijke Produktie) - 50 BF * (absolute waarde van verschil tussen Gebudgetteerde Produktie en Werkelijke Produktie)

Een aantal voorbeelden ter verduidelijking. Stel dat je een verwachte mix hebt bekeken, en dat je je doel voor de volgende periode stelt op 8 orders. Wanneer de periode begint blijkt dat de werkelijke produkt mix inderdaad is zoals verwacht, en je slaagt erin om alle 8 orders te maken. Je vergoeding is dan:

Ontvangst = 50 BF * (8) - 50 BF * (8-8) = 400 BF.

Wanneer echter de werkelijke mix makkelijker is dan verwacht zodat je 10 orders maakt i.p.v. de vooropgestelde 8, dan is je vergoeding:

Ontvangst = 50 BF * (10) - 50 BF * (8-10) = 400 BF.

Je ziet dat je er niet beter van wordt door meer orders te maken dan je produktie-objectief.

Wanneer tenslotte de werkelijke mix moeilijker is dan verwacht zodat je er maar in slaagt om 6 orders te maken i.p.v. de gebudgetteerde 8, dan is je vergoeding:

Ontvangst = 50 BF * (6) - 50 BF * (8-6) = 200 BF.

Je ziet dat je beboet wordt wanneer je je budget niet haalt. Indien je in dit geval je budget op 6 orders had gezet, was je vergoeding:

Onvangst = 50 BF * (6) - 50 BF * (6-6) = 300 BF.

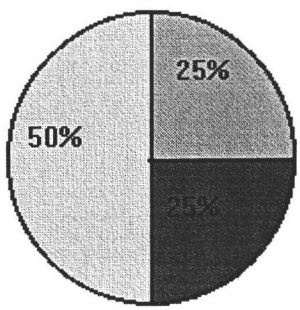
Hierna volgen nog een aantal **voorbeelden** in een tabelletje:

Als je budget staat op	7,	en je maakt ze alle	7,	dan krijg je	350 BF.
Als je budget staat op	7,	en je maakt er	10,	dan krijg je	350 BF.
Als je budget staat op	8,	maar je maakt slechts	7,	dan krijg je	300 BF.
Als je budget staat op	8,	en je maakt er	14,	dan krijg je	400 BF.
Als je budget staat op	9,	maar je maakt slechts	7,	dan krijg je	250 BF.
Als je budget staat op	9,	en je maakt ze alle	9,	dan krijg je	450 BF.
Als je budget staat op	10,	maar je maakt slechts	8,	dan krijg je	300 BF.
Als je budget staat op	10,	en je maakt ze alle	10,	dan krijg je	500 BF.
Als je budget staat op	10,	en je maakt er	13,	dan krijg je	500 BF.
Als je budget staat op	12,	maar je maakt slechts	7,	dan krijg je	100 BF.
Als je budget staat op	12,	en je maakt ze alle	12,	dan krijg je	600 BF.

Appendix 12: Explanation of Environmental Uncertainty in Experiment 2 (in Dutch)

ONZEKERHEID: ONZE OMGEVING IS MOEILIJK TE VOORSPELLEN!

Het schema dat je zopas gemaakt hebt is de verwachte produktmix voor de volgende periode. Aangezien je deze mix zelf al hebt gemaakt kun je goed inschatten wat je maximale produktie op deze mix zou kunnen zijn. Je zult gevraagd worden een produktie-objectief (of een budget) op te stellen voor de volgende produktieperiode; dit is een doelstelling m.b.t. het aantal orders die je zult maken in de komende periode van 5 minuten. Het probleem is echter dat de werkelijke produktmix die je zult ontvangen kan verschillen van de verwachte produktmix (die je net gemaakt hebt). Onze externe omgeving is immers moeilijk te voorspellen, en we kunnen nooit met zekerheid weten hoe de produktmix er in de volgende periode zal uitzien. De werkelijke produktmix kan meer of minder moeilijke orders bevatten, maar hij kan natuurlijk ook precies zijn zoals verwacht. We weten dat in 50% van de gevallen de werkelijke mix precies is zoals de verwachte. In de andere 50% van de gevallen echter verschilt de werkelijke mix van de verwachte. Als de werkelijke mix verschilt van de verwachte, is hij ofwel moeilijker ofwel gemakkelijker. Beide situaties zijn even waarschijnlijk. De volgende "taart" geeft de kansverdeling weer:



- Werkelijke mix is als verwacht
- Werkelijke mix is moeilijker dan verwacht
- Werkelijke mix is makkelijker dan verwacht

We kunnen je nu nog niet zeggen hoe de werkelijke mix er voor jou zal uitzien, en of hij moeilijker, makkelijker, of precies gelijk zal zijn als verwacht. We kunnen je enkel de kansverdeling geven. De werkelijke produktiemix die je straks zult ontvangen is bepaald door het kleur dat je bij het binnenkomen hebt getrokken. We zeggen natuurlijk niet welke kleur voor welke mix staat (anders zou er geen onzekerheid meer zijn), maar je mag wel weten dat de helft van de doos kleurtjes waren die voor een gelijke produktmix staan (werkelijke mix = verwachte mix), één vierde van de doos kleurtjes bevatte die voor een moeilijker mix staan, en een ander vierde kleurtjes waren die voor een makkelijker mix staan.

Appendix 13: Measures Experiment 2 (in Dutch)

(Items 1-6: Perceived Information Asymmetry; items 7-10: Pressure not to misrepresent; items 11-13: Job Tension from reduced Job Control; item 14: indicator of goal acceptance; items 15-17: Job Tension from reduced Job Control and high Job difficulty; items 18-21: Need for Dysfunctional Behaviors)

OMCIRKEL VOOR ELKE UITSPRAAK EEN KEUZE VAN 1 (Sterk Akkoord) tot 7 (Sterk Niet Akkoord).

1. In vergelijking met mijn baas heb ik betere informatie om te schatten hoeveel orders ik kan maken van het verwachte produktieschema.	Sterk Akkoord	Redelijk Akkoord	Beetje Akkoord	Noch Akkoord, Noch Niet Akkoord	Beetje Niet Akkoord	Redelijk Niet Akkoord	Sterk Niet Akkoord
	1	2	3	4	5	6	7
2. In vergelijking met mijn baas weet ik beter wat complexe orders zijn en wat gemakkelijke.	Sterk Akkoord	Redelijk Akkoord	Beetje Akkoord	Noch Akkoord, Noch Niet Akkoord	Beetje Niet Akkoord	Redelijk Niet Akkoord	Sterk Niet Akkoord
	1	2	3	4	5	6	7
3. In vergelijking met mijn baas weet ik beter hoe deze produktietaak in elkaar zit.	Sterk Akkoord	Redelijk Akkoord	Beetje Akkoord	Noch Akkoord, Noch Niet Akkoord	Beetje Niet Akkoord	Redelijk Niet Akkoord	Sterk Niet Akkoord
	1	2	3	4	5	6	7
4. Mijn baas is goed geïnformeerd om een produktie-objectief te stellen voor deze taak.	Sterk Akkoord	Redelijk Akkoord	Beetje Akkoord	Noch Akkoord, Noch Niet Akkoord	Beetje Niet Akkoord	Redelijk Niet Akkoord	Sterk Niet Akkoord
	1	2	3	4	5	6	7
5. In vergelijking met mijn baas weet ik beter hoe lang het duurt om specifieke activiteiten van deze taak uit te voeren.	Sterk Akkoord	Redelijk Akkoord	Beetje Akkoord	Noch Akkoord, Noch Niet Akkoord	Beetje Niet Akkoord	Redelijk Niet Akkoord	Sterk Niet Akkoord
	1	2	3	4	5	6	7

6. Mijn baas heeft goede informatie om de complexiteit van de produktieschemas te evalueren.	Sterk Akkoord	Redelijk Akkoord	Beetje Akkoord	Noch Akkoord, Noch Niet Akkoord	Beetje Niet Akkoord	Redelijk Niet Akkoord	Sterk Niet Akkoord
	1	2	3	4	5	6	7
7. Toen ik mijn budgetsuggestie opgaf had ik het gevoel dat ik mezelf niet te zwak mocht voorstellen omdat de baas schijnbaar wist wat mijn potentieel was.	Sterk Akkoord	Redelijk Akkoord	Beetje Akkoord	Noch Akkoord, Noch Niet Akkoord	Beetje Niet Akkoord	Redelijk Niet Akkoord	Sterk Niet Akkoord
	1	2	3	4	5	6	7
8. Toen ik mijn budgetsuggestie opgaf had ik het gevoel dat de baas zou weten wanneer ik mijn potentieel onderschatte.	Sterk Akkoord	Redelijk Akkoord	Beetje Akkoord	Noch Akkoord, Noch Niet Akkoord	Beetje Niet Akkoord	Redelijk Niet Akkoord	Sterk Niet Akkoord
	1	2	3	4	5	6	7
9. Toen ik mijn budgetsuggestie opgaf had ik het gevoel dat de baas precies wist welk getal hij wou zien.	Sterk Akkoord	Redelijk Akkoord	Beetje Akkoord	Noch Akkoord, Noch Niet Akkoord	Beetje Niet Akkoord	Redelijk Niet Akkoord	Sterk Niet Akkoord
	1	2	3	4	5	6	7
10. Wanneer ik mijn budgetsuggestie opgaf had ik het gevoel dat ik eigenlijk weinig keuze had over wat ik moest opschrijven.	Sterk Akkoord	Redelijk Akkoord	Beetje Akkoord	Noch Akkoord, Noch Niet Akkoord	Beetje Niet Akkoord	Redelijk Niet Akkoord	Sterk Niet Akkoord
	1	2	3	4	5	6	7
11. Na de budgetvergadering voel ik mij gespannen omdat ik geen goed budget heb kunnen bekomen.	Sterk Akkoord	Redelijk Akkoord	Beetje Akkoord	Noch Akkoord, Noch Niet Akkoord	Beetje Niet Akkoord	Redelijk Niet Akkoord	Sterk Niet Akkoord
	1	2	3	4	5	6	7

12. Na de budgetvergadering voel ik mij gespannen omdat het informatiesysteem waarover mijn baas beschikt mij weinig controle geeft over mijn budget.	Sterk Akkoord	Redelijk Akkoord	Beetje Akkoord	Noch Akkoord, Noch Niet Akkoord	Beetje Niet Akkoord	Redelijk Niet Akkoord	Sterk Niet Akkoord
	1	2	3	4	5	6	7
13. Ik vind dat ik een grote graad van controle heb over mijn budget.	Sterk Akkoord	Redelijk Akkoord	Beetje Akkoord	Noch Akkoord, Noch Niet Akkoord	Beetje Niet Akkoord	Redelijk Niet Akkoord	Sterk Niet Akkoord
	1	2	3	4	5	6	7
14. Geef aan hoe hard je gaat werken:	Zeer hard	Tamelijk hard	Hard	Gewoon	Beetje Traag	Redelijk Traag	Zeer Traag
	1	2	3	4	5	6	7
15. Gegeven mijn produktie-objectief voelde ik heel wat spanning bij het maken van de werkelijk mix.	Sterk Akkoord	Redelijk Akkoord	Beetje Akkoord	Noch Akkoord, Noch Niet Akkoord	Beetje Niet Akkoord	Redelijk Niet Akkoord	Sterk Niet Akkoord
	1	2	3	4	5	6	7
16. Bij het maken van de werkelijke mix was ik gespannen omdat ik dacht dat ik mijn budget niet zou halen.	Sterk Akkoord	Redelijk Akkoord	Beetje Akkoord	Noch Akkoord, Noch Niet Akkoord	Beetje Niet Akkoord	Redelijk Niet Akkoord	Sterk Niet Akkoord
	1	2	3	4	5	6	7
17. Bij het maken van de werkelijke mix was ik gespannen omdat mijn budget nogal hoog was gesteld.	Sterk Akkoord	Redelijk Akkoord	Beetje Akkoord	Noch Akkoord, Noch Niet Akkoord	Beetje Niet Akkoord	Redelijk Niet Akkoord	Sterk Niet Akkoord
	1	2	3	4	5	6	7

