

Performance Measurement with a Balanced Scorecard for Non-university

Research Institutes

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Abstract: The non-university research sector (NURS) is a part of the nonprofit sector and an eminently important component of the German research system (Höhn, 2011, p. 9; von Görtz et al., 2010, p. 9; Hohn, 2010, p. 457). A primary consequence resulting from the increased autonomy of research facilities as provided by the Academic Freedom Act (*Wissenschaftsfreiheitsgesetz*) is a growing demand for information (Hüttl, 2012, p. 16). Performance measurement instruments can be useful in providing feedback as to how well an organization is meeting its stated objectives (Greiling, 2009, p. 84). Thus, the theoretical aim of this paper is to determine which special organizational characteristics of research institutes have to be considered when transforming the Balanced Scorecard (BSC) concept. In terms of practical implementation, an ideal proposal for a BSC for the NURS is developed on the basis of theoretical analysis on the one hand and expert interviews on the other.

Key words: nonprofit organizations; performance measurement; balanced scorecard; non-university research institutions

JEL codes: L25, L30, M40

1. Introduction

The German 1 term "*außeruniversitäre Forschung*" (non-university research) originates from the unique complementary relationship of the research institutes to the universities in Germany (Dornbusch & Kulicke, 2010, p. 11). It has become the accepted term used to identify this sector of the German research landscape, although a more accurate term would be "non-university, non-industrial research." First, research and development activities are performed not only at universities, but also at the universities of applied sciences (Kothcier, 2005, p. 1). Second, according to the general understanding and application of the concept, research performed by industry is usually excluded (Höhn, 2011, p. 9). Research at non-university research institutes (NURI) in Germany occupies an exceptional status in international comparisons (Meurer & Schulze, 2010, p. 23).

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1.1 Importance and Development of Non-university Research in Germany

The term "non-university research" (NUR) in Germany commonly refers to the institutes run by the Max Planck (MPG), Fraunhofer (FhG), Helmholtz (HGF) and Leibniz (WGL) organizations (Dornbusch & Kulicke, 2010, p. 10). These organizations operate within the research landscape of Germany and are seen as part of the scientific establishment, obligated to perform their respective research missions (Horak & Heimerl, 2002, p. 181) as well as to achieve impacts for stakeholders through a diverse range of research activities and services (Höhn. 2011, p. 9). While the non-university research sector (NURS) is very important to the German research system, it continues to be a subject generally relegated to the fringe of professional economic literature. According to various authors, however, the performance of NURI is considered to be one of Germany's strongest areas of innovation activity (Polt et al., 2010, p. 3). German economic data for 2010 shows a total of more than half a billion Euros (578 million Euros) in third party funding flowed to NURI (GWK, 2011, p. 30). On the one hand, the NUR organizations employ approximately one fourth of the R&D staff in comparison to the universities, but control more than 60 percent of the university R&D resources on the other (Hohn, 2010, p. 457). In recent years, especially, there have been significant changes concerning the framework conditions for NUR (Koch, 2013, p. 14). Research institutions are recently facing great challenges (Dittmer & Strätz, 2012, p. 22) similar to the ones faced by commercial enterprises, brought about by the increasing competitive pressure and scarcity of resources (Gordon & Beck, 2013, p. 36). In this context, it is important to mention the "Pact for Research and Innovation". The German research policy has chosen a path to implement more competition and cooperation within the German research establishment (Hohn, 2011, p. 99). NURI face a special funding bottleneck in that their financial resources rely in large measure on public funding (Koch, 2013, p. 14 as well as Knie & Simon, 2010, p. 30). In the face of ever shrinking state budgets, the allocation of resources to NURI has become a subject of serious discussion in recent years.

