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**Sparking ideas: Empirical insights and new directions  
for performance management in knowledge-intensive  
settings**

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***“Knowledge is power. Information is liberating. Education is the premise of progress, in every society, in every family.”***

Kofi A. Annan

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## **Abstract**

The present dissertation analyzes the measurement and management of performance in knowledge-intensive settings by drawing on theories from social psychology, cognitive psychology and general psychology. The present thesis comprises four essays that report empirical studies. Specifically, the studies of the first essay assessed an alternative performance measure (Facebook likes for unpublished scientific manuscripts) which was compared to traditional bibliometrics. The study findings show that Facebook likes can positively predict citations for psychological manuscripts in the business area. However, Facebook likes do not predict the impact of non-psychological manuscripts in the business area nor of manuscripts in the area of life sciences. The study of the second essay investigated individual factors influencing research performance by applying an online survey of young scholars in the fields of business and economics. The findings indicate that intrinsic work motivation and job satisfaction have an indirect effect on research performance, whereas extrinsic work motivation only has a direct effect on research performance. The study of the third essay explored current undesirable developments in higher education institutions and assessed the possibilities of a chair, faculty, or higher education institution to foster work motivation and work performance. Data were derived through semi-structured interviews with individuals working in different positions at higher education and research institutions in the field of business and economics or the field of social sciences and sociology. The results indicate that insufficient funding is the most significant current undesirable development. Moreover, the results show that at the chair level, a good leadership style and interpersonal acknowledgment may motivate and enhance performance, whereas at the faculty level, beneficial framework conditions and cooperation may increase motivation and performance. At the institutional level, appropriate organizational structures and an appropriate leadership culture may foster motivation and performance. The study of the fourth essay used a laboratory experiment based on a student sample to investigate the influence of goal setting on creative performance aspects. The findings reveal that having an assigned goal versus having no goal causes anger to outweigh happiness, which in turn increases cognitive persistence and (with control variables in the equation) also creative

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fluency. With regard to the aspects cognitive flexibility and originality, no influence is observed. Furthermore, an assigned goal leads to less appropriate ideas than having no goal, while anger compared to happiness does not mediate the effect. In sum, the dissertation indicates that improvements in performance measurement are possible and needed and shows that performance management needs to be adjusted to embrace the complex nature of performance in knowledge-intensive settings. On the basis of the empirical findings, the thesis derives theoretical and practical implications and offers further research avenues in the area of performance management in knowledge-intensive settings.

## **Kurzfassung (German abstract)**

Die vorliegende Dissertation untersucht die Messung und das Management von Leistung in wissensintensiven Bereichen auf Basis von Theorien der Sozialpsychologie, Kognitionspsychologie und Allgemeinen Psychologie. Die vorliegende Dissertation umfasst vier Aufsätze, in denen empirische Studien berichtet werden. Konkret erfassten die Studien des ersten Aufsatzes ein alternatives Leistungsmaß (Facebook Likes für unveröffentlichte wissenschaftliche Manuskripte), welches mit traditionellen bibliometrischen Indikatoren verglichen wurde. Die Studienergebnisse zeigen, dass Facebook Likes für psychologische Manuskripte aus dem wirtschaftswissenschaftlichen Bereich Zitationen positiv vorhersagen können; allerdings sagen Facebook Likes nicht den Einfluss von nicht-psychologischen Manuskripten aus dem wirtschaftswissenschaftlichen Bereich und von Manuskripten im Bereich Lebenswissenschaften vorher. Die Studie des zweiten Aufsatzes erforschte durch eine Onlinebefragung von Nachwuchswissenschaftlern in den Wirtschaftswissenschaften individuelle Faktoren, welche Forschungsleistung beeinflussen. Die Ergebnisse zeigen auf, dass die intrinsische Arbeitsmotivation und die Arbeitszufriedenheit einen indirekten Effekt auf die Forschungsleistung haben, wohingegen die extrinsische Arbeitsmotivation nur einen direkten Einfluss auf die Forschungsleistung hat. Die Studie des dritten Aufsatzes erforschte die aktuell größten Fehlentwicklungen an Hochschulen und ermittelte was ein Lehrstuhl, eine Fakultät und eine Hochschule jeweils konkret tun können, um Motivation und Leistung zu fördern. Die Daten stammen aus semi-strukturierten Interviews mit Personen, die in unterschiedlichen Positionen an Hochschulen oder Forschungseinrichtungen in den Wirtschaftswissenschaften, den Sozialwissenschaften oder der Soziologie arbeiten. Die Ergebnisse deuten darauf hin, dass eine mangelhafte Finanzierung die größte aktuell vorzufindende Fehlentwicklung ist. Darüber hinaus zeigen die Forschungsergebnisse, dass ein guter Führungsstil und zwischenmenschliche Anerkennung auf Lehrstuhlebene motivieren und Leistung fördern können, wohingegen auf Fakultätsebene förderliche Rahmenbedingungen und Kooperation die Motivation und Leistung steigern können. Auf institutioneller Ebene können angemessene Organisationsstrukturen und eine angemessene Führungskultur förderlich für die Motivation und Leistung sein. Die