18. Om mijn objectief te halen heb ik soms wat ingeboet aan kwaliteit (of heb het tenminste overwogen).	Sterk Akkoord	Redelijk Akkoord	Beetje Akkoord	Noch Akkoord, Noch Niet Akkoord	Beetje Niet Akkoord	Redelijk Niet Akkoord	Sterk Niet Akkoord
	1	2	3	4	5	6	7
19. Om mijn objectief te halen heb ik wel eens overwogen om een moeilijk order over te slaan.	Sterk Akkoord	Redelijk Akkoord	Beetje Akkoord	Noch Akkoord, Noch Niet Akkoord	Beetje Niet Akkoord	Redelijk Niet Akkoord	Sterk Niet Akkoord
	1	2	3	4	5	6	7
20. Ik zou mijn baas wel eens willen overtuigen dat zijn informatiesysteem leidt tot veel te hoge objectieven.	Sterk Akkoord	Redelijk Akkoord	Beetje Akkoord	Noch Akkoord, Noch Niet Akkoord	Beetje Niet Akkoord	Redelijk Niet Akkoord	Sterk Niet Akkoord
	1	2	3	4	.5	6	7
21. In een werkelijke bedrijfs-situatie zou ik waarschijnlijk protesteren tegen deze manier van budgetbepaling.	Sterk Akkoord	Redelijk Akkoord	Beetje Akkoord	Noch Akkoord, Noch Niet Akkoord	Beetje Niet Akkoord	Redelijk Niet Akkoord	Sterk Niet Akkoord
	1	2	3	4	5	6	7

Appendix 14: Activity-based budget meeting Experiment 2 (in Dutch)

DE BUDGET BEPALING (= PRODUKTIE-OBJECTIEF)

Hallo, hier spreekt je directeur. Ik heb je hulp, je ervaring, en je produktkennis nodig bij het bepalen van je produktie-objectief voor de volgende produktieperiode. Ik heb net zoals jij de verwachte produktmix bekeken voor volgende periode, en ik heb een voorstel voor je budget. Ik beschik over een gedetailleerd informatiesysteem gebaseerd op een analyse van je activiteiten en hun "kostdrijvers"; dit laatste zijn factoren die de tijd en dus de kost van je activiteiten beïnvloeden. Dit informatiesysteem zegt mij dat je in de komende produktieperiode die 5 minuten lang is (= 300 seconden) in staat moet zijn om 12 tot 13 orders te maken. Dit is gebaseerd op de volgende gegevens:

ACTIVITEIT	**"KOSTDRIJVER"**	**TIJD PER EENHEID KOSTDRIJVER**
Catalogus Maken	Het Aantal Catalogusjes	8,2 seconden per Catalogusje
Catalogus Envelopperen	Het Aantal Enveloppen	3 seconden per Enveloppe
Enveloppe Labelen	Het Aantal Labels	2,6 seconden per Label

De volgende tabel geeft aan dat je inderdaad de eerste 12 (tot aan Bull - Jet - Golf - Dancers) à 13 (tot aan Wine - Dancers - Hats - Jazz) orders moet kunnen maken van de verwachte mix:

ACTIVITEIT	**EERSTE 12 ORDERS**	**EERSTE 13 ORDERS**
Catalogus Maken	98,4 seconden voor 12 Catalogusjes	106,6 seconden voor 13 Catalogusjes
Catalogus Envelopperen	36 seconden voor 12 Enveloppen	39 seconden voor 13 Enveloppen
Enveloppe Labelen	156 seconden voor 60 Labels	161,2 seconden voor 62 Labels
Benodigde Tijd	290,4 seconden	306,8 seconden

Je ziet dat je in 5 minuten (= 300 seconden) inderdaad de eerste 12 à 13 orders moet kunnen maken. Wat stel je zelf voor?

Schrijf hieronder wat je voorstel is voor je produktie-objectief, en bezorg mij dit blad zodat ik kan zien of ik je voorstel aanvaard of niet.

Objectief in Aantal Orders: ☐

Aangepast Objectief in Aantal Orders (in te vullen door je directeur): ☐

Appendix 14: Unit-based budget meeting Experiment 2 (in Dutch)

DE BUDGET BEPALING (= PRODUKTIE-OBJECTIEF)

Hallo, hier spreekt je directeur. Ik heb je hulp, je ervaring, en je produktkennis nodig bij het bepalen van je produktie-objectief voor de volgende produktieperiode. Ik heb net zoals jij de verwachte produktmix bekeken voor volgende periode, en ik heb een voorstel voor je budget. Uit vorige periodes weet ik dat het gemiddeld ongeveer 23 à 24 seconden duurt voor de produktie van een typisch order (vb. Hats - Wine - Jazz - Dancers, of Hats - Bear - Jet - Golf). Deze informatie zegt mij dat je in de komende produktieperiode die 5 minuten lang is (= 300 seconden) in staat moet zijn om 12 tot 13 orders te maken. Wat stel je zelf voor?

Schrijf hieronder wat je voorstel is voor je produktie-objectief, en bezorg mij dit blad zodat ik kan zien of ik je voorstel aanvaard of niet.

Objectief in Aantal Orders: ☐

Aangepast Objectief in Aantal Orders (in te vullen door je directeur): ☐

Appendix 15: Experimental Procedures - Experiment 2

PROCEDURES EXPERIMENT

PROCEDURE	LOGISTICS	TEXT	DURATION
a. Welcome and random assignment of subjects to 2 groups.	Random assignment: when subjects show up one by one, they are assigned a seat in order of appearance (e.g. first subject in VDM, second one in ZN). Seats are numbered 1-40 in VDM, 41-80 in ZN. Upon arrival subjects receive a subject number on a card. Also upon arrival, subjects draw a color from a box; this color will determine the actual mix. There are four assistants in each room. They assist subjects in finding their place. Also they maintain control.		
b. Demonstration and practice session.	Standing in the doorway between the two rooms I explain and demonstrate the task for both groups at the same time. MATERIAL: all subjects have a plastic holder with logos, a pile of 25 envelopes, a stapler and spare staples, a box, a stopwatch, and their handbook. Two spare holders are sitting next to the subjects. Also there are rubber bands. Everybody has a pencil. ASSISTANTS: The assitants stand by and assist subjects in case of problems. At the end, they provide new envelopes (20). Collect unused envelopes and the used plastic holders; also collect the stopwatches. SUBJECTS: At the end they change staples (eventually); remove the used holder, and put a new one in place. They empty their box: put a rubber band around the envelopes and put them aside.	Welkom op deze budgetteringsoefening. INFO VOORAF. Mag ik u vragen deze oefening serieus op te vatten, en u in te leven alsof dit een werkelijke onderneming was. Uw antwoorden worden anoniem verwerkt. Enkel uw nummer in de oefening moet op de formulieren voorkomen. Zet uw nummer steeds op elk blad dat u krijgt; zoniet riskeert u dat we uw beloning niet kunnen uitrekenen. GO-GO-GO. De oefening heeft voornamelijk te maken met budgetteren, maar dan moet er natuurlijk een bedrijvigheid zijn waarover een budget moet opgesteld worden. Daarom hebben we een produktietaak opgezet waarvoor we later een budget of produktie-objectief zullen bepalen. We simuleren hier een bedrijf uit de grafische sector gespecialiseerd in het ontwerpen van logos. Het bedrijf biedt een aantal standaardfiguren aan voor de logos, en in uw afdeling worden catalogusjes gemaakt met een selectie van te verkrijgen standaardfiguren. Deze catalogusjes worden samengesteld op klantenspecificatie. Bijvoorbeeld: een reisbureau vraagt aan u welke figuren u hebt m.b.t. reizen (Travel). In het eerste deel van deze oefening krijgt u de kans om uitgebreid ervaring op te doen met de bedrijvigheid van catalogusjes samenstellen. U kunt het verloop van deze oefensessie volgen in uw handboek. U vindt voor u een plastiek blad met allerlei kaartjes waarop figuren staan voor logos. Een catalogusje is een collectie van vier van deze kaartjes, tesamengeniet met één nietje. U neemt de kaartjes in de volgorde van het produktieschema in uw handboek.	15 minutes

		SHOW: Travel catalog. SUBJECTS MAKE: Skyline, Luggage, Continent, Jet + Wine, Hats, Jazz, Dancers. (Stapler problems?) U hebt net een catalogusje gemaakt van de Travel-lijn en één van de Party-lijn. Elk catalogusje moet in een envelop gestopt worden, en deze envelop moet voorzien worden van labels zodanig dat het inzittende catalogusje wordt bepaald. Op de envelop ziet u een kolom "Type" en een kolom "Colors". De labels voor de "Type" kolom zitten bovenaan uw plastiek blad; die voor "Colors" zitten onderaan. De pas gemaakte Travel-catalogus vraagt een FluoRood label voor "Type" en een Wit label voor "Colors"; alle kaartjes van de Travel-catalogus zijn immers Wit. SHOW: Envelope and Label Travel catalog. Ask subjects to do the same for Travel and Party catalog. SUBJECTS ENVELOPE AND LABEL: Travel + Party. (Remark that subjects should try to keep the stapler in their hand while enveloping and labeling.) Nadat je dit gedaan hebt stapel je het afgewerkte order in de doos. SHOW + SUBJECTS PUT ENVELOPES IN BOX. Een ander type van catalogus die onze klanten soms vragen is de Wildlife catalogus. Maak deze catalogus zoals in uw handboek en werk het order volledig af . U zult zien dat dit order één Oranje label vraagt in de "Type" kolom, maar drie in de "Colors" kolom (Wit, Groen, Rood). De labels moeten netjes onder elkaar in de kolommen geplaatst worden. SUBJECTS MAKE, ENVELOPE, LABEL, & STORE: Bull, Horse, Elephant, Bear. Een ander type van catalogus combineert kaartjes uit verschillende series. Bijvoorbeeld, een catalogus met Elephant, Motorcross, Continent, & Wine, vraagt vier labels voor "Type" (LichtGroen, Oranje, FluoRood, en Geel), en twee labels in de "Colors" kolom (Wit en Blauw). SHOW: Make, Envelope, Label and Store this catalog. SUBJECTS: Do the same + also Skyline, Elephant, Wine, Tennis (same Type). Tenslotte is er er een catalogus van het volgende type: Sports, Continent, Bear, Hats. Deze	

		catalogus heeft vier labels nodig voor "Type" (de zelfde van daarnet), maar ook vier voor "Colors" (Rood, Wit, Blauw, DonkerGroen). SHOW: make, envelope, label and store ths catalog. SUBJECTS: do the same + also Skyline, Elephant, Wine, Tennis (same Type). Dit zijn de types van catalogusjes die in uw afdeling worden gemaakt op vraag van de klanten. Hebt u hier vragen over? INSTRUCTIES: In uw handboek vindt u een lijstje met 10 orders. Werk deze orders volledig af bij wijze van oefening. Let hierbij vooral op snelheid zonder de kwaliteit van uw werk te verwaarlozen. Hou het nietmachientje steeds in uw hand. Herhaal voor uzelf de figuren voor elk order. Probeer het volgende order reeds te lezen terwijl u het afgewerkte order in de doos stapelt. SUBJECTS: work on practice list. INSTRUCTIES: Tenslotte is het belangrijk dat u bij benadering weet hoelang het duurt om verschillende orders te maken. Daarom gaat u uw tijd opnemen met de chronometers voor een paar orders van elk type. Staan alle chronometers op nul? Met de rechter knop start u of stopt u de tijd; met de linker knop zet u de tijd weer op nul. U gaat telkens twee orders per type maken en uw totale tijd opnemen per twee orders. U start de klok bij het begin van een nieuw type; let erop dat u kunt produceren onmiddellijk na het starten van de tijd. U stopt de tijd onmiddellijk na het beeindigen van het tweede order. U schrijft uw totale tijd neer in het juiste vakje naast het produktieschema. Deel die tijd ook door twee om te komen tot een tijd per order. Vervolgens reset u de klok, en herhaalt dit alles voor de volgende twee orders. U kunt nu beginnen. Laat de tijden eventjes tot u doordringen. SUBJECTS: work on list and measure time. Ziezo, hiermee zijn we aan het einde gekomen van de oefensessie. U hebt nu ervaring kunnen opdoen met de bedrijvigheid van de onderneming. Het is nu alsof u hier al tien jaar werkt. We kunnen nu verder gaan met het vervolg van de oefening. INSTRUCTIES: 1/ Gelieve de gebruikte plastiek houders aan de medewerkers in de zaal te geven, en een nieuwe houder te installeren. 2/ Leeg ook de doos met enveloppen: doe een elastiekje rond de gebruikte enveloppen en leg het stapeltje opzij. De ongebruikte enveloppen zullen worden opgehaald. U krijgt een nieuw stapeltje enveloppen. Ook de chronos zullen worden opgehaald. Er hoeven	10 minuten 10 minuten