1.2 Performance Measurement Activities Require a Basis of Transparency

The debate in the scientific sector is increasingly questioning the best possible use of public resources and the allocations made not just to the universities (Jost & Scherm, 2012, p. 30), but also to the area of NUR (Seckelmann et al., 2006, p. 195). Furthermore, the general call for more effective and more efficient control is growing stronger. The challenge is to find a balance between autonomy and control (Dittmer & Strätz, 2012, p. 23). Besides the lack of performance transparency, public funding authorities are quick to assume and criticize what is perceived as an inadequate focus on current problems (Hüttl, 2012, p. 16). In addition to raising awareness and improving the quality of the research performance, the need for greater efficiency and effectiveness in the use of resources is at the forefront of the public debate. One of the main efforts for the management of a research institute is to insure continuous improvement in quality through the establishment of appropriate framework conditions, while also demanding and maintaining the creativity of the researchers (Puchta & Moegen, 2005, p. 191). In order to insure that NURI maintain the capability to produce gualified, internationally respected research results and knowledge based services, modern performance measurement tools are required (Henkel, 2002, p. 10). This demand is explicitly stated in the Academic Freedom Act (Wissenschaftsfreiheitsgesetz) passed by the Federal German Parliament on October 18, 2012 (BMBF, 2012). A primary consequence of the increased autonomy of the research institutes is a growing demand for information (Hüttl, 2012, p. 16). Thus, an information system supporting the management (Coenenberg et al., 2012, p. 39) is necessary in order to measure performance (Hubig, 2009, p. 2). Not only under pressure to justify claims for resources, but also regarding the requirement to improve performance transparency looming in the background, NURI have been experiencing a growing need to substantiate their accomplishments for quite some time now (Mayntz, 1985, p. 20). Performance measurement forms a basis that allows them to do this (Gleich & Quitt, 2012, p. 47). In NUR, the topic of performance measurement is associated with various problem areas. While commercial enterprises use periodic business results as indicators of success, nonprofit research organizations emphasize first and foremost the accomplishment of the research assignment (Höhn, 2011, p. 109; Kothcier, 2005, pp. 14-15). In terms of performance measurement, there is a need for further information in addition to the monetary data obtained from the accounting system. Financial indicators, regardless of the relevant objects of performance, are not the primary interest in terms of measuring the level of goal achievement at NPOs (Kaplan & Norton, 2001, p. 121). However, performance measurement systems should never be implemented for their own sake, but rather for obtaining results that provide arguments to aid in making larger decisions. The transparency required for performance measurement (Klingebiel, 1999, p. 374) is, in practice, not generally provided at NURI to the degree required. Top management at research institutes has to deal with numerous information deficits (Locker-Grütjen et al., 2012, p. 35). Thus, the high level of complexity of the core activities in research requires the granting of a broad freedom of action for the research staff (Hubig, 2009, p. 39). The main reason for this is explained in the fact that the activity of researchers requires a large degree of special knowledge (Tropp, 2002, p. 36). The technologies involved have a complexity that can be mastered only by so called "experts" (Schneidewind, 2009, p. 45). In order to increase the level of acceptance by external stakeholders like e.g. the scientific community, the first step within an organization is to achieve an internal improvement concerning transparency of generated performance (Stratmann & Schruff, 2012, p. 27). Performance measurement is considered as a major component in a management system designed to facilitate this analysis of goal attainment (Brühl, 2009, p. 408). A performance measurement system (PMS) forms the background based on which the managers of a research institute can evaluate the effectiveness of the organization (Gmür, 2010, p. 43). The term "performance measurement" has been used since the 1980s (as a rule, used synonymously with the German word "Leistungsmessung" in the German literature) to describe information systems that include both financial as well as non-financial indicators (Giese, 2012, p. 35 as well as Baum et al., 2007, p. 362). Performance measurement tools can be useful in providing feedback as to how well an organization is meeting its objectives. This paper proceeds under the assumption that PMS are internal information systems that should provide this feedback.

2. The Balanced Scorecard and Nonprofit Organizations

According to several different empirical studies, the Balanced Scorecard (BSC) is the most widely adopted performance measurement concept practiced in the German speaking regions. For the results of individual studies, see Greiner (2012, p. 67), Hannig (2008, pp. 31-34), Weiss et al. (2008, pp. 140-145) and Marr (2005, pp. 645-652). It is beyond dispute and also empirically proven that the BSC has met with broad acceptance. According to numerous articles on economics, the BSC is also increasingly gaining importance for NPOs in general as well as to NURI and may be even predestined to become the PMS of choice by such organizations (Gleich & Quitt, 2012, p. 58; Eschenbach & Siller, 2009, p. 281; Graßhoff & Kothcier, 2006, p. 209; Kothcier, 2005, p. 127; and Brade, 2005, p. 301).

2.1 Original Model from Kaplan and Norton

The BSC from Kaplan and Norton was originally developed for the production oriented business practices in the USA (Gleich & Quitt, 2012, p. 58). Over time, it has been adopted by organizations of every size in every

industry (Rieg & Esslinger, 2012, p. 569). For the purposes of this paper, the BSC is viewed as "Type I" as labeled by Badura et al. (2012, p. 232). Thus, the BSC in this respect is not considered a strategic management tool but as a PMS. The BSC approach distances itself from the one-sided monetary view and proposes a total of four perspectives that also focus on non-financial aspects (Kaplan & Norton, 1997, p. 8). It rests on the assumption that organizations can only survive over the long term, if they achieve an equal measure of success in all four of the perspectives given. The primary aim is to achieve a balance between financial and non-financial objectives, past and future oriented indicators, results and performance drivers as well as internally and externally oriented indicators (Balanced Approach). Strategic goals are linked to operational actions.