Studie des vierten Aufsatzes untersuchte in einem Laborexperiment den Einfluss von Zielsetzung auf kreative Leistungsaspekte bei Studierenden. Die Forschungsergebnisse deuten darauf hin, dass ein vorgegebenes Ziel im Vergleich zu keiner Zielsetzung dazu führt, dass Ärger Freude überwiegt, was wiederum die kognitive Persistenz steigert und (mit Kontrollvariablen in der Gleichung) zu einer höheren Anzahl an generierten, nicht-redundanten Ideen (d.h. „creative fluency“) führt. In Bezug auf die Aspekte kognitive Flexibilität und Originalität wurde kein Einfluss beobachtet. Des Weiteren führt ein vorgegebenes Ziel zu weniger geeigneten und angemessenen Ideen im Vergleich zu keiner Zielsetzung, was aber nicht durch Ärger im Vergleich zu Freude mediiert wird. Fazit der Dissertation ist, dass Verbesserungen der Leistungsmessung möglich und notwendig sind, und eine Anpassung des Leistungsmanagements erforderlich ist, um der Komplexität von Leistung in wissensintensiven Bereichen gerecht zu werden. Auf Grundlage der empirischen Erkenntnisse leitet die Dissertation theoretische und praktische Implikationen ab und zeigt zukünftige Forschungsrichtungen im Bereich Leistungsmanagement von wissensintensiven Organisationen auf.

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# 1 Introduction<sup>1</sup>

## 1.1 Motivation and research questions

### 1.1.1 Motivation

The development and application of knowledge is currently of utmost importance and has been widely recognized as being critical to the growth and prosperity of societies. For example, the European Commission (2014b, p. 3) states, “Research and innovation contribute to making Europe a better place in which to live and work. They improve Europe’s competitiveness, boost growth and create jobs.” To foster discoveries and breakthroughs from the laboratories to the market, the European Union has launched research and innovation actions (Horizon 2020 calls) with approximately 80 billion Euro in funding (European Commission, 2014a). This increase in the importance of knowledge is grounded on the shift in organizations to match the move from production economies to knowledge economies (Drucker, 1999; Grant & Ashford, 2008). Over the last decades, traditional sources of competitive advantage (e.g., financial capital) have become more available, which renders human capital even more strategically relevant to staying ahead of the competition (Aguinis, Gottfredson, & Joo, 2012a; Powell & Snellman, 2004). This is particularly true, for example, in highly competitive work surroundings such as research and development departments in the IT domain (Gleadle, Hodgson, & Storey, 2012; Polidoro & Theeke, 2012). For this reason, politicians and entrepreneurs have intensified their actions to gain knowledge-based competitive advantages.