		momenteel geen nieuwe nietjes in het machientje.	
c. Expected Mix: assesment of potential; effort stimulating pay scheme.	Subjects turn to the expected mix (Schedule 1) in their handbook. MATERIAL: all subjects have a fresh holder with logos, a fresh pile of envelopes (20), an empty box, a full stapler, and their handbook with the mix. ASSISTANTS: assist in case of problems, maintain control. At the end collect plastic holders and the unused envelopes. Also distribute explanation of Uncertainty. SUBJECTS: at the end remove holder, empty box (put rubber band around envelopes), write performance on handbook, put handbook aside. Give holder and unused envelopes to assistants.	Nu dat u de taak onder de knie hebt kunt u voor u zelf testen hoe goed u er eigenlijk in bent (daarna stoppen we een tijdje met produceren). INSTRUCTIES: Op de laatste bladzijde van uw handboek staat een produktieschema. U krijgt vijf minuten de tijd om zo ver mogelijk in het schema te komen, in de aangegeven volgorde. Let hierbij vooral op snelheid zonder de kwaliteit te verwaarlozen. Om u te stimuleren is er het volgende bonussysteem: de beste 10 performers in elke zaal krijgen nog eens 100 BEF extra op wat ze op het einde van de oefening zullen verdiend hebben. Schrijf uw performantie onderaan het schema. Alleen volledig afgewerkte orders opgeslagen in de doos tellen mee. U vertelt uw performantie voorlopig aan niemand. Pas op het einde van de oefening zullen we de beste performers bepalen. SUBJECTS: do it. INSTRUCTIES: 1/ Tel uw produktie en schrijf het onderaaan het schema. 2/ U kunt opnieuw de plastiek houder verwijderen en aan de medewerkers geven. Voorlopig moet u nog geen nieuwe in de plaats zetten. 3/ Maak ook de doos opnieuw leeg. Doe een elastiekje rond de produktie. Zet uw nummer op de eerste enveloppe van dit stapeltje. Leg het stapeltje opzij. 4/ Scheur de laatste bladzijde van uw handboek, en leg de rest van het handboek opzij. De ongebruikte enveloppen zullen opgehaald worden.	7 minuten
d. Explanation of Uncertainty.	LOGISTICS: all subjects have a paper with the explanation of uncertainty. ASSISTANTS: assist in case of problems, maintain control. At the end, distribute explanation of Pay scheme. SUBJECTS: read	U kent nu de taak en uw capaciteiten. Nu volgt wat uitleg over de manier van werken in de onderneming, en onze externe omgeving. In onze onderneming werken we met produktieperiodes. Bij het begin van elke periode wordt een produktie-objectief (of budget) opgesteld m.b.t. het aantal catalogusjes die in die periode zullen gemaakt worden. Dit objectief wordt door u en uw baas samen bepaald op basis van de verwachte produktmix voor die periode. De verwachte produktmix is een voorspelling van de marketingafdeling over hoe het produktieschema er in de komende periode zal uitzien. Het verwachte produktieschema voor de komende periode ziet eruit zoals dat wat u zopas hebt geproduceerd. Aangezien u dit schema reeds hebt gemaakt kunt u goed inschatten wat uw maximale produktie op zo'n schema kan zijn. Dit moet u helpen om een produktie-objectief te bepalen voor de komende periode. Dit is een objectief m.b.t. het aantal orders die u gaat maken in die periode (een periode is 5 minuten lang). Het probleem is echter dat het werkelijke produktieschema dat u zult ontvangen kan verschillen van het verwachte schema. Onze externe omgeving is immers gekenmerkt door onzekerheid, zodat we niet met volledige zekerheid kunnen voorspellen hoe de produktmix er werkelijk zal uitzien. Op het blad dat u zopas gekregen hebt leest u wat die onzekerheid betekent. SUBJECTS: read Uncertainty.	7 minuten

		Is hierover alles duidelijk? Op het bord wordt dit nog eventjes voor u samengevat.	
e. Explanation of Pay Scheme.	LOGISTICS: all subjects have a paper with the explanation of the Pay scheme. ASSISTANTS: assist in case of problems, maintain control. At the end distribute budget setting: unit-based in group 1; activity-based in group 2. SUBJECTS: read	Vooraleer we aan de eigenlijke objectiefbepaling kunnen beginnen moeten we het nog hebben over het beloningsysteem in de onderneming, want uw vergoeding is natuurlijk voor een stuk afhankelijk van het halen van uw objectief. Op het blad dat u zopas hebt gekregen leest u hoe het beloningssysteem in elkaar zit. SUBJECTS: read Pay scheme. Is hierover alles duidelijk? Op het bord staat de beloningsformule. Leg dan het beloningssysteem omgekeerd weg. U hoeft enkel de formule voor de geest te hebben. VRAAGJE: Wat is uw beloning als uw budget op 8 staat en je er werkelijk 10 maakt?	7 minuten
f. Budget Setting	LOGISTICS: all subjects have a paper with the budget negotiation. ASSISTANTS: at the end they collect the budget paper and adjust. Write budget on your own file. Give this file to administrators. Also distribute measures for next procedure. SUBJECTS: read; do; give budget to assistant; get it back.	Nu u alles weet over de werking van de onderneming, de onzekerheid in onze omgeving, en het beloningssysteem, kunnen we overgaan tot de budgetbepaling. Hierbij gaat u een produktie-objectief bepalen samen met uw baas. Uw baas zal een voorstel doen van een produktie-objectief, en dan geeft u zelf uw eigen voorstel. Natuurlijk zal de baas het laatste woord hebben, maar u kunt in elk geval een voorstel doen dat al dan niet door uw baas zal worden aanvaard. Als het niet wordt aanvaard zal een aanpassing gebeuren op basis van regels die enkel door uw baas gekend zijn. Praktisch zal dat gebeuren door de medewerkers in de zaal. INSTRUCTIES: Neem eventueel de verwachte mix terug bij u, maar leg alle andere documenten omgekeerd weg (u hebt die toch voor niets nodig). Dan begint nu de budgetvergadering. SUBJECTS: make a budget suggestion. Is iedereen klaar? ASSISTANTS: adjust budget.	7 minuten
g. Measurement of Perceived Information Asymmetry, pressure not to misrepresent, job tension from the control system,	LOGISTICS: all subjects have the measurement scales. ASSISTANTS: maintain control and assist. At the end they collect the answers, and distribute the actual mix. Also distribute new envelopes. SUBJECTS: read; do; give measures to assistant. At the end, put new holder in	Nu uw budget is bepaald, gelieve te antwoorden op de volgende vraagjes. INSTRUCTIES: voor elke vraag omcirkelt u een keuze van 1 tot 7. SUBJECTS: fill out measurement of info.asymmetry, pressure not to misrepresent, and job tension caused by the type of control system, and risk preference. INSTRUCTIES: 1/ Neem nu de laatste houder zodat we kunnen overgaan tot de werkelijke produktie. 2/ Breng nieuwe nietjes in; doe de ouwe in uw doos. De medewerkers zullen	7 minuten

and risk preference.	place and control stapler. Put new staples.	rondgaan om uw antwoorden op te halen, enveloppen uit te delen, en u de gepaste produktmix geven i.f.v. het kleur dat u in het begin hebt getrokken. U zult dus nu de werkelijke mix krijgen die dus kan gelijk zijn of verschillen van de verwachte. ASSISTANTS: provide actual product mix.	
h. Actual product mix	LOGISTICS: all subjects receive actual mix. Everybody has a fresh holder, new envelopes, a full stapler, and an empty box. ASSISTANTS: maintain control and assist. At the end control counting performance and write it down on your files. Give the files to the administrators. Collect the students' actual output, as well as their output on the expected mix; keep the two outputs together with a rubber band, and write the subjects' number on the first envelope. Distribute measures. SUBJECTS: do.	De produktieperiode begint zodadelijk. U heeft nu de werkelijke produktmix ontvangen. Uw beloning zal bepaald worden i.f.v. uw produktie op deze mix en na vergelijking met uw objectief. Daarbij zal het uitgelegde beloningssysteem worden gebruikt. SUBJECTS: make, envelope, label and store actual mix. INSTRUCTIES: 1/ Schrijf uw werkelijke produktie onderaan het schema. Dit zal ook door de medewerkers geverifiëerd worden. 2/ Doe ook een elastiekje rond uw produktie, en schrijf uw nummer op de eerste enveloppe. Zowel uw huidige produktie als die van de verwachte mix zullen nu worden opgehaald.	7 minuten
I. Measures of job tension from job difficulty/ low control, need for dysfunctional behavior.	LOGISTICS: all subjects have the measurement scales. ASSISTANTS: maintain control and assist. Distribute the Check Out questions. Collect previous measures. SUBJECTS: fill out measurements.	Nu u ook de werkelijke produktie hebt gehad, gelieve opnieuw een aantal vragen te beantwoorden. Omcirkel voor elke vraag een keuze van 1 tot 7. SUBJECTS: fill out measurement of job tension caused by job difficulty and low control, and need for dysfunctional behavior. ASSISTANTS: distribute Check Out Questions. Collect the measures.	7 minuten
j. Check out questions.	LOGISTICS: all subjects have the Check Out Questions. ASSISTANTS: maintain control and assist. SUBJECTS: fill out Check Out Questions.	Hiermee zijn we aan het einde gekomen van de oefening. Gelieve nog eventjes op de Einde-Oefening vraagjes te antwoorden; ondertussen wordt uw beloning berekend. SUBJECTS: fill out Check Out Questions. ASSISTANTS: collect everything.	7 minuten
Calculation of Pay.	LOGISTICS: performance on expected mix, performance on actual mix, computer program, one computer and operator in each room. Softdrinks. ASSISTANTS: collect check out questions.	Wij danken u alvast voor uw medewerking. U kunt van een drankje genieten terwijl wij uw vergoeding bereken. Ook de bonussen zullen daarbij toegekend worden. Wij hebben iets meer dan 5 minuten nodig. Mensen die onmiddellijk willen vertrekken kunnen hun vergoeding via iemand anders ontvangen.	

	SUBJECTS: get a drink.		

Appendix 16: Checklist for Assistants - Experiment 2

PROCEDURES EXPERIMENT (medewerkers)

A. Welcome en random toewijzing.

Alle plaatsen zullen genummerd zijn, en alle materiaal ligt reeds ter plaatse. Subjects krijgen een kaartje bij binnenkomen met hun subjectnummer. Ze trekken ook een kleurtje uit een doos. Medewerkers helpen subjects bij het vinden van hun plaats. De subjects moeten zelf geen enkel materiaal meebrengen. Jassen kunnen ze over hun stoel hangen. Medewerkers zorgen ervoor dat alles rustig verloopt, en houden alles onder controle op een vriendelijke manier (creëer geen stress). De subjects laten het materiaal onaangeroerd.

B/ Demonstratie en practice session.

Tijdens de practice session zorgen de medewerkers dat alles rustig verloopt. Sta bij i.g.v. van problemen.

Op het einde: verzamel de ongebruikte enveloppen;
verzamel de gebruikte houders;
breng nieuwe enveloppen.

C/ Expected mix.

Tijdens de produktie van de verwachte mix zorgen de medewerkers ervoor dat alles rustig blijft. Sta bij i.g.v. problemen.

Op het einde: verzamel ongebruikte enveloppen;
verzamel gebruikte houders;
deel de uitleg over onzekerheid uit.

D/ Uncertainty.

Tijdens de uitleg over onzekerheid zorgen de medewerkers ervoor dat alles rustig blijft. Sta bij i.g.v. problemen.

Op het einde: verdeel de uitleg over het beloningssysteem.

E/ Beloningssysteem.

Tijdens de uitleg over het beloningssysteem zorgen de medewerkers ervoor dat alles rustig blijft. Sta bij i.g.v. problemen.

Op het einde: verdeel de budget-setting: unit-based in group 1; activity-based in group 2.

F/ Budget setting.

Tijdens de budgetbepaling zorgen de medewerkers ervoor dat alles rustig blijft. Sta bij i.g.v. problemen. Let erop dat vorige documenten niet gebruikt worden; enkel het blad met de verwachte mix mag bij de subjects liggen.