The Financial Perspective presents the "ultimate definition of organizational success" (Kaplan & Norton, 2004, p. 6). It is thought of as the final target (primary goal) placed above the other three perspectives (Giese, 2012, p. 48) and aligns the company's business goals on financial targets as the most important priority of the model (Kaplan & Norton, 2006, p. 6). The original BSC is based on a generic value chain model that consists of the three business processes innovation process, operations process (production and delivery) and customer service (Kaplan & Norton, 1997, p. 92). The Customer Perspective implements the strategic targets in the customer and market segments where it will compete (Gladen, 2011, p. 417). This perspective fundamentally places increasing customer value in the foreground. Indicators used for this perspective are, e.g., customer satisfaction, loyalty, acquisition and profitability as well as value propositions like delivery and throughput-time (Kaplan & Norton, 1997, pp. 24-25). The Internal Process Perspective covers economies of scale in the value chain for the current purchasing, production and distribution processes as a means of expanding competitive advantage (Kaplan & Norton, 2006, p. 9). It also includes the identification of new processes that could contribute to the (over)satisfaction of customer needs (Kaplan & Norton, 1997, pp. 25, 89). In the Learning and Development Perspective (also called the Innovation and Learning perspective), the benefits and continued development of intangible assets are measured (Kaplan & Norton, 2006, p. 9). This perspective aids in the identification of those factors that make it possible to achieve the goals of the other perspectives (Weber & Schäffer, 2000, p. 11) and insures long term growth and improvement. The BSC does not restrict what goals should be pursued within an organization or what indicators should be selected (Gladen, 2011, p. 415), so its suitability for use by NPOs in general and NURI in particular cannot be categorically ruled out (Gmür & Brandl, 2002, p. 34).

2.2 Non-university Research Institutions as a Subgroup of the Nonprofit Sector

In recent years, the Nonprofit sector (NPS) plays an increasingly social, cultural and economic role in all German language regions as well as at the European level overall (Bono, 2010, p. 403; Greiling, 2009, p. 7). Just as commercial enterprises, NPOs are subjected to rising pressure to document their performance both internally and externally (Greiling, 2010, p. 91). This situation applies especially to NURI when considered as a subgroup of the NPS. The term "Nonprofit organization" has entered into German language literature mainly due to the preponderance of literature originating in the USA (Klingebiel, 1999, p. 372). The common element regarding the ideal goal systems of NPOs is their so called "functional goal dominance" (Abram et al., 2010, p. 353; Berens et al., 2000, p. 24). Functional goals are non-monetary goals and describe the desired state, in contrast to formal (or primary) goals, which have a monetary character (Gladen, 2011, p. 51). Formal goals take on a more subordinate role in NPOs (Krönes, 2009, p. 86). According to other authors, the main defining criterion for an NPO is the so called "restriction on distribution" (Berens et al., 2000, p. 23), a ban on distributions to owners and members. In summary, the two decisive factors for classification as an NPO are the functional goal dominance and the restriction on distribution. Furthermore, the funding of an NPO can also be viewed as a differentiating

characteristic to other organizations. Traditionally, NPOs have a different funding structure than commercial enterprises. Their financial resources include, for example, government grants (Viehbeck, 2013, p. 20), foundation endowments, donations or sponsorship money in addition to considerations for services offered (Berens et al., 2000, p. 24). Consequently, because of the strong reliance on public funding authorities, NURI are classified in the subgroup of NPOs called Quasi Non-Governmental Organizations (QUANGOs).

3. Balanced Scorecard for Non-University Research Organizations

At the current state of knowledge, there are no empirical findings concerning the use of the BSC at NURI. In principle, the implementation of a BSC could assist the management of NURI to close durable information gaps.

3.1 NPO Goal System as the Starting Point

Since functional goals dominate at NPOs, their ideal mission-oriented goal system differs greatly from the prevalent goal systems existing at profit-oriented companies. In particular, "goal plurality" frequently leads to conflicts between the individual functional goals as well as between the functional goals and the financial framework conditions (Abram et al., 2010, p. 353). Given the emphasis on qualitative goal setting at NPOs, it is evident that an expansion is required beyond the prevailing three-step, purely quantitative definition and view of performance found at commercial enterprises (Input-Throughput-Output). Following the impact-oriented controlling approach for NPOs proposed by Halfar and Hegenauer, the performance dimension "Output" is therefore extended to the so called "Impact" dimension (Halfar & Hegenauer, 2010, pp. 90-92):

• **Output**: Quantitative output quantities as the basis for qualitative influence effects (Outcome, Effect). Example: Number of opera productions staged per season.

• **Outcome**: Social impacts and benefits generated from the goods or services provided by the NPO for the common welfare (social effectiveness). Example: Opera "produces" an urban quality of life, not audience applause.

• **Effect**: Direct, objectively apparent and verifiable impact for individual stakeholders, i.e., target group-specific and intended impact, independent of stakeholder observations (objective effectiveness). Example: Impact measured on the basis of the number of target group-specific season ticket holders.

In respect to the fundamental structure of a BSC, elements of the NPO goal system and performance dimensions can be merged as follows (Stötzer, 2009, pp. 30-32; Heyd, 2000, p. 219; and Potocnik, 1994, p. 295):

• The mission sets the framework conditions for the overall goal system. It can be accomplished through the specification of worthwhile **impact related goals** (outcome and effect). These are therefore located at the top position of the BSC.