Rapid changes in global competition (Erez, Kleinbeck, & Thierry, 2001) and digitalization, e.g., the Internet and big data (Kaivo-oja, Virtanen, Jalonen, & Stenvall, 2015), mean that the ability to solve complex problems has become a core competence of today’s employees (Boudreau, Lacetera, & Lakhani, 2011; Jenssen &

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<sup>1</sup> This section is partly based on Ringelhan, Wollersheim, and Welppe (2015a), Ringelhan, Wollersheim, Welppe, Fiedler, and Spörrle (2013), Ringelhan, Wollersheim, and Welppe (forthcoming) and Ringelhan, Wollersheim, Welppe, and Spörrle (2015c).

Nybakk, 2009; Schnurr, 2015). The good news is that the ability to solve complex problems is not a stable personality trait; rather, creative problem solving can be trained and fostered to certain degrees, i.e., through building innovation competencies and/or an adequate work environment (Amabile, 1983; Schnurr, 2015). The increased competition (which is also present in and between universities (Fiedler, Welppe, Lindlbauer, & Sattler, 2008; Fiedler, Welppe, & Picot, 2006; Melo, Sarrico, & Radnor, 2010)) and the aforementioned complex challenges demand that knowledge-intensive organizations and their experts create the best ideas for new products or services in an efficient, productive and yet sustainable manner and, subsequently, that they quickly bring these products or services to the market (European Commission, 2014a).

This situation calls for a profound comprehension of individual and organizational factors that may stimulate or hinder performance in knowledge-intensive settings (e.g., in academia, which is the context this thesis primarily focuses on). Some studies have investigated individual antecedents (De Dreu, Baas, & Nijstad, 2008) and institutional antecedents of performance in knowledge-intensive settings such as academia (Wollersheim, Lenz, Welppe, & Spörrle, 2015). Furthermore, other studies have examined alternative possibilities to evaluate scientific performance from the perspective of different stakeholders (Aguinis, Suárez-González, Lannelongue, & Joo, 2012b). However, some questions remain unanswered, for example, (1) are there performance measures that can predict the impact of scientific manuscripts, (2) how can performance management tools (e.g., incentives, target agreements) foster different aspects of (creative/scientific) performance at different organizational levels, and (3) which motivation (i.e., intrinsic or extrinsic) should be fostered to increase research performance? This thesis aims to address these unsolved questions. Investigating these questions will allow a sound decision regarding which management control method (Ouchi, 1977, 1979) should be applied in academia. The next paragraphs outline the theoretical background and define the key concepts of this thesis.

### 1.1.2 Theoretical background

Knowledge-intensive organizations may be defined as organizations whose key input is exceptional expertise, i.e., a stock of knowledge that experts possess (Starbuck, 1992). These organizations are defined as having one-third or more of their personnel represented by experts with a high formal educational background equivalent to a doctoral degree (Starbuck, 1992). As a result, knowledge-intensive organizations may be labeled as human capital intensive (Kuvaas, 2006; Starbuck, 1992). Examples of knowledge-intensive settings are higher education institutions, research and development departments and management consultancies (Starbuck, 1992). The work in knowledge-intensive settings is characterized by comparably few routine tasks and rather complex, multifaceted tasks that are conducted in a flexible and creative manner with a considerable degree of autonomy (Keller, 2012; Kuvaas, 2006). Because a “defining characteristic of this kind of work is the difficulty involved in prescribing ahead-of-time actions required for successful work performance” (Kuvaas, 2006, p. 367), knowledge-intensive organizations rely on proactive employees (Grant & Ashford, 2008; Kuvaas, 2006). Measuring the performance in knowledge-intensive work (e.g., planning, analyzing, designing) is common in practice and attempts have been made to improve these measurements (Aguinis et al., 2012b). However, it is a very challenging task and is sometimes even regarded as impossible; for example, some claim that the work output is immeasurable, such as, for example, in science (Dilger, 2010). These special characteristics of knowledge-intensive work imply that employed experts (e.g., scientists, software engineers) need a considerable amount of intrinsic work motivation to self-manage their daily mental work (Starbuck, 1992). However, how do experts get credit for their work? How do they gain information about the output’s value? Moreover, what generates the high motivation that experts need to compete for excellence and how can they be motivated to strive for a common strategic goal? This is where performance management comes in place, and it is not an easy undertaking considering the high autonomy that experts usually have and, in fact, may also require.