Op het einde: Ga rond in uw groep en pas het budget aan: In unit-based: + 1, behalve wanneer reeds 12 of meer; In activity-based: pas aan naar 12, behalve wanneer het reeds daarop staat of hoger. Schrijf de budgetten en hun aanpassing in de juiste file (FILE BUDGET); geef die file aan de administrateurs.

Tenslotte: Verdeel de meetschalen.

G/ Metingen.

Tijdens de metingen zorgen de medewerkers ervoor dat alles rustig verloopt. Sta bij i.g.v. problemen.

Op het einde: haal antwoorden op meetschalen op;

let erop dat het subjectnummer vermeld is en juist is;

deel de werkelijke mix uit;

deel nieuwe enveloppen uit.

H/ Werkelijke mix.

Tijdens de produktie van de werkelijke mix zorgen de medewerkers ervoor dat alles rustig verloopt. Sta bij i.g.v. problemen.

Op het einde: tel de werkelijke produktie bij de subjects en schrijf het in uw files (FILE ACTUAL);
geef die file aan de administrateur;
haal ook het blad op met de verwachte mix, en verifieer het getal dat erop staat met de produktie op de verwachte mix;
collecteer zowel de produktie op de verwachte mix als die op de werkelijke mix: doe een elastiekje om beiden.

I/ Meting.

Tijdens de meting zorgen de medewerkers ervoor dat alles rustig blijft. Sta bij i.g.v. problemen.

Op het einde: haal de metingen op;
deel de check-out questions uit.

J/ Check-Out.

Tijdens het invullen van de check-out questions zorgen de medewerkers ervoor dat alles rustig blijft. Sta bij i.g.v. moeilijkheden.

Op het einde: haal de antwoorden op.

Appendix 17: Handbook for Subjects - Experiment 2

HANDBOEK

1. OEFENSESSIE

* **Maak** de volgende catalogusjes:

No.					Types	Colors	Labels
1	Skyline	Luggage	Continent	Jet	1	1	2
2	Wine	Hats	Jazz	Dancers	1	1	2

* **Enveloppeer** en **Label** deze catalogusjes

* **Stockeer** deze catalogusjes in doos

* **Maak**, **Enveloppeer**, **Label** en **Stockeer** de volgende Wildlife catalogus:

3	Bull	Horse	Elephant	Bear	1	3	4

* **Maak**, **Enveloppeer**, **Label** en **Stockeer** de volgende catalogusjes:

4	Elephant	Motorcross	Continent	Wine	4	2	6
5	Skyline	Elephant	Wine	Tennis	4	2	6

* **Maak**, **Enveloppeer**, **Label** en **Stockeer** de volgende catalogusjes:

6	Sports	Continent	Bear	Hats	4	4	8
7	Golf	Luggage	Bear	Dancers	4	4	8

* Oefen met de volgende catalogusjes. Werk zo snel je kunt zonder de kwaliteit te verwaarlozen.

No.						Types	Colors	Labels
1	Continent	Luggage	Skyline	Jet		1	1	2
2	Wine	Dancers	Hats	Jazz		1	1	2
3	Horse	Bull	Elephant	Bear		1	3	4
4	Sports	Continent	Bear	Hats		4	4	8
5	Skyline	Elephant	Wine	Tennis		4	2	6
6	Hats	Wine	Dancers	Jazz		1	1	2
7	Luggage	Skyline	Jet	Continent		1	1	2
8	Skyline	Elephant	Wine	Tennis		4	2	6
9	Continent	Jet	Luggage	Skyline		1	1	2
10	Golf	Luggage	Bear	Dancers		4	4	8

* **<u>Hoe lang werkt u aan de volgende orders</u>**? Schrijf uw tijd neer op de voorbehouden plaats. Deze tijd is uitsluitend voor uw informatie. Zet na elke meting de klokjes terug op nul.

TIJD VOOR BEIDE ORDERS: TIJD PER ORDER:

No.					Types	Colors	Labels
1	Skyline	Luggage	Continent	Jet	1	1	2
2	Wine	Hats	Jazz	Dancers	1	1	2

TIJD VOOR BEIDE ORDERS: TIJD PER ORDER:

No.					Types	Colors	Labels
3	Bull	Horse	Elephant	Bear	1	3	4
4	Bear	Horse	Bull	Elephant	1	3	4

TIJD VOOR BEIDE ORDERS: TIJD PER ORDER:

No.					Types	Colors	Labels
5	Elephant	Motorcross	Continent	Wine	4	2	6
6	Wine	Tennis	Skyline	Elephant	4	2	6

TIJD VOOR BEIDE ORDERS: TIJD PER ORDER:

No.					Types	Colors	Labels
7	Sports	Bear	Continent	Hats	4	4	8
8	Golf	Luggage	Bear	Dancers	4	4	8

*** Gedurende 5 minuten maakt u zoveel orders als u kunt zonder de kwaliteit te verwaarlozen. Enkel volledig afgewerkte orders opgeslagen in de doos mogen worden meegeteld. Denk aan het bonussysteem!**

(hierna volgde Schedule 1: expected product mix for next period)

Appendix 18: Check-Out Questions Experiment 2

EINDE-OEFENING VRAAGJES

NUMMER IN DE OEFENING: ☐ LEEFTIJD: ☐

GESLACHT (aankruisen a.u.b.) MAN ☐
VROUW ☐

1/ WERD DE TAAK GOED UITGELEGD? JA ☐ NEE ☐ COMMENTAAR:

2/ VERSTOND JE DE TAAK VOLDOENDE NA DE OEFENINGSESSIE? JA ☐ NEE ☐ COMMENTAAR:

3/ BEGREEP JE VOLDOENDE WAT DE MOEILIJKE ORDERS WAREN EN WAT DE MAKKELIJKE? JA ☐ NEE ☐ COMMENTAAR:

4/ WAREN DE CHRONOMETERS NUTTIG BIJ HET EVALUEREN VAN DE COMPLEXITEIT VAN VERSCHILLENDE ORDERS TIJDENS DE OEFENING-SESSIE? JA ☐ NEE ☐ COMMENTAAR:

5/ KRUIS HET MEEST COMPLEXE ORDER AAN:

WINE - DANCERS - JAZZ - HATS ☐
BULL - BEAR - ELEPHANT - HORSE ☐
GOLF - LUGGAGE - BULL - WINE ☐

6/ VERSTOND JE WAT JE DIRECTEUR VERTELDE BIJ DE BUDGET BEPALING? JA ☐ NEE ☐ COMMENTAAR:

7/ ANTICIPEERDE JE EEN EVENTUELE BUDGET-AANPASSING DOOR JE DIRECTEUR WANNEER JA ☐ NEE ☐

JE JE PRODUKTIE-OBJECTIEF NEERSCHREEF? COMMENTAAR:

8/ BIJ HET BEPALEN VAN JE PRODUKTIE-OBJECTIEF, STELDE JE EEN IETWAT LAAG GETAL VOOR OMDAT JE VERWACHTE DAT HET NAAR BOVEN ZOU WORDEN AANGEPAST?
JA ☐
NEE ☐
COMMENTAAR:

9/ HEB JE HET AANGEPASTE PRODUKTIE-OBJECTIEF AANVAARD? M.a.w., HEB JE WERKELIJK GEPROBEERD OM HET VOOROPGESTELDE DOEL TE BEREIKEN?
JA ☐
NEE ☐
COMMENTAAR:

10/ VERSTOND JE HET BELONINGSSYSTEEM?
JA ☐
NEE ☐
COMMENTAAR:

11/ IN WELK VAN DE VOLGENDE GEVALLEN IS JE VERGOEDING HET HOOGST? (kruis aan)

HET BUDGET STAAT OP 8, EN JE MAAKT ER 6 ☐
HET BUDGET STAAT OP 6, EN JE MAAKT ER 6 ☐

12/ WAS JE DOOR HET BONUSSYSTEEM (+ 100 BF) GEMOTIVEERD OM GOED JE BEST TE DOEN BIJ DE PRODUKTIE VAN DE VERWACHTE MIX?
JA ☐
NEE ☐
COMMENTAAR:

13/ DENK JE DAT JE NOG EEN PAAR ORDERS MEER HAD KUNNEN PRODUCEREN OP DE VERWACHTE MIX?
ZEKER WEL ☐
WAARSCHIJNLIJKE WEL ☐
WAARSCHIJNLIJK NIET ☐
ZEKER NIET ☐

14/ HOE WAS DE WERKELIJKE PRODUKTMIX IN VERGELIJKING MET DE VERWACHTE MIX?
MOEILIJKER ☐
GELIJK ☐
MAKKELIJKER: ☐

15/ HEB JE MOEILIJKHEDEN GEHAD MET DE NIETMACHIENTJES, DIE IN BELANGRIJKE MATE JE PRODUKTIE HEBBEN BEINVLOED?
JA ☐
NEE ☐
COMMENTAAR:

16/ VOND JE DEZE OEFENING GLOBAAL

GEZIEN

NOGAL VERVELEND ☐

O.K. ☐

EERDER LEUK ☐

17/ HEB JE EEN IDEE WAT WE MET DEZE OEFENING WILDEN ONDERZOEKEN? JA ☐ NEE ☐

ZO JA, WAT?

18/ WAS DE OEFENING GOED GEORGANIZEERD? JA ☐ NEE ☐

COMMENTAAR:

19/ STEL HET VOLGENDE: Ik geef u ofwel 150 BEF vast, ofwel een "alles-of-niets" lottoticketje waarmee u 300 BEF kunt winnen met een kans van p% en 0 BEF met een kans van (100-p)%. Vanaf welke hoogte van p (een percentage tussen 0 en 100) bent u indifferent tussen de 150 BEF gegarandeerd en het lottoticket? Bijvoorbeeld: als p = 20, dan geeft het ticketje u 20% kans op 300 BEF en 80% op 0 BEF. Wat zou voor u p moeten zijn vooraleer u indifferent bent tussen de vaste vergoeding en het lottoticket?

ANTWOORD: p=_____%

HARTELIJK DANK VOOR UW MEDEWERKING!

Appendix 19: Example of Order Form - Experiment 3

BESTELBON

VOOR:

ADAMO BVBA
Zeeweg Zuid 345
1702 Groot-Bijgaarden
02/481.88.00

BESTELLING:

AANTAL	OMSCHRIJVING	EENHEIDSPRIJS incl. BTW	TOTAAL PRIJS
1	HP Color Monitor	12750	12750
2	IBM Thinkpad 340	57243	114486

FORTISSIMO BVBA
321 STEENWEG OOST
9070 DESTELBERGEN
BTW: 12333344455666

Appendix 20: Example Invoice in Experiment 3

VERKOOPFACTUUR



VAN: FORTISSIMO BVBA
321 STEENWEG OOST
9070 DESTELBERGEN
BTW: 12333344455666

AAN:

AANTAL	OMSCHRIJVING	EENHEIDSPRIJS incl. BTW	TOTAAL PRIJS
		SOM:	

FORTISSIMO DANKT U VOOR UW VERTROUWEN!

Appendix 21: MIX 1, 2, 3 (types of orders) - Experiment 3

MIX 1: medium complexity		**MIX 2: high complexity**		**MIX 3: low complexity**	
Customer	# order lines	Customer	# order lines	Customer	# order lines
old	1	old	3	old	1
new	2	new	2	old	1
old	3	new	3	new	2
new	2	old	3	new	1
old	3	new	3	old	1
old	3	new	3	new	2
new	1	new	3	new	2
new	2	new	3	old	1
new	1	new	2	new	3
new	2	old	1	old	1
new	3	old	1	new	1
new	3	old	3	old	1
old	2	new	2	old	1
old	1	new	2	new	3
new	2	old	2	new	2

Appendix 22: Questionnaire used in TEST 2

1/ De informatie van de baas is geloofwaardig.	Sterk Akkoord	Redelijk Akkoord	Beetje Akkoord	Noch Akkoord, Noch Niet Akkoord	Beetje Niet Akkoord	Redelijk Niet Akkoord	Sterk Niet Akkoord
	1	2	3	4	5	6	7
2/ Wanneer de werkelijke mix precies is zoals verwacht, is een objectief van 10 facturen haalbaar.	Sterk Akkoord	Redelijk Akkoord	Beetje Akkoord	Noch Akkoord, Noch Niet Akkoord	Beetje Niet Akkoord	Redelijk Niet Akkoord	Sterk Niet Akkoord
	1	2	3	4	5	6	7
3/ Een objectief van 10 facturen op de verwachte mix is alleen haalbaar mits een zeer hoge inspanning.	Sterk Akkoord	Redelijk Akkoord	Beetje Akkoord	Noch Akkoord, Noch Niet Akkoord	Beetje Niet Akkoord	Redelijk Niet Akkoord	Sterk Niet Akkoord
	1	2	3	4	5	6	7
4/ Wanneer het finale budget op 9 facturen ligt is dit onrealistisch hoog.	Sterk Akkoord	Redelijk Akkoord	Beetje Akkoord	Noch Akkoord, Noch Niet Akkoord	Beetje Niet Akkoord	Redelijk Niet Akkoord	Sterk Niet Akkoord
	1	2	3	4	5	6	7
5/ Een finaal budget van 9 orders op de verwachte mix is haalbaar.	Sterk Akkoord	Redelijk Akkoord	Beetje Akkoord	Noch Akkoord, Noch Niet Akkoord	Beetje Niet Akkoord	Redelijk Niet Akkoord	Sterk Niet Akkoord
	1	2	3	4	5	6	7

Appendix 23: Recruitment Letter Subjects for Experiment 3

Vrijdag 7 april, 1995

Beste,

Met dit briefje willen wij u op de hoogte brengen van een initiatief dat wordt georganiseerd door de vakgroep Accountancy en Beheerscontrole van de Economische Faculteit.