• **Performance goals** as quantitative, measurable indicators are assigned to the performance dimension "Output" and correspondingly, to the external (customer) perspective.

• **Potential goals** as a range in which the NPO can perform activities and provide services, pertain to the performance dimension "Throughput" and are assigned to the internal (processes) perspective.

• **Formal goals** conceived as the "Input" oriented performance dimension, especially, in terms of efficient service performance form the base of the BSC.

3.2 Possible Adaption and Modification Requirements

The financial perspective is *adapted* to the extent that the higher-level organizational goal is placed at the top position on the model. A *modification* is made in such a way as to generalize the meaning of the perspective

taking ideal goal systems of NPOs into account, renaming it the "Impact" perspective. According to Bergmann (2004, p. 235), when modifying the BSC for use by NPOs, reconfiguration should be done in such a way as to give the monetary perspective the role of a necessary precondition. It is evident in this context that the meaning of the Learning and Development perspective has to be scrutinized. This perspective is where those factors necessary to achieve the goals of the other perspectives placed above are to be identified. In NPOs, that also includes the financial resources (Giese, 2012, p. 49). It should be noted that on the basis of empirical findings in practice, the treatment of the Learning and Development perspective of the BSC concept is conspicuously weak (Marr, 2005, p. 646). In many cases, an "Employee" perspective has been substituted as an alternative. However, any exclusive focus on the employees defeats the original purpose of the Learning and Development perspective. Rather, this perspective should seek to identify, if possible, all relevant enablers and resources that appear as preconditions for attaining the goals of the other perspectives. Clearly, the different perspectives should not be considered in isolation from one another. The Learning and Development perspective is *adapted* to the extent that the causal relationships to the higher level perspectives correspond to a position at the bottom of the model. A *modification* is made in such a way that the perspective is redesignated as "Enablers and Resources". The term "enabler" is a reference to the EFQM model for NPOs developed by Schwarz (2005, p. 90). In a next step, factors have to be identified that are necessary to attain the goals of the top perspective (the financial perspective in the original model), with the focus being the so called "performance drivers" (Eschenbach & Siller, 2009, p. 279). For an NPO, the investor and the beneficiary are not always the same (Kaplan & Norton, 2001, p. 120). In many cases, the activities performed and the services rendered by the NPO are not delivered to those individuals or organizations that pay for the activities and services. The customer perspective in the original BSC does not account for such complex external relationships (Bergmann, 2004, p. 231). The targeted external stakeholders of an NPO may be so heterogeneous to an extent that it makes sense to subdivide this perspective into several fields (Knoche, 2005, p. 22). The customer perspective can be *adapted* to the extent that an NPO can deliver services to external beneficiaries that are of great importance to the organization. The perspective is *modified*, in such a way as to account not only for the "customer", but also for all relevant "External Stakeholders". The Internal Process perspective focuses to the provision of service or goods. Originally, it was developed with the intention of using the BSC at companies that provide and produce products or services in the form of standardized processes. The generic value chain model of Kaplan and Norton with a focus on the internal processes required to assure optimal satisfaction of customer requirements (Kaplan & Norton, 1997, p. 92) is not applicable to the majority of NPOs. Based on the NPO's diverse fields of action (for example, environmental protection, social services, research etc.), the process perspective of the BSC must be scrutinized with analytical skepticism. For the purpose of this paper, it is assumed that standardized processes do not exist for the provision of service at most NPOs. The process perspective is therefore *adapted*, so that, similar to the original perspective, the "Main Operating Activities" are in the foreground. In this respect, it is *modified*, so as to proceed under the assumption that standardized processes for the provision of service are of minor significance at NURI as a subgroup of the NPS.

3.3 Application of Mintzberg's Organizational Configurations Framework

Several approaches to the modification of the BSC for use at NPOs can be found in the existing literature. The modification of the BSC concept for NPOs by Kaplan and Norton (2001, pp. 120-121), however, must be excluded from further examination for use by NPOs in Germany on the basis of inappropriate assumptions and a lack of comparability with the framework conditions, especially concerning the financing structure. The modification of the model by Berens et al. (2000, pp. 23-28) represents just a first approximation of the

particularities of NPOs in general. For an applicable modification of the BSC for NURI in particular, it is necessary to divide the object range into identifiable sub-areas based on the various forms of NPOs and given the heterogeneity of the German NPO sector. Explicit indicators for charitable organizations, environmental protection organizations or research organizations will differ significantly in terms of content. In the continuing scientific debate and consequently also in the course of this study, a **specialization in terms of the main object of performance** (for example, research activities, social services, environmental protection, etc.) must be determined. The precise matching of content for NURI seems to be possible only if the model adequately accounts for the object of performance and, correspondingly, the conceptual framework of the study. In this process, especially the structural details of the organization have to be taken into account.