This thesis focuses in large part on a prime example of a knowledge-intensive setting, namely higher education institutions, because these institutions vividly

illustrate the knowledge-based, autonomous, mental work of experts who have the knowledge equivalent of a doctoral degree or even higher. The literature even states that knowledge-intensive organizations derive some properties from academia (Starbuck, 1992), which is highly plausible because an organization's experts very likely underwent college education and socialization. Consequently, knowledge-generating academia may even be regarded as the mother of knowledge-intensive settings/organizations and clearly contrasts with, for example, the routine-based industrial production of for-profit private organizations. Another reason for interest in investigating higher education institutions is the fundamental governance changes that have taken place in academia over recent decades (Wilkesmann & Würmseer, 2009). Finally, excellence in science has been widely acknowledged as one of the main pillars of innovation in societies (European Commission, 2010, 2014a). Thus, academia (with its primary tasks, research, teaching, self-administration and their third mission) deserves special attention. One topic receiving extensive attention in the research about higher education institutions is the management of performance.

Performance management may be defined as “[...] a continuous process of identifying, measuring, and developing the performance of individuals and teams and aligning performance within the strategic goals of the organization” (Aguinis, 2009, p. 2). The performance management process is said to encompass six cyclic steps: (1) prerequisites setting (e.g., setting a mission statement, corporate strategy, job goals), (2) performance planning (e.g., clarifying job tasks, methods), (3) performance execution (i.e., actual work performance), (4) performance assessment (e.g., measuring qualitative and/or quantitative performance information, performance evaluation according to set criteria), (5) performance review (e.g., performance appraisal meeting, announcement of rewards or punishment by the decision maker, setting future job goals), and (6) performance renewal and recontracting (e.g., informed adjustment of job tasks, methods) which again leads to the beginning of the performance management cycle (Aguinis, 2009; Aguinis et al., 2012a). While the number and labeling of the performance management stages vary to some degree in the literature, the aim of performance management is clear in that it aims to fulfill the strategic goals of an organization (Melo et al., 2010; Radnor & Barnes, 2007).

A very famous creativity and motivation researcher, Teresa M. Amabile (1998, p. 77), aptly depicts how important performance management is for knowledge-intensive settings: “[I]f you want to spark innovation, rethink how you motivate, reward and assign work to people”. In practice, performance management is often highly output oriented, for example, as in the recently introduced New Public Management of academia in many countries (Wilkesmann & Würmseer, 2009; Wissenschaftsrat, 2011). New Public Management was introduced, for example, in Germany, due to lagging international research performance and perceived inefficiencies in the scientific system (Wissenschaftsrat, 2011). In turn, it strived to increase transparency, competition, and accountability by, for example, allocating resources based on clear performance indicators; furthermore, third-party funded projects gained momentum (Wissenschaftsrat, 2011). In contrast to common output oriented practices, however, the literature also discusses other governance methods, namely, input control and process control (Ouchi, 1977, 1979). Process control encompasses peer control and the application of regulations. Output control consists of the use of defined measurable performance criteria and competition, while input control entails the thorough selection of qualified employees and their subsequent socialization. According to a classification scheme of management control theory (Ouchi, 1977, 1979), input control should be applied when both the measurability of the outcome and the knowledge about the cause-and-effect relationship are low. The classification scheme further indicates that output control is the adequate governance method when measurability of the outcome is possible, but the cause-and-effect relationship may be unknown. Last, process control should be applied when the measurability of the outcome may be low, although the cause-and-effect relationship is well established. Accordingly, there may be a more suitable governance method than output control, which is common in practice, for example, in academia. Based on arguments from management control theory, scholars often argue that input control is an adequate method in higher education institutions (Kieser, 2010; Osterloh & Frey, 2011) for fostering work motivation and performance.