Prof. Dr. Werner Bruggeman en medewerker Dominique Waeytens werken aan een onderzoek dat gaat over het bepalen van objectieven in een budgetteringscontext. Om verschillende redenen gebeurt dit onderzoek niet in echte bedrijven maar wel in een gesimuleerde bedrijfssituatie. We hebben een oefening opgesteld waarin een budgetbepaling wordt geënsceneerd voor een administratieve functie. De resultaten van de oefening moeten helpen om conclusies te formuleren in bovenstaand onderzoek.

Voor deze oefening hebben we een groot aantal mensen nodig, en het is hiervoor dat we ons richten tot de studenten van de 1ste en 2de licentie. De oefening heeft raakpunten met de vakken Kostencalculatie en Beheerscontrole van Prof. Bruggeman, al is er eigenlijk geen specifieke voorkennis nodig. De oefening zal ongeveer 1,5 uur in beslag nemen en zal door iedereen tesamen worden uitgevoerd. Deelname gebeurt uiteraard op vrijwillige basis. Een belangrijke stimulans is echter dat u voor uw moeite zult betaald worden! Uw verdienste zal zeker liggen tussen de 300 BF en 800 BF (onmiddellijk uitbetaald). Het kan echter ook meer zijn aangezien u extra bonussen kunt verdienen. Is dit niet leuk meegenomen voor anderhalf uur werk? De preciese hoogte van de beloning is afhankelijk van uw prestatie in de oefening, een beetje handigheid, en een beetje geluk. Er zal voor iedereen ook een drankje zijn achteraf. Het is geen test van kennis, en er is geen enkele specifieke voorkennis vereist.

Wat zal er precies gebeuren? De oefening simuleert een administratieve functie van een bedrijf dat informaticaprodukten aanbiedt. U zult werken op de afdeling waar de verkoopfacturen worden opgesteld op basis van de bestelbons. Nadat u eerst de gelegenheid hebt gekregen om even met deze taak te oefenen, zult u vervolgens een objectief opstellen m.b.t. het aantal facturen die u in de volgende periode zult opmaken. Daarna zult u effectief proberen deze doelstelling te realiseren. Meer uitleg zult u natuurlijk krijgen tijdens de oefening zelf, maar ook bij het begin van de les Arbeidseconomie van Prof. Omey op 20 april (voor eerste licentie) en Belgisch Belastingstelsel van Prof. Beghin op 19 april (voor tweede licentie). Er zal dan een lijst rondgaan waarop u uw naam kunt zetten voor deelname. Een bijkomende inschrijving zal eventueel voorzien worden bij het begin van de les Methodologie van Prof. Van Kenhove op 25 april (voor eerste lic.) en Bedrijfsfinanciering van Prof.

Manigart op 25 april (voor tweede lic.). De oefening zelf heeft plaats op woensdag 26 april om 13.30 uur in auditorium 1 op de Hoveniersberg. Breng wel je favoriete rekenmachientje mee omdat op de facturen prijzen van bestellingen moeten opgeteld worden.

Wij hopen u, net voor de blokperiode, nog te kunnen motiveren voor deelname aan dit onderzoek. U zult er in elk geval een financiële vergoeding aan over houden, plus ook een werkelijke ervaring met het opstellen van budgetten. Bovendien is de simulatie zeker niet onaangenaam; de overgrote meerderheid van de deelnemers aan vorige gelijkaardige oefeningen heeft er steeds zeer positief op gereageerd.

Bij voorbaat al dank voor uw medewerking!

Prof.Dr. Werner Bruggeman

Dominique Waeytens

Appendix 24: Explanation of Pay Scheme - Experiment 3

HET BELONINGSSYSTEEM IN ONZE ONDERNEMING

Je zult 50 BF krijgen voor elke factuur die je maakt, maar je wordt beboet als je er minder doet dan je volume-objectief. Bovendien word je er niet beter van door meer facturen te maken dan je objectief. Anders gezegd: je krijgt 50 BF per afgewerkt produkt min 50 keer het verschil tussen uw budget en uw produktie. In formulevorm ziet het beloningssysteem er als volgt uit:

Ontvangst =50 BF * (Werkelijke Produktie) - 50 BF * (absolute waarde van verschil tussen Gebudgetteerde Produktie en Werkelijke Produktie)

Een aantal voorbeelden ter verduidelijking. Stel dat je een verwachte mix hebt bekeken, en dat je je doel voor de volgende periode stelt op 8 facturen. Wanneer de periode begint blijkt dat de werkelijke mix van bestellingen en klanten inderdaad is zoals verwacht, en je slaagt erin om alle 8 facturen op te maken. Je vergoeding is dan:
Ontvangst = 50 BF * (8) - 50 BF * (8-8) = 400 BF.

Wanneer echter de werkelijke mix makkelijker is dan verwacht zodat je 10 facturen maakt i.p.v. de vooropgestelde 8, dan is je vergoeding:
Ontvangst = 50 BF * (10) - 50 BF * (8-10) = 400 BF.
Je ziet dat je er niet beter van wordt door meer facturen te maken dan je produktie-objectief.

Wanneer tenslotte de werkelijke mix moeilijker is dan verwacht zodat je er maar in slaagt om 6 facturen te maken i.p.v. de gebudgetteerde 8, dan is je vergoeding:
Ontvangst = 50 BF * (6) - 50 BF * (8-6) = 200 BF.
Je ziet dat je beboet wordt wanneer je je budget niet haalt. Indien je in dit geval je budget op 6 facturen had gezet, was je vergoeding:
Onvangst = 50 BF * (6) - 50 BF * (6-6) = 300 BF.

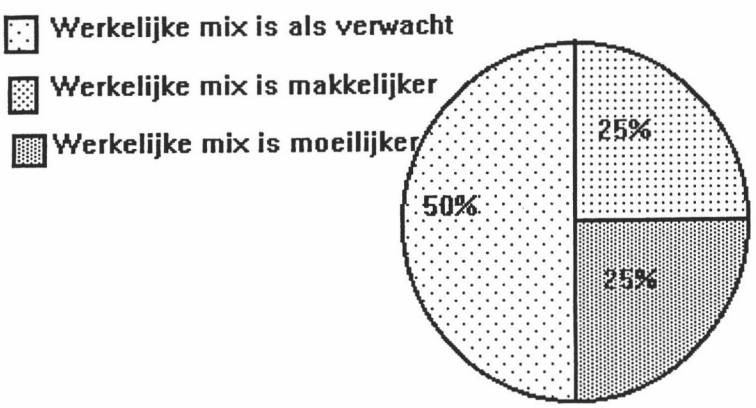
Hierna volgen nog een aantal **voorbeelden** in een tabelletje:

Als je budget staat op	7,	en je maakt ze alle	7,	dan krijg je	350 BF.
Als je budget staat op	7,	en je maakt er	10,	dan krijg je	350 BF.
Als je budget staat op	8,	maar je maakt slechts	7,	dan krijg je	300 BF.
Als je budget staat op	8,	en je maakt er	14,	dan krijg je	400 BF.
Als je budget staat op	9,	maar je maakt slechts	7,	dan krijg je	250 BF.
Als je budget staat op	9,	en je maakt ze alle	9,	dan krijg je	450 BF.
Als je budget staat op	10,	maar je maakt slechts	8,	dan krijg je	300 BF.
Als je budget staat op	10,	en je maakt ze alle	10,	dan krijg je	500 BF.
Als je budget staat op	10,	en je maakt er	13,	dan krijg je	500 BF.
Als je budget staat op	12,	maar je maakt slechts	7,	dan krijg je	100 BF.
Als je budget staat op	12,	en je maakt ze alle	12,	dan krijg je	600 BF.

Appendix 25: Explanation of Uncertainty - Experiment 3

ONZEKERHEID: ONZE OMGEVING IS MOEILIJK TE VOORSPELLEN!

De mix van facturen die je zopas gemaakt hebt is de verwachte mix voor de volgende periode. Aangezien je deze mix zelf al hebt gemaakt kun je goed inschatten wat je maximale output op deze combinatie zou kunnen zijn. Je zult gevraagd worden een volume-objectief (of een budget) op te stellen voor de volgende periode; dit is een doelstelling m.b.t. het aantal facturen die je zult opmaken in de komende periode van 10 minuten. Het probleem is echter dat de werkelijke mix van bestellingen die je zult ontvangen kan verschillen van de verwachte mix (die je net gemaakt hebt). Onze externe omgeving is immers moeilijk te voorspellen, en we kunnen nooit met zekerheid weten welke bestellingen er de volgende periode zullen binnenkomen. De werkelijke mix kan er één zijn met meer of minder moeilijke facturen, maar hij kan natuurlijk ook precies zijn zoals verwacht. We weten dat in 50% van de periodes de werkelijke mix precies is zoals verwacht. In de andere 50% van de periodes echter verschilt de werkelijke mix van de verwachte. In de periodes dat de werkelijke mix verschilt van de verwachte, is hij ofwel moeilijker ofwel gemakkelijker. Beide situaties zijn even waarschijnlijk. De volgende "taart" geeft de kansverdeling weer:



We kunnen je nu nog niet zeggen hoe de werkelijke mix er voor jou zal uitzien, en of hij moeilijker, makkelijker, of precies gelijk is als verwacht. We kunnen je enkel de kansverdeling geven. De werkelijke mix die je straks zult ontvangen is bepaald door de kleur van het briefje dat je bij het binnenkomen hebt gekregen (met je nummer op). De eerste persoon die zich aanmelde heeft een groen briefje gekregen, de tweede een blauw, de derde een rood, en de vierde een geel; vanaf de vijfde persoon begon het weer opnieuw: groen, blauw, rood, geel, enz. We zeggen natuurlijk niet welke kleur voor welke mix staat (anders zou er geen onzekerheid meer zijn), maar je mag wel weten dat twee van de vier kleuren staan voor een mix die is zoals verwacht, één kleur staat voor een moeilijker mix, en het vierde kleur staat voor een makkelijker mix.

Appendix 26: Measurement Scales in Experiment 3

Items 1 to 12: Perceived Information Asymmetry; Items 13 to 20: Pressure not to misrepresent; Items 21 to 27: Job Tension from Reduced Job Control; Items 28 to 30: Job Tension from Job difficulty and Low Control; 31 to 34: Need for Dysfunctional Behavior.

OMCIRKEL VOOR ELKE UITSPRAAK EEN KEUZE VAN 1 (Sterk Akkoord) tot 7 (Sterk Niet Akkoord).