3.3.1 Organizational Structures

Different decision makers at various management levels of an organization may influence the shaping of the organizational structure. Mintzberg takes up this aspect in particular in his so called "**organizational configurations framework**". His organizational configurations are also referred to as typologies and generic structures to facilitate the assignment of the object of study within the scientific research process (Wolf, 2000, p. 31). Mintzberg identifies the key organizational units in order to find a common intellectual and linguistic basis for the discussion of organizations as social entities (Hubig, 2009, p. 38). His configurations are based on a total of five organizational elements, so called basic components (Mintzberg, 1979, pp. 29-33):

• **Operating core:** This part of the organization comprises those employees whose work is directly related to the main activity purpose.

• **Strategic apex**: In relation to the operational core, it is found at the other end of the organizational hierarchy and is responsible for the fulfillment of the organizational mission.

• **Middle line:** The strategic apex is linked to the operational core by a formally defined chain of authority comprised of the middle line managers.

• **Technostructure**: The technostructure's mission is to reduce the amount of coordination or personal instruction required in the organization. In this component, Mintzberg groups those persons who exert influence over the work of the operational core through standardization.

• **Support staff:** The support staff differs from the technostructure primarily because it undertakes no standardization of the activities of the operational core. It comprises diverse staff functions, for example, cafeteria, media relations, and even legal counsel.

The differentiation between those units that have a standardizing effect on the operational core (technostructure) and those units that perform only support activities (support staff) is of special significance for this study. The support staff with its support functions is found in the "Enablers and Resources" perspective. The main (core-)activity happens in the operational core. This information is typically found in the original "Process" perspective. At this point in discussion of organizational characteristics, a common level of reference must be clearly defined. All four relevant NUR organizations have decentralized management, rely on a specific contextual framework and pursue separate goals and strategies. For these reasons, the only constructive alternative for the further scholarly examination of performance measurement is to focus on the *institute level* as the unit of investigation. Ideal organizational structures for NURI differentiate between scientific-technical tasks represent the main purpose of NUR, these are relevant in the operational core of such organizations. The importance of a clear definition of the area of investigation is evident. A bird's eye view on the entire organization

as an umbrella or host organization would require the characterization of the separate institutes as operational cores. Hence, no separation of the research and support activities would take place. NURI are ideally organized in an operational core (research) and a support staff. Correspondingly, the support staff is assigned to the "Enablers and Resources" perspective and the operational core is located in the "main operating activities" perspective. The support staff provides services to the operational core in the form of administrative activities as well as through the provision of infrastructure like IT and workshops, which are classified as internal services that also must be included in the BSC. Therefore, objectives and guidelines for the support staff must be defined and target/actual comparisons implemented. Hence, an appropriate degree of formalization of the support functions is necessary to satisfy this requirement. According to the current state of knowledge, issues have not yet been addressed in the professional literature concerning the formalization of the support staff organization or structure at NURI. However, general approaches in terms of internal IT-services have been developed and proposed in recent years and are gaining increasing attention, especially in professional journals under the key words "IT-Controlling" and "Service Level Agreements".

3.3.2 Design Parameters and Coordination Mechanisms

NURI do not primarily produce standardized products and services, but rather work on innovative research projects. This makes it necessary to investigate the main operating activities in NURI in more detail. Two important elements of Mintzberg's configurations framework are the identification of the dominant coordination mechanisms on the one hand and the primary design parameters within the organizational configuration on the other hand. These elements set the focus on the manner of service provision as well as on the coordination of separate processes within the organization. With an operational core that consists primarily of scientists, so called "experts", research institutes clearly demonstrate a key characteristic of the so called "professional bureaucracy" proposed by Mintzberg. However, the BSC was originally developed for so called "machine bureaucracy" organizations (e.g., automobile manufacturers). Their industrial operations base on a generic value chain model that makes the following assumptions: All value creation activities are performed in standardized processes that can be characterized by a specific objective and temporal logic when carrying out defined tasks (Rüegg-Stürm, 2004, p. 71). The paramount coordination mechanism in a machine bureaucracy is, consequently, the standardization of processes. Undoubtedly, this type of standardization does not apply to the operational core in research institutes. According to Schneidewind (2009, p. 45), scientists belong to a category known in organizational theory as professionals (experts). NURI, just like universities, may be characterized as professional organizations. This conclusion was also reached by Speckbacher et al. (2008, p. 54) and Hoffmann (2000, p. 98). According to Mintzberg (1979, pp. 256-257), professional organizations are characterized by the fact that their primary coordination mechanism is the standardization of qualifications. Mintzberg makes the assumption that qualifications (i.e., a successful Ph.D. in a special subject area) are a prerequisite for fulfilling the tasks in the operational core at a professional organization (or research project). In contrast, the primary coordination mechanism for a machine bureaucracy is the standardization of the work processes. Furthermore, at a research institute there are temporary organizational structures with a project nature. Specifically, this refers to cross departmental or cross divisional working groups and project teams comprised of scientists with various qualifications and experience (Meusel, 1999, p. 259). In Mintzberg's framework, such work and project groups are called "adhocratic" organizations. In an adhocracy, the focus is usually on projects that aim for innovation. Adhocratic structures in a NURI are usually found only in project-related activities at the operational core. This leads to the conclusion that NURI can be characterized as a hybrid of two organizational configurations, in the form of a "professional adhocracy". Based on this characterization and with regard to the dominant coordination mechanisms resulting from this, a key hypothesis for a modification of the BSC specifically for NURI can be derived:

As opposed to machine bureaucracies, the dominant coordination mechanism at NURI characterized as professional adhocracies according to Mintzberg is not the standardization of processes, but rather the standardization of qualifications.

Since the dominant coordination mechanism represents the causal determinant for the "main operating activities" perspective, a requirement arises for the modification of the BSC: The original process perspective is modified for use at NURI to read "**Research Tasks and Qualifications**" perspective. Mintzberg's configurations framework provides several useful starting points for this study that are appropriate for the analysis of research institutes. However, this applies only in respect to the internal situation and the internal viewpoint of the BSC (enablers and resources; research tasks and qualifications). In terms of the external perspective, an empirical study of German NUR in 2009 conducted by the Zentrumfür Europäische Wirtschaftsforschung, ZEW (Center for European Economic Research), provides valuable findings.

3.4 Secondary Empirical Findings as a Starting Point for Defining External Stakeholders

By dividing NPOs according to the main beneficiaries of the services performed into three groups as proposed by Purtschert (2001, p. 51), the empirical findings of the ZEW study indicate that NURI can be assigned to the group of publicly oriented NPOs (especially, knowledge transfer to the general public, provision of public services), as well as to the group of third party services NPOs (especially measure/test/control, knowledge/technology transfer to companies, provision of scientific infrastructure). A trend has been observed for several years that these organizations are increasingly becoming R&D service providers (Rammer et al., 2004, p. 140). In this context, the knowledge and technology transfer to companies, consulting services to public authorities and the provision of scientific infrastructure is of particular importance based on the results of the ZEW study.

Considering the main users of the research activities, in analogy to the differences in the main tasks, a relatively clear division of work is evident among the NURI in Germany (Polt et al., 2010, pp. 45-46):

• The main users of the research results from the **MPG** Institutes are universities, whereas the **FhG**-Institutes are strongly aligned with industry as its target group (especially SMEs) as well as the departmental research for government ministries and other agencies.

• The main user groups from **HGF** and **WGL** are more diverse. Helmholtz Centers rely equally on universities and companies as their stakeholders, followed by other NURI and ministries/agencies. The Leibniz Institutes report mainly universities and NUR facilities as the main users, while ministries/agencies and companies play a lesser role.

In order to model a representative external situation for all NURI in a BSC, all of the stakeholders identified in these empirical findings must be considered. In the framework of defining organization or institute-specific models, a further step has to be the weighting of the importance of the various stakeholders.

4. Synthesis of the Model and Primary Empirical Findings

If assigning NURI to NPOs as the object of study, the alignment of the goal system must be differentiated in terms of the impact. Sandberg (2002, p. 462) draws a similar conclusion in her modification of the BSC for universities.

4.1 Proposed Structure

The proposed ideal structure of a BSC modification for NURI is pictured in the following Figure 1 assigning the relevant performance dimensions to the respective perspectives.



Figure 1 Structure of a BSC modification for Non-university Research Institutes

The financial perspective is not placed at the top of the BSC, but rather the "Impact". In conformity with the impact oriented controlling approach for NPOs by Halfar and Hegenauer (2010, pp. 90-92), measurable indicators to specify the qualitative performance dimensions "Outcome" and "Effect" must be defined. Just like the functions of the support staff, the finances in NURI have an enabling role. These two aspects are located in the "Enablers and Resources" perspective. In the original internal processes perspective, the focus of consideration is set on the main operating activities. The process perspective is therefore replaced by the "Qualifications and Research Tasks" perspective (activities of the operational core). The expansion of the original "Customer" perspective takes into account the aspect that NURI are considered as NPOs. Thus, it is necessary to consider not only customers, but all targeted external stakeholders. The external perspective of a BSC for research institutes, in addition to potential financial sponsors of research activities like public funding authorities and commercial enterprises, also has to include institutions of science (especially universities as well as other NURI) as "External Stakeholders". With regard to the common benefit, it seems appropriate to locate the public (in terms of the society) in this externally oriented perspective as well. It is recommended here to make a distinction between measures concerning the general public and others that are targeted exclusively on the Scientific Community.