Although theoretically a certain governance method may be indicated in a given situation, governance methods have their advantages and disadvantages. In the context of this thesis, two governance methods are of particular importance: (1) input control because it is often recommended for knowledge-intensive settings such as

academia (Kieser, 2010; Osterloh & Frey, 2011) and (2) output control, which is heavily relied on in the recent New Public Management movement (Wilkesmann & Würmseer, 2009). The disadvantages of input control are old boys' networks and subjectivity in selecting employees (Osterloh, 2010). In contrast, it has been stated that the advantage of input control is that this governance method does not harm intrinsic motivation (Osterloh, 2010). Output control is more objective and transparent (Wissenschaftsrat, 2011) than input control. However, one disadvantage of output control is that setting clear performance criteria can cause a performance paradox (Meyer, 2005; Meyer & Gupta, 1994). This is a phenomenon according to which setting a clear performance indicator can result in the loss of the discriminative power of this indicator. Two processes can result in a performance paradox: (1) positive learning and (2) unintended perverse learning in that employees focus on achieving the indicators rather than on the performance that is being sought (Osterloh, 2010). An example of perverse learning is that some scholars increase their research output by slicing their work into the smallest publishable unit, while they disregard the theoretical and/or practical contribution that each single publication may make (Lawrence, 2003). Positive and perverse learning make it difficult to distinguish between good and poor performers, especially when few indicators are relied on (Osterloh, 2010). Therefore, it has been suggested that many and varying performance indicators should be applied (Osterloh, 2010). Another disadvantage of output control pertains to performance assessment. There are two major challenges: the measurement problem, i.e., not all performance aspects are easy to objectively and reliably measure such as performance quality (Nicolai, Schmal, & Schuster, 2015; Osterloh & Kieser, 2015; Ringelhan, Wollersheim, & Welp, 2015b), and the interdependency problem, i.e., performance is often the result of the work of several employees, which impedes knowledge about each employee's contribution, especially because social loafing can occur (Karau & Williams, 1993)). Social loafing is a phenomenon according to which individuals in a group show reduced task motivation and effort (Karau & Williams, 1993). Another challenge of output-oriented performance management is the crowding-out or overjustification effect (Deci, 1971), according to which extrinsic incentives can decrease intrinsic motivation because one feels controlled (Frey, 1994; Gneezy & Rustichini, 2000; Lepper, Greene, & Nisbett, 1973). This effect received much

attention in research and practice because motivation channels and sustains work behavior (Steers, Mowday, & Shapiro, 2004) and, hence, is regarded as a success ingredient in performance management. The crowding-out effect contradicts classical economic theory, which would suggest that incentives increase motivation and performance. However, crowding-out may only occur when motivation is intrinsic in the first place. Further research has shown that a more fine-grained view is necessary. For example, it has been demonstrated that monetary incentives might increase performance, yet motivation and quality may be reduced in combination with greater effort (Hammermann & Mohnen, 2014). Moreover, Kuvaas (2006) shows that the base pay level, but not the bonus level, was positively related to the reported work performance of knowledge workers. In addition to controversial monetary incentives, there are also non-monetary incentives, such as goal setting. Goal setting may be located in output control and has been described as an effective performance management tool for fostering work motivation and performance (Asmus, Karl, Mohnen, & Reinhart, 2015). Goals have been widely used in management practice, for example, in the form of SMART goals (i.e., specific, measurable, assignable, realistic and time-related goals (Doran, 1981)) to heighten extrinsic work motivation. Moreover, the literature has indicated that extrinsic and intrinsic motivation can also be additive rather than subtractive (Amabile, Hill, Hennessey, & Tighe, 1994). Therefore, diverse options arise to retain satisfied and motivated employees who achieve high performance. Possibilities are to ensure that work is meaningful (Amabile & Kramer, 2012), challenging (i.e., skills-demands fit (Keller, Ringelhan, & Blomann, 2011)) and interesting so that intrinsic motivation is kept high as well as providing career- and ability-development opportunities (Aguinis et al., 2012a), in addition to informal-interpersonal acknowledgment (Wollersheim, Welppe, & Ringelhan, 2014). Contrary to theoretical advice (i.e., by management control theory), governance is in practice often built on a mixture of governance methods (Osterloh, 2010; Osterloh, Wollersheim, Ringelhan, & Welppe, 2015). For an overview of performance management and incentive systems in research organizations, see Ringelhan et al. (2015b).