1. In de budgetnegotiatie lijkt de baas veel informatie te hebben over deze taak.	Sterk Akkoord	Redelijk Akkoord	Beetje Akkoord	Noch Akkoord, Noch Niet Akkoord	Beetje Niet Akkoord	Redelijk Niet Akkoord	Sterk Niet Akkoord
	1	2	3	4	5	6	7
2. In de budgetnegotiatie lijkt de baas veel informatie te hebben over de deelactiviteiten waaruit deze taak bestaat.	Sterk Akkoord	Redelijk Akkoord	Beetje Akkoord	Noch Akkoord, Noch Niet Akkoord	Beetje Niet Akkoord	Redelijk Niet Akkoord	Sterk Niet Akkoord
	1	2	3	4	5	6	7
3. In de budgetnegotiatie lijkt de baas veel informatie te hebben over de factoren die bepalen hoelang men zal werken aan een bepaalde factuur.	Sterk Akkoord	Redelijk Akkoord	Beetje Akkoord	Noch Akkoord, Noch Niet Akkoord	Beetje Niet Akkoord	Redelijk Niet Akkoord	Sterk Niet Akkoord
	1	2	3	4	5	6	7
4. In de budgetnegotiatie lijkt de baas goed op de hoogte van de complexiteit van de verwachte mix.	Sterk Akkoord	Redelijk Akkoord	Beetje Akkoord	Noch Akkoord, Noch Niet Akkoord	Beetje Niet Akkoord	Redelijk Niet Akkoord	Sterk Niet Akkoord
	1	2	3	4	5	6	7
5. Omdat ik nu al verschillende facturen heb opgemaakt weet ik veel beter dan de baas hoe deze taak in elkaar zit.	Sterk Akkoord	Redelijk Akkoord	Beetje Akkoord	Noch Akkoord, Noch Niet Akkoord	Beetje Niet Akkoord	Redelijk Niet Akkoord	Sterk Niet Akkoord
	1	2	3	4	5	6	7

6. De informatie van mijn baas over deze taak is vrij volledig.	Sterk Akkoord	Redelijk Akkoord	Beetje Akkoord	Noch Akkoord, Noch Niet Akkoord	Beetje Niet Akkoord	Redelijk Niet Akkoord	Sterk Niet Akkoord
	1	2	3	4	5	6	7
7. De informatie van mijn baas over deze taak is vrij gedetailleerd.	Sterk Akkoord	Redelijk Akkoord	Beetje Akkoord	Noch Akkoord, Noch Niet Akkoord	Beetje Niet Akkoord	Redelijk Niet Akkoord	Sterk Niet Akkoord
	1	2	3	4	5	6	7
8. In de budgetnegotiatie weet ik beter dan mijn baas hoeveel orders ik maximaal zou kunnen maken op de verwachte mix.	Sterk Akkoord	Redelijk Akkoord	Beetje Akkoord	Noch Akkoord, Noch Niet Akkoord	Beetje Niet Akkoord	Redelijk Niet Akkoord	Sterk Niet Akkoord
	1	2	3	4	5	6	7
9. De argumentatie van mijn baas in de budgetnegotiatie is vrij overtuigend.	Sterk Akkoord	Redelijk Akkoord	Beetje Akkoord	Noch Akkoord, Noch Niet Akkoord	Beetje Niet Akkoord	Redelijk Niet Akkoord	Sterk Niet Akkoord
	1	2	3	4	5	6	7
10. De argumentatie van mijn baas in de budgetnegotiatie is blijkbaar gebaseerd op een vrij grondige analyse van de taak.	Sterk Akkoord	Redelijk Akkoord	Beetje Akkoord	Noch Akkoord, Noch Niet Akkoord	Beetje Niet Akkoord	Redelijk Niet Akkoord	Sterk Niet Akkoord
	1	2	3	4	5	6	7
11. De standaardtijden waarover mijn baas beschikt lijken mij gemiddeld gezien vrij geloofwaardig.	Sterk Akkoord	Redelijk Akkoord	Beetje Akkoord	Noch Akkoord, Noch Niet Akkoord	Beetje Niet Akkoord	Redelijk Niet Akkoord	Sterk Niet Akkoord
	1	2	3	4	5	6	7

12. Tegenover mijn baas heb ik weinig extra kennis en troeven om een goed budget te negotiëren.	Sterk Akkoord	Redelijk Akkoord	Beetje Akkoord	Noch Akkoord, Noch Niet Akkoord	Beetje Niet Akkoord	Redelijk Niet Akkoord	Sterk Niet Akkoord
	1	2	3	4	5	6	7
13. Wanneer ik mijn eigen budgetsuggestie opgaf had ik het gevoel dat de baas precies wist welk voorstel hij wou zien.	Sterk Akkoord	Redelijk Akkoord	Beetje Akkoord	Noch Akkoord, Noch Niet Akkoord	Beetje Niet Akkoord	Redelijk Niet Akkoord	Sterk Niet Akkoord
	1	2	3	4	5	6	7
14. Wanneer ik mijn eigen budgetsuggestie opgaf had ik het gevoel dat ik eigenlijk weinig keuze had over wat ik moest neerschrijven.	Sterk Akkoord	Redelijk Akkoord	Beetje Akkoord	Noch Akkoord, Noch Niet Akkoord	Beetje Niet Akkoord	Redelijk Niet Akkoord	Sterk Niet Akkoord
	1	2	3	4	. 5	6	7
15. Wanneer ik mijn eigen budget-suggestie opgaf had ik het gevoel dat ik mezelf niet mocht onderschatten.	Sterk Akkoord	Redelijk Akkoord	Beetje Akkoord	Noch Akkoord, Noch Niet Akkoord	Beetje Niet Akkoord	Redelijk Niet Akkoord	Sterk Niet Akkoord
	1	2	3	4	5	6	7
16. Wanneer ik mijn budget-suggestie opgaf voelde ik een druk om mijn voorstel niet te laag te zetten.	Sterk Akkoord	Redelijk Akkoord	Beetje Akkoord	Noch Akkoord, Noch Niet Akkoord	Beetje Niet Akkoord	Redelijk Niet Akkoord	Sterk Niet Akkoord
	1	2	3	4	5	6	7
17. Gegeven de informatie van de baas kan hij makkelijk weten wanneer mijn voorstel te laag is.	Sterk Akkoord	Redelijk Akkoord	Beetje Akkoord	Noch Akkoord, Noch Niet Akkoord	Beetje Niet Akkoord	Redelijk Niet Akkoord	Sterk Niet Akkoord
	1	2	3	4	5	6	7

18. De budgetnegotiatie geeft mij een soort druk om mezelf niet verkeerd voor te stellen.	Sterk Akkoord	Redelijk Akkoord	Beetje Akkoord	Noch Akkoord, Noch Niet Akkoord	Beetje Niet Akkoord	Redelijk Niet Akkoord	Sterk Niet Akkoord
	1	2	3	4	5	6	7
19. De argumentatie van de baas heeft op mij geen enkele invloed gehad.	Sterk Akkoord	Redelijk Akkoord	Beetje Akkoord	Noch Akkoord, Noch Niet Akkoord	Beetje Niet Akkoord	Redelijk Niet Akkoord	Sterk Niet Akkoord
	1	2	3	4	5	6	7
20. Ik heb mijn budgetsuggestie gezet totaal onafhankelijk van de baas.	Sterk Akkoord	Redelijk Akkoord	Beetje Akkoord	Noch Akkoord, Noch Niet Akkoord	Beetje Niet Akkoord	Redelijk Niet Akkoord	Sterk Niet Akkoord
	1	2	3	4	5	6	7
21. Na de budgetbepaling voel ik mij wat gespannen omdat ik geen gunstig budget heb bekomen.	Sterk Akkoord	Redelijk Akkoord	Beetje Akkoord	Noch Akkoord, Noch Niet Akkoord	Beetje Niet Akkoord	Redelijk Niet Akkoord	Sterk Niet Akkoord
	1	2	3	4	5	6	7
22. De budgetbepaling geeft mij weinig controle over mijn finaal budget.	Sterk Akkoord	Redelijk Akkoord	Beetje Akkoord	Noch Akkoord, Noch Niet Akkoord	Beetje Niet Akkoord	Redelijk Niet Akkoord	Sterk Niet Akkoord
	1	2	3	4	5	6	7
23. Ik denk dat het finaal budget waarschijnlijk haalbaar moet zijn.	Sterk Akkoord	Redelijk Akkoord	Beetje Akkoord	Noch Akkoord, Noch Niet Akkoord	Beetje Niet Akkoord	Redelijk Niet Akkoord	Sterk Niet Akkoord
	1	2	3	4	5	6	7

24. Het finaal budget wijkt weinig af van mijn werkelijk potentieel.	Sterk Akkoord	Redelijk Akkoord	Beetje Akkoord	Noch Akkoord, Noch Niet Akkoord	Beetje Niet Akkoord	Redelijk Niet Akkoord	Sterk Niet Akkoord
	1	2	3	4	5	6	7
25. De wijze van budgetbepaling geeft mij weinig speelruimte.	Sterk Akkoord	Redelijk Akkoord	Beetje Akkoord	Noch Akkoord, Noch Niet Akkoord	Beetje Niet Akkoord	Redelijk Niet Akkoord	Sterk Niet Akkoord
	1	2	3	4	5	6	7
26. Ik voel mij wat gespannen omdat ik niet weet of het finaal budget haalbaar zal zijn.	Sterk Akkoord	Redelijk Akkoord	Beetje Akkoord	Noch Akkoord, Noch Niet Akkoord	Beetje Niet Akkoord	Redelijk Niet Akkoord	Sterk Niet Akkoord
	1	2	3	4	5	6	7
27. Ik voel mij wat gespannen omdat ik het budget graag flink anders had gezien.	Sterk Akkoord	Redelijk Akkoord	Beetje Akkoord	Noch Akkoord, Noch Niet Akkoord	Beetje Niet Akkoord	Redelijk Niet Akkoord	Sterk Niet Akkoord
	1	2	3	4	5	6	7
28. Gegeven mijn budget voelde ik me wat gespannen bij het uitvoeren van de taak.	Sterk Akkoord	Redelijk Akkoord	Beetje Akkoord	Noch Akkoord, Noch Niet Akkoord	Beetje Niet Akkoord	Redelijk Niet Akkoord	Sterk Niet Akkoord
	1	2	3	4	5	6	7
29. Terwijl ik aan de taak werkte voelde ik nogal wat spanning omdat ik dacht dat ik mijn objectief niet zou halen.	Sterk Akkoord	Redelijk Akkoord	Beetje Akkoord	Noch Akkoord, Noch Niet Akkoord	Beetje Niet Akkoord	Redelijk Niet Akkoord	Sterk Niet Akkoord
	1	2	3	4	5	6	7

30. Terwijl ik aan de taak werkte voelde ik nogal wat spanning omdat mijn doelstelling nogal scherp was gesteld.	Sterk Akkoord	Redelijk Akkoord	Beetje Akkoord	Noch Akkoord, Noch Niet Akkoord	Beetje Niet Akkoord	Redelijk Niet Akkoord	Sterk Niet Akkoord
	1	2	3	4	5	6	7
31. Om mijn objectief te halen heb ik soms wat ingeboet aan kwaliteit en netheid (of heb het tenminste overwogen).	Sterk Akkoord	Redelijk Akkoord	Beetje Akkoord	Noch Akkoord, Noch Niet Akkoord	Beetje Niet Akkoord	Redelijk Niet Akkoord	Sterk Niet Akkoord
	1	2	3	4	5	6	7
32. Om mijn objectief te halen heb ik wel eens overwogen om een moeilijker factuur over te slaan.	Sterk Akkoord	Redelijk Akkoord	Beetje Akkoord	Noch Akkoord, Noch Niet Akkoord	Beetje Niet Akkoord	Redelijk Niet Akkoord	Sterk Niet Akkoord
	1	2	3	4	5	6	7
33. Ik zou mijn baas wel eens willen overtuigen dat zijn informatiesysteem leidt tot veel te hoge objectieven.	Sterk Akkoord	Redelijk Akkoord	Beetje Akkoord	Noch Akkoord, Noch Niet Akkoord	Beetje Niet Akkoord	Redelijk Niet Akkoord	Sterk Niet Akkoord
	1	2	3	4	5	6	7
34. In een werkelijke bedrijfs-situatie zou ik waarschijnlijk protesteren tegen deze manier van budgetbepaling.	Sterk Akkoord	Redelijk Akkoord	Beetje Akkoord	Noch Akkoord, Noch Niet Akkoord	Beetje Niet Akkoord	Redelijk Niet Akkoord	Sterk Niet Akkoord
	1	2	3	4	5	6	7

Appendix 27: Activity-based budget meeting in Experiment 3

DE BUDGET BEPALING (= VOLUME-OBJECTIEF)

Hallo, hier spreekt je directeur. Ik heb je hulp, je ervaring, en je proceskennis nodig bij het bepalen van je volume-objectief voor de volgende werkperiode. Ik heb net zoals jij de mix van verwachte bestellingen bekeken voor volgende periode, en ik heb een voorstel voor je objectief. Ik beschik over een gedetailleerd informatiesysteem gebaseerd op een analyse van je activiteiten en hun "kostdrijvers"; dit laatste zijn factoren die de tijd en dus de kost van je activiteiten beïnvloeden. Dit informatiesysteem zegt mij dat je in de komende werkperiode die 10 minuten lang is (= 600 seconden) in staat moet zijn om ongeveer 10 facturen af te werken. Dit is gebaseerd op de volgende gegevens, bepaald na onderzoek met een grote groep mensen:

ACTIVITEIT	**"KOSTDRIJVER"**	**TIJD PER EENHEID KOSTDRIJVER (a)**
Invullen Nieuwe Klant	Het Aantal Nieuwe Klanten	24 seconden per Nieuwe Klant
Opmaken en Berekenen Factuur	Het Aantal Orderlijnen	21 seconden per Orderlijn
Nieten en Opslaan Factuur en Bestelbon	Het Aantal Facturen	6 seconden per Factuur

De volgende tabel geeft aan dat je in 10 minuten (= 600 seconden) inderdaad de eerste 10 facturen kunt afwerken:

ACTIVITEIT	**AANTAL DRIJVERS VOOR EERSTE 10 FACTUREN (b)**	**TIJD PER ACTIVITEIT (a) * (b)**
Invullen Nieuwe Klant	6 Nieuwe Klanten	6 * 24 = 144 seconden
Opmaken en Berekenen Factuur	18 Orderlijnen	18 * 21 = 378 seconden
Nieten en Opslaan Factuur en Bestelbon	10 Facturen	10 * 6 = 60 seconden
	TOTAAL BENODIGDE TIJD:	**582 seconden**

Je ziet dat een objectief van 10 facturen in 10 minuten inderdaad haalbaar moet zijn. Welk objectief stel je zelf voor?