4.2 Empirical Findings

To date, there are no empirical findings available concerning performance measurement in general and BSC in particular at NURI. Consequently, the related issues have to be judged as not yet sufficiently studied. The essential discovery of items and relationships makes a qualitative research design appear to be the most appropriate. Thus, a qualitative research strategy was implemented in which expert interviews in the form of semi-structured conversations (Schnell et al., 2011, p. 379) were conducted with representatives of all of the four largest non-university research institutions in Germany. In the context of 8 interviews with a total of 12 participants, the proposed BSC model was evaluated in terms of suitability as well as completeness. Furthermore, starting points were indentified for the definition of indicators to be used for the individual perspectives. All expert interviews were recorded and literally transcribed. The subsequent data analysis followed in multiple steps. In an initial step, a rough analysis was prepared through repeated readings and annotation of the transcribed interviews. The assignment of the memos and the coding of transcripts was computer-aided using MAXQDA software. Detailed information on the features of this software are given by Mayring (2010, p. 113) and Kuckartz (2012, p. 142).

Concerning the "Enablers and Resources" perspective, the experts predominantly evaluated the role of

finances as a framework condition in NURI and, accordingly, assigned it to the performance dimension "Input" appropriately justifying the positioning of financial goals and measures at the bottom of the proposed BSC model. Furthermore, it can be concluded that in the majority of NURI the prerequisites for performance measurement of the support staff functions are not yet adequately fulfilled based on the empirical findings. In order to assess the efficiency of the support staff in the framework of a BSC, there are certain organizational prerequisites that must be met. The degree of formalization in the definition of the performance of internal support services at NURI is still distinctly low. In the course of the expert interviews, a majority of the experts found the importance of the tools for the definition of performance and goal agreement concerning the services centrally provided by the support staff to be relevant and emphasized that activities towards this end were either ongoing or currently planned.

Replacing the original internal processes perspective of the BSC, the proposed model for NURI focuses on the *qualifications and research tasks* of the research staff located in the operating core according to Mintzberg. One purpose of the expert interviews was to determine to what extent prerequisites to the capture of these aspects relevant to performance measurement are already fulfilled and what indicators have already been selected at the different research institutions. According to Kothcier (2005, p. 135), especially the support of young researchers must be listed among the core missions of non-university research. The empirical findings reveal that the advancement of young researchers at NURI, by all means, plays indeed a significant role. In addition, several more indicators were identified. The ratio of PhDs, for example, can be assigned to the performance dimension "Throughput" and as a consequence then to the "Qualifications and Research Tasks" perspective. Similarly, the number of successfully completed doctorates per year directly affects the performance dimension "Outcome" and therefore, has to be part of the "Impact" perspective.

In conjunction with the expert interviews, experts were requested to name five primary external stakeholders based on the criterion of relative importance. The primary external stakeholders determined in this way can be grouped into four categories:

• Scientific institutions: Other research institutes and universities,

• **Public funding authorities**: Federal and state, other public funding authorities, public funding authorities in general,

- Industry: Large corporations, SMEs, general business,
- Public: Society, general public, scientific community and media.

Substantiating an ideal BSC model for NURI with indicators especially concerning the "Impact" perspective requires the acknowledgment and analysis of relevant performance indicators from the internal viewpoint of these organizations. The interviewees were initially requested to limit their responses to the five most important indicators as seen from an internal viewpoint to measure the performance of the organizational units located in the operating core (research) and then to rank the indicators listed. Unfortunately, most of the experts were unable to assign comprehensible rankings to their responses. Nevertheless, the question generated valuable new empirical findings. The experts named a total of 20 different indicators which can be applied to evaluate the performance of research units. The importance of acquiring *third party funding* is ranked very high in the literature and by other external sources, although there are also critical voices (Jansen et al., 2007, pp. 125-149). Generally, third party funding is increasingly viewed as a useful indicator in evaluating scientific institutions in general and NURI in particular. However, there appears to be a significant discrepancy between the external and the internal perspectives on this point. The great importance assigned to third party funding as a performance indicator in research in the literature is to be viewed in a more critical light. The representatives of the German NURI do not

commonly share this opinion according to the empirical findings. Significantly, all three of the FhG representatives explicitly named only the percentage of business revenues as a specific portion of the external funds raised as an important and critical performance indicator. The indicator most often named by a wide margin is publications. There was also extensive discussion during the interviews about the problem of evaluating the respective publications and *citations* as well as the obvious dependence on subject areas. Based on the expert interviews, there is an implication valid across all of the surveyed institutions that the performance indicator with the greatest importance, from the internal view of NURI, has to be undoubtedly attributed to *publications*. How the various publications are weighted or evaluated in the respective organizations and institutes depends on so many different factors, that this cannot be covered in an "ideal" model proposal intended for all those organizations. Indicators regarding qualifications were also mentioned by the experts. This category is missing in the external perspective on the basis of the aforementioned ZEW study. The education of young researchers through professional education in general, temporary exchange of personnel, fluctuation, appointments to a professorship and successfully completed doctorates were mentioned. The indicators named as being important in terms of the focus on external stakeholders included research collaborations and the knowledge transfer to the public. Regarding the scientific community, the indicators named included in particular prizes (awards) and invited lectures. This view is not only missing in the ZEW study of NUR, the indicators can be moreover characterized as easy to measure and assign to the performance dimension "Effect" (direct, objectively evident and verifiable impact on the separate stakeholders in the sense of objective effectiveness) according to Halfar and Hegenauer (2010, pp. 90-92). The discussion also included the ratio of submitted to accepted papers. On the subject of innovation, the indicator mainly considered as important was *patents*. The citing of indicators of a financial nature was concentrated among the institutes for applied research. This mainly centered on target guidelines like cost coverage and the percentage of business revenue related to the operating budget. Only few strategically aligned indicators were identified during the expert interviews. This corresponds directly with the rather rudimentary strategic activities identified. In this context, two of the respondents pointed out the special importance of enforcing internationalization.