Schrijf hieronder wat je voorstel is voor je volume-objectief, en bezorg mij dit blad zodat ik kan zien of ik je voorstel aanvaard of niet.

Objectief in Aantal Facturen: ☐

Aangepast Objectief in Aantal Facturen (in te vullen door je directeur): ☐

Appendix 27: Unit-based budget meeting in Experiment 3

DE BUDGET BEPALING (= VOLUME-OBJECTIEF)

Hallo, hier spreekt je directeur. Ik heb je hulp, je ervaring, en je proceskennis nodig bij het bepalen van je volume-objectief voor de volgende werkperiode. Ik heb net zoals jij de verwachte bestellingen bekeken voor volgende periode, en ik heb een voorstel voor je objectief. Uit vorige periodes weet ik dat het gemiddeld ongeveer 60 seconden duurt voor het afwerken van een volledige factuur. Deze informatie zegt mij dat je in de komende periode die 10 minuten lang is (= 600 seconden) in staat moet zijn om ongeveer 10 facturen te maken. Welk objectief stel je zelf voor?

Schrijf hieronder wat je voorstel is voor je volume-objectief, en bezorg mij dit blad zodat ik kan zien of ik je voorstel aanvaard of niet.

Objectief in Aantal Facturen: ☐

Aangepast Objectief in Aantal Facturen (in te vullen door je directeur): ☐

Appendix 28: Experimental Procedures - Experiment 3

PROCEDURE	LOGISTICS	TEXT	DURATION
a. Welcome and random assignment of subjects to 2 groups.	Random assignment: when subjects show up one by one, they are assigned a seat in order of appearance. In the front rows of Aud. 1 seats are numbered 1-40, in the last rows they are numbered 41-80. Upon arrival subjects receive a subject number on a card. Also upon arrival, subjects draw a color from a box; this color will determine the actual mix. The assistants assist subjects in finding their place. Also they maintain control.		
b. Demonstration and practice session.	Standing in front of the room I explain and demonstrate the task for the whole group. MATERIAL: all subjects have an envelope with the material for the practice session and the expected mix. Also they have a stapler, and there own calculator. ASSISTANTS: The assitants stand by and assist in case of problems. At the end of the practice session they make sure that the subjects put their practice material aside. SUBJECTS: At the end they put their practice material aside, and take the forms for the expected mix.	Welkom op deze budgetteringsoefening. INFO VOORAF. Mag ik u vragen deze oefening serieus op te vatten, en u in te leven alsof dit een werkelijke onderneming was. Uw antwoorden worden anoniem verwerkt. Enkel uw nummer in de oefening moet op de formulieren voorkomen. Zet uw nummer steeds op elk blad dat u krijgt; zoniet riskeert u dat we uw beloning niet kunnen uitrekenen. GO-GO-GO. De oefening heeft voornamelijk te maken met budgetteren, maar dan moet er natuurlijk een bedrijvigheid zijn waarover een budget moet opgesteld worden. Daarom hebben we een administratieve taak opgezet waarvoor we later een budget of volume-objectief zullen bepalen. We simuleren hier een bedrijf uit de informatica sector, waarbij u in de facturatie-afdeling werkt. Uw opdracht is om verkoopfacturen op te maken op basis van de interne bestelbons (opgemaakt door de verkopers). INSTRUCTIES: Neem uit uw enveloppe de witte bladen, en leg de bestelbons en de op te maken verkoopfacturen naast elkaar. Neem ook het nietmachientje uit de enveloppe en leg het voor u. Neem ook uw rekenmachientje en uw stylo bij de hand. Leg de rest van de enveloppe uit de weg. SUBJECTS: do it Een verkoopfactuur opmaken houdt in dat u de klant invult in het voorbestemde vakje, de bestelling volledig overneemt op de factuur, het totaal bedrag uitrekent en onderaan invult, en tenslotte bestelbon en factuur samenniet en opzij legt. U hebt zes bestelbons gekregen om mee te oefenen.	15 - 20 minutes

		INSTRUCTIES: Bekijk die eens goed zodat u de bedoeling verstaat en vertrouwd geraakt met de terminologie. SUBJECTS: kijk eens goed naar stapeltje. We gaan onmiddellijk oefenene met deze taak. De bedoeling is om zo snel mogelijk deze facturen te leren opmaken, zonder echter de kwaliteit, correctheid en netheid te verwaarlozen. U neemt de bestelbons in de volgorde waarin ze voorkomen. INSTRUCTIES: U kunt nu beginnen oefenen. Let dus op snelheid, maar ook op correctheid en netheid. Probeer het nieten zo vlot mogelijk te laten verlopen, en zoek een geschikte routine voor het optellen. U kunt nu beginnen; u doet dit ieder voor zich. Deze oefening is volledig individueel. SUBJECTS: do it. Ziezo, hiermee zijn we aan het einde gekomen van de oefensessie. U hebt nu ervaring kunnen opdoen met de bedrijvigheid in uw afdeling. Het is nu alsof u hier al tien jaar werkt. We kunnen nu verder gaan met het vervolg van de oefening. INSTRUCTIES: Stop de afgewerkte facturen en de rest v.d. formulieren terug in de enveloppe. Haal het stapeltje groene formulieren nu uit de enveloppe en leg de bestelbons en facturen opnieuw naast elkaar. SUBJECTS: do it.	
c. Expected Mix: assesment of potential; effort stimulating pay scheme.	Subjects turn to the green forms that contain the mix for next period. MATERIAL: all subjects have this green set of forms, their stapler, and their calculator. ASSISTANTS: assist in case of problems, maintain control. At the end make sure that the subjects put the green forms aside. Also distribute explanation of Uncertainty. SUBJECTS: at the end put green forms aside.	Nu dat u de taak onder de knie hebt kunt u voor u zelf testen hoe goed u er eigenlijk in bent (daarna stoppen we een tijdje met deze taak). INSTRUCTIES: U krijgt 10 minuten om zoveel mogelijk verkoopfacturen correct en net op te maken. Let dus vooral op snelheid zonder de kwaliteit te verwaarlozen. Om u te stimuleren is er het volgende bonussysteem: de beste 20 performers krijgen nog eens 150 BEF extra op wat ze op het einde van de oefening zullen verdiend hebben. Op het einde schrijft u uw totaal aantal afgewerkte facturen (samengeniet en al) op de voorkant van uw enveloppe.	12 minuten
d. Explanation of	LOGISTICS: all subjects have a paper with	U kent nu de taak en uw capaciteiten. Nu volgt wat uitleg over de manier van werken in de	7 minuten

Uncertainty.	the explanation of uncertainty. ASSISTANTS: assist in case of problems, maintain control. At the end, distribute explanation of Pay scheme. SUBJECTS: read	onderneming, en onze externe omgeving. In onze onderneming werken we in periodes. Bij het begin van elke periode wordt een objectief (of budget) opgesteld m.b.t. het aantal facturen die in die periode zullen opgemaakt worden. Dit objectief wordt door u en uw baas samen bepaald op basis van de mix van de verwachte orders (facturen) voor die periode. De verwachte mix is een voorspelling van de marketingafdeling m.b.t. tot de bestellingen en klanten voor de volgende periode. De verwachte mix van facturen voor de volgende periode ziet eruit als die die u net heeft opgemaakt. Aangezien u deze mix reeds heeft kunnen maken, kunt u goed inschatten wat uw maximale output op zo'n mix moet kunnen zijn. Deze kennis moet u helpen om een volume-objectief te bepalen voor de komende periode. Dit is een objectief m.b.t. het aantal facturen dat u gaat opmaken in die periode (een periode is 10 minuten lang). Dit objectief wordt vastgesteld in samenspraak met uw baas, tijdens een budgetvergadering. Het probleem is echter dat de werkelijke mix van bestellingen die u zult ontvangen kan verschillen van de verwachte mix. Onze externe omgeving is immers gekenmerkt door onzekerheid, zodat we niet met volledige zekerheid kunnen voorspellen hoe de mix er werkelijk zal uitzien. Op het blad dat u zopas gekregen hebt leest u wat die onzekerheid betekent. SUBJECTS: read Uncertainty. Is hierover alles duidelijk? Op het bord wordt dit nog eventjes voor u samengevat. INSTRUCTIES: Steek blad Uncertainty in uw enveloppe.	
e. Explanation of Pay Scheme.	LOGISTICS: all subjects have a paper with the explanation of the Pay scheme. ASSISTANTS: assist in case of problems, maintain control. At the end distribute budget setting: unit-based in group 1; activity-based in group 2. SUBJECTS: read	Vooraleer we aan de eigenlijke objectiefbepaling kunnen beginnen moeten we het nog hebben over het beloningsysteem in de onderneming, want uw vergoeding is natuurlijk voor een stuk afhankelijk van het halen van uw objectief. Op het blad dat u zopas hebt gekregen leest u hoe het beloningssysteem in elkaar zit. SUBJECTS: read Pay scheme. Is hierover alles duidelijk? Op het bord staat de beloningsformule. INSTRUCTIES: Steek blad Pay Scheme in uw enveloppe. U hoeft enkel de formule voor de geest te hebben. VRAAGJE: Wat is uw beloning als uw budget op 8 staat en je er werkelijk 10 maakt?	7 minuten
f. Budget Setting (before adjustment).	LOGISTICS: all subjects have a paper with the budget negotiation. ASSISTANTS: at the end, distribute the measures of information asymmetry and pressure not to misrepresent, plus Risk Attitude. SUBJECTS: give a budget suggestion.	Nu u alles weet over de werking van de onderneming, de onzekerheid in onze omgeving, en het beloningssysteem, kunnen we overgaan tot de budgetbepaling. Hierbij gaat u een volume-objectief bepalen samen met uw baas. Uw baas zal een voorstel doen m.b.t. het aantal facturen dat u zou moeten maken, en dan geeft u zelf uw eigen voorstel. Natuurlijk zal de baas het laatste woord hebben, maar u kunt in elk geval een voorstel doen dat al dan niet door uw baas zal worden aanvaard. Als het niet wordt aanvaard zal een aanpassing gebeuren op basis van regels die enkel door uw baas gekend zijn. Praktisch zal dat gebeuren door de medewerkers in	7 minuten