On the basis of the expert interviews, five categories of performance indicators were identified. In some cases, the indicators (in parentheses) for performance measurement at NURI could be assigned to multiple categories, for example, publications and citations also fit in the category "Scientific Community" located at the external stakeholder perspective:

• **Qualifications** (appointments to a professorship, professional education in general, successfully completed doctorates in particular),

- **Research and innovation** (publications, citations, patents),
- External perspective in general (research collaboration, knowledge transfer to the public),

• Scientific community (prizes/awards, invited lectures, ratio of accepted to submitted papers/success rate for proposals),

• **Financing** (volume of research in acquisition, cost coverage, percentage of business revenues in relation to operating budget, share of external funding revenue)

• Strategy (internationalization, growth, strategic nature of the projects).

The target specification of these indicators will differ considerably at the various NURI depending on their respective missions. Therefore, the process of implementing a performance measurement concept like the BSC must always be preceded by a comprehensive discussion of the organization's strategy.

The overall BSC model modification was put to the test empirically, as the surveyed experts were asked about the suitability as well as the practicality of the model. On the issue of completeness, it must be noted that a model designed as a BSC for NURI cannot make the claim to represent every institute of NUR with all their many conceivable facets. Models as "simplified pictures of reality" (Schwaninger, 2004, p. 53) fundamentally pursue an intentional focus on the essential points. Several experts expressly confirmed that the proposed model satisfies this requirement and welcomed the associated and intentional reduction in complexity. None of the respondents pointed out any missing aspects and no skepticism could be determined on the part of the experts about the practicality of the BSC model.

5. Summary and Outlook

As a result of the empirical study, a substantial backlog in the need for performance measurement activities in NURI was determined. The expert interviews conducted with representatives of all the largest German research institutions highlighted a clear focus on operational measures. Also, the need for more attention on strategic aspects at research institutes was becoming clearly evident. Correspondingly, the increased emphasis on strategic activities at NURI is to be further encouraged. The reconfiguration of the original BSC structure was theory-based. It takes the internal situation into account on the basis of various assumptions. These assumptions were reviewed in the course of the expert interviews. The location of finances at the bottom of the proposed BSC model follows from the assumption that NURI, because of their benefit to the public, can be characterized as NPOs. The role of financing as a framework condition was a perspective shared by the majority of the experts and, consequently, it is assigned to the performance dimension "Input." Therefore, the positioning of financial indicators at the bottom perspective of the proposed model of a BSC for NURI is viewed as reasonable. However, it should be pointed out that the self-image as a commercial enterprise can exist even among the top management of a nonprofit research organization. For this reason, a fundamental first step before the introduction of a performance measurement concept has to be a critical examination of the internal goal system as well as the weighting of the individual organizational goals. Based on the empirical findings, it is evident that requirements for performance measurement activities regarding the internal services are still inadequately addressed in the majority of NURI. The degree of formalization by definition of centrally provided services remains distinctly low. In the course of the interviews, a majority of the experts found the importance of the tools used to define the activities and performance of the internal services provided by support staff to be relevant and emphasized that activities towards this end were either ongoing or planned at the time of the interviews. Although gaps regarding the formalization for performance measurement of the support staff were determined, a trend was also identified that the level of formalization and, in particular, the relevance of service level agreements at NURI will continue to increase in the coming years. All the categories of external stakeholders suggested in the draft BSC model were confirmed in expert interviews. The empirical part of the study also served the identification of indicators which, in turn, facilitated the definition of the perspectives in the BSC. Exemplary indicators have been derived for all four perspectives on the basis of the expert interviews. One of the aims of this paper was to develop an ideal proposal for a BSC for NUR. It can be stated that on the basis of the expert interviews, this goal can be rated as being attained. Nevertheless, it must also be explicitly pointed out that the proposed model is mainly binding regarding the overall perspective categories. Considering the heterogeneity of the NUR sector, indicators used as well as their respective weighting and the various target specifications will differ substantially. In summary, using

a qualitative research design framework, useful initial empirical findings for the largely unexplored subject of German NURI could be generated. These findings can and should be used as a starting point for subsequent research, especially through quantitative studies.

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