		de zaal. Het is het finaal budget dat zal beschouwd worden bij de loonberekening. INSTRUCTIES: Neem eventueel de verwachte mix terug bij u (witte bladen), maar voor de rest hebt u niets anders nodig. Dan begint nu de budgetvergadering. SUBJECTS: make a budget suggestion. Is iedereen klaar? Leg dan uw budgetblad omgekeerd weg (u heeft het niet nodig voor het volgende onderdeel); u moogt ook geen wijzigingen meer aanbrengen aan uw voorstel.	
g. Measurement of Perceived Information Asymmetry and Pressure not to Misrepresent, and Risk Attitude.	LOGISTICS: all subjects have the measurement scales. ASSISTANTS: maintain control and assist. At the end, prepare for adjustment. SUBJECTS: fill out measures.	Vooraleer we overgaan tot een eventuele aanpassing, gelieve even de volgende vragen te beantwoorden. INSTRUCTIES: Omcirkel voor elke uitspraak een keuze van 1 tot 7. Schrijf ook uw nummer op het vragenblad. Antwoord ook op de vraag m.b.t. hypothetische budget-situatie. SUBJECTS: do it. INSTRUCTIES: Stop de vragen en uw antwoorden in uw enveloppe.	7 minutes
h. Adjustment.	ASSISTANTS: adjust the budgets in your group. Collect the budget setting; leave a note with the final budget.	Dan kunnen we nu overgaan tot een eventuele budgetaanpassing. We zullen bij ieder van u langskomen en eventueel een aanpassing doen. We nemen uw budgetblad mee (voor uw loonberekening), maar noteren ook uw finaal doel op uw kaartje met uw nummer. ASSISTANTS: In unit-based condition pas aan met +1 (behalve als het staat op 9 of hoger); in activity-based condition pas aan tot 9 tenzij het reeds op 9 staat of hoger. Neem budget mee (make sure dat nummer erop staat), en schrijf eindbudget op kaartje met nummer. Deel ook de volgende vragen uit.	7 minutes
i. Measurement of Job Tension from the control system.	LOGISTICS: all subjects have the measurement scales. ASSISTANTS: maintain control and assist. At the end distribute the actual mix. . SUBJECTS: read; do; put measures away.	Nu uw budget is bepaald, gelieve te antwoorden op de volgende vraagjes. INSTRUCTIES: voor elke vraag omcirkelt u een keuze van 1 tot 7. SUBJECTS: fill out measurement Job tension caused by the type of control system. INSTRUCTIES: Stop de antwoorden in uw enveloppe (let erop dat uw nummer op elk blad voorkomt). U zult nu de werkelijke mix krijgen waarmee u uw objectief zult proberen te halen. Zoals u weet is deze mix afhankelijk van het kleur dat u bij het binnenkomen hebt getrokken, en dit volgens de kansverdeling die u is uitgelegd. ASSISTANTS: provide actual product mix.	4 minutes

j. Production of Actual mix.	LOGISTICS: all subjects receive actual mix in function of the color they drew at the beginning. ASSISTANTS: maintain control and assist. At the end count performance and write it down on your files; also write the color of the subject's mix on the file. Note also subject's performance on the expected mix (cfr. c.). Give the files to the administrators. Distribute measures. SUBJECTS: do.	De produktieperiode begint zodadelijk. U heeft nu de werkelijke mix ontvangen. Uw beloning zal bepaald worden i.f.v. uw output op deze mix en na vergelijking met uw finaal objectief. Daarbij zal het uitgelegde beloningssysteem worden gebruikt. INSTRUCTIES: u krijgt 10 minuten om zoveel mogelijk facturen op te maken, zonder de kwaliteit te verwaarlozen. SUBJECTS: do it. INSTRUCTIES: 1/ Tel uw produktie en schrijf het op de enveloppe voorafgegaan door "Werkelijk". Dit zal ook door de medewerkers geverifiëerd worden. De medewerkers zullen uw werkelijke produktie opschrijven, alsook uw produktie op de verwachte mix (zie uw enveloppe), zodat nu uw beloning kan worden bepaald. INSTRUCTIES: Steek uw produktie in de enveloppe.	12 minutes
k. Measures of job tension from job difficulty/ low control, need for dysfunctional behavior.	LOGISTICS: all subjects have the measurement scales. ASSISTANTS: maintain control and assist. Distribute the Check Out questions. SUBJECTS: fill out measurements.	Nu u ook de werkelijke produktie hebt gehad, gelieve opnieuw een aantal vragen te beantwoorden. Omcirkel voor elke vraag een keuze van 1 tot 7. SUBJECTS: fill out measurement of job tension caused by job difficulty and low control, and need for dysfunctional behavior. At the end: put them in your enveloppe. ASSISTANTS: distribute Check Out Questions.	7 minuten
l. Check out questions.	LOGISTICS: all subjects have the Check Out Questions. ASSISTANTS: maintain control and assist. SUBJECTS: fill out Check Out Questions.	Hiermee zijn we aan het einde gekomen van de oefening. Gelieve nog eventjes op de Einde-Oefening vraagjes te antwoorden; ondertussen wordt uw beloning berekend. SUBJECTS: fill out Check Out Questions, and put them in your enveloppe. ASSISTANTS: collect enveloppes.	7 minuten
Calculation of Pay.	LOGISTICS: performance on expected mix, performance on actual mix. Softdrinks. ASSISTANTS: collect check out questions. SUBJECTS: get a drink.	Wij danken u alvast voor uw medewerking. U kunt van een drankje genieten terwijl wij uw vergoeding bereken. Ook de bonussen zullen daarbij toegekend worden. Wij hebben iets meer dan 5 minuten nodig. Mensen die onmiddellijk willen vertrekken kunnen hun vergoeding via iemand anders ontvangen.	

Appendix 29: Procedures for Assistants in Experiment 3

PROCEDURES MEDEWERKERS

A/ WELCOME AND RANDOM ASSIGNMENT.

Help subjects bij het vinden van hun plaats: Stuur hen naar de plaats waar hun nummer op voorkomt. Hou alles rustig.

B/ DEMONSTRATIE EN OEFENSESSIE.

Hou alles rustig.

C/ PRODUKTIE VAN VERWACHTE MIX.

Hou alles rustig.

Op het einde: deel blad UNCERTAINTY uit.

(Merk op: subjects zullen hun aantal afgewerkte facturen noteren op de voorkant van hun verzamelenveloppe. Dit getal zal later - in punt J - door u overgenomen worden.)

D/ UITLEG VAN UNCERTAINTY.

Hou alles rustig.

Op het einde: deel blad PAY SCHEME uit.

E/ UITLEG VAN PAY SCHEME.

Hou alles rustig.

Op het einde: deel blad BUDGET SETTING uit (Unit-based van 1-40; Activity-based van 41-80).

F/ BUDGET SETTING (before adjustment).

Hou alles rustig.

Op het einde: deel MEETSCHALEN 1 UIT: vragen over Informatie Asymmetry, Pressure not to Misrepresent, en Risk Attitude (alles is samengebundeld).

G/ METING VAN INFORMATIE ASYMMETRY, PRESSURE NOT TO MISREPRESENT, and RISK ATTITUDE.

Hou alles rustig.

H/ BUDGET AANPASSING.

In unit-based (1 tot 40): verhoog voorstel met +1, behalve wanneer het reeds staat op 9 of meer.

In activity-based (41 tot 80): verhoog voorstel tot 9, behalve wanneer het reeds staat op 9 of meer.

NEEM HET BUDGETBLAD MEE (geef het aan administrateur), en schrijf het eindbudget op het kaartje met nummer v.d. student (zodat hij/zij ook weet wat het finaal budget is).

Deel MEETSCHALEN 2 UIT: maatstaf van job tension.

I/ METING VAN JOB TENSION.

Hou alles rustig.

Op het einde: DEEL WERKELIJKE MIX UIT i.f.v. het kleur dat de studenten bij binnenkomen trokken. Geef een rood stapeltje aan wie een rood kaartje trok; een groen aan een groen; een geel aan een geel; en een blauw aan een blauw.

J/ PRODUKTIE VAN WERKELIJKE MIX.

Hou alles rustig.

Op het einde: NOTEER werkelijke output op uw RESULTATENFILE + output op verwachte mix (staat op hun enveloppe sinds punt C.).

Deel MEETSCHALEN 3 uit.

K/ METING VAN JOB TENSION FROM JOB DIFFICULTY, en (NEED FOR) DYSFUNCTIONAL BEHAVIOR.

Hou alles rustig.

Op het einde: deel CHECK OUT QUESTIONS uit.

L/ CHECK OUT QUESTIONS.

Hou alles rustig.

Appendix 30: Check-Out Questions Experiment 3

NUMMER IN DE OEFENING: ☐ LEEFTIJD: ☐

GESLACHT (aankruisen a.u.b.) MAN ☐
VROUW ☐

1/ WERD DE TAAK GOED UITGELEGD?
JA ☐
NEE ☐
COMMENTAAR:

2/ VERSTOND JE DE TAAK VOLDOENDE NA DE OEFENINGSESSIE?
JA ☐
NEE ☐
COMMENTAAR:

3/ BEGREEP JE VOLDOENDE WAT DE MOEILIJKE (tijdrovende) FACTUREN WAREN EN WAT DE MAKKELIJKE?
JA ☐
NEE ☐
COMMENTAAR:

4/ VERSTOND JE WAT JE DIRECTEUR VERTELDE BIJ DE BUDGET BEPALING?
JA ☐
NEE ☐
COMMENTAAR:

5/ ANTICIPEERDE JE EEN EVENTUELE BUDGET-AANPASSING DOOR JE DIRECTEUR WANNEER JE JE OBJECTIEF NEERSCHREEF?
JA ☐
NEE ☐
COMMENTAAR:

6/ BIJ HET BEPALEN VAN JE OBJECTIEF, STELDE JE EEN IETWAT LAAG GETAL VOOR OMDAT JE VERWACHTE DAT HET NAAR BOVEN ZOU WORDEN AANGEPAST?
JA ☐
NEE ☐
COMMENTAAR:

7/ HEB JE HET AANGEPASTE OBJECTIEF AANVAARD? M.a.w., HEB JE WERKELIJK GEPROBEERD OM HET VOOROPGESTELDE DOEL TE BEREIKEN?
JA ☐
NEE ☐
COMMENTAAR:

8/ VERSTOND JE HET BELONINGSSYSTEEM?

JA ☐
NEE ☐
COMMENTAAR:

9/ IN WELK VAN DE VOLGENDE GEVALLEN IS JE VERGOEDING HET HOOGST? (kruis aan)

HET BUDGET STAAT OP 8, EN JE MAAKT ER 6 ☐
HET BUDGET STAAT OP 6, EN JE MAAKT ER 6 ☐

10/ WAS JE DOOR HET BONUSSYSTEEM (+ 100 BF) GEMOTIVEERD OM GOED JE BEST TE DOEN BIJ HET MAKEN VAN DE VERWACHTE MIX?

JA ☐
NEE ☐
COMMENTAAR:

11/ DENK JE DAT JE NOG EEN PAAR FACTUREN MEER HAD KUNNEN MAKEN OP DE VERWACHTE MIX?

ZEKER WEL ☐
WAARSCHIJNLIJKE WEL ☐
WAARSCHIJNLIJK NIET ☐
ZEKER NIET ☐

12/ HOE WAS DE WERKELIJKE MIX IN VERGELIJKING MET DE VERWACHTE?

MOEILIJKER ☐
GELIJK ☐
MAKKELIJKER: ☐

13/ HEB JE MOEILIJKHEDEN GEHAD MET DE NIETMACHIENTJES, DIE IN BELANGRIJKE MATE JE PRODUKTIE HEBBEN BEINVLOED?

JA ☐
NEE ☐
COMMENTAAR:

14/ VOND JE DEZE OEFENING GLOBAAL GEZIEN

NOGAL VERVELEND ☐
O.K. ☐
EERDER LEUK ☐

15/ HEB JE EEN IDEE WAT WE MET DEZE OEFENING WILDEN ONDERZOEKEN?

JA ☐
NEE ☐

ZO JA, WAT?

16/ WAS DE OEFENING GOED GEORGANIZEERD? JA ☐
NEE ☐
COMMENTAAR:

17/ STEL HET VOLGENDE: Ik geef u ofwel 300 BEF vast, ofwel een "alles-of-niets" lottoticketje waarmee u 600 BEF kunt winnen met een kans van p% en 0 BEF met een kans van (100-p)%. Vanaf welke hoogte van p (een percentage tussen 0 en 100) bent u indifferent tussen de 300 BEF gegarandeerd en het lottoticket? Bijvoorbeeld: als p = 20, dan geeft het ticketje u 20% kans op 600 BEF en 80% op 0 BEF. Wat zou voor u p moeten zijn vooraleer u indifferent bent tussen de vaste vergoeding en het lottoticket?

ANTWOORD: p=_____%

HARTELIJK DANK VOOR UW MEDEWERKING!

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