In short, the current discourse in the management literature about performance management in knowledge-intensive settings centers on how to adequately assess performance (Aguinis et al., 2012b; De Dreu et al., 2008) and whether output-

oriented governance is needed or other governance mechanisms may instead be the method of choice (Osterloh, 2010). The investigation of different governance approaches may help to best address the individual work motivation orientations (Amabile et al., 1994) and specific work environment factors (Locke, 2000; Locke & Latham, 2002) in knowledge-intensive settings such as academia.

The present dissertation builds on the above named research streams by examining what new online possibilities have become available to predict the impact of the vast amount of scientific work and by investigating characteristics of knowledge-intensive workers (e.g., their work motivation) and the adequateness of performance management tools (i.e., assigned goals) in knowledge-intensive settings. Respectively, this dissertation is placed in the human resources management, governance and organizational behavior areas, as applied to knowledge-intensive settings such as academia.

### 1.1.3 Research gaps

Despite the espoused and well-documented significance of adequately managing performance in knowledge-intensive settings such as academia for staying ahead of the competition in increasingly knowledge-based economies, little is known about predicting the impact of scientific work and about individual factors and organizational factors (that are applied at different organizational levels) to foster performance aspects in knowledge-intensive settings. The above identified research gaps are noteworthy and constitute major oversights in management research for the following reasons.

**(1) Relevance of investigating early predictive indicators of the impact of scientific work:** Early predictive indicators of the impact of scientific work are important for the efficient advancement of science and, therefore, of the economy and society. Early predictive impact indicators could avoid unknown parallel research streams and the delayed integration of already existing results. In addition, early predictive impact indicators may overcome one problem of traditional indicators; that is, the problem that traditional indicators can take months to years to indicate influence from the standpoint of scholars (Amat, 2008). Moreover, early predictive impact indicators can help stakeholders in science to find, process and evaluate

relevant scientific work and, thus, may assist in daily decision making such as recruitment decisions that entail million dollar bets on young scholars (Penner, Pan, Petersen, & Fortunato, 2013). This type of information filter is highly needed to process the vast amount of scientific work (Priem, Groth, & Taraborelli, 2012). Hence, there is a need for an appropriate, contemporary early indicator predicting the impact of scientific manuscripts.

**(2) Relevance of investigating individual-psychological antecedents of research performance:** Knowledge about the individual-psychological antecedents of research performance is necessary to generate an appropriate incentive system in higher education institutions, which, in turn, propel our knowledge-based society. Given that motivation is the driving force of behavior, it is puzzling that it is yet not entirely clear what motivates scholars toward excellent research performance, how this is related to job satisfaction and which incentives are adequate. An understanding of the latter is relevant because job satisfaction has been shown in the literature to be interlinked with turnover (Huang, 2011). There is a widely held belief that intrinsic work motivation is the most relevant in academia and that applicants should be selected based on their intrinsic motivation (Frey & Osterloh, 2011; Kim & Oh, 2002), as this motivation type results in more persistence and effort (Lawler & Hall, 1970). However, others posit that (aspects) of extrinsic work motivation can be just as relevant in academia (Lam, 2011; Tien, 2000). Moreover, it has been shown that intrinsic and extrinsic motivation may be additive (Amabile et al., 1994). However, studies are still lacking that address whether those performance management and incentive systems introduced in the course of New Public Management (Wilkesmann & Würmseer, 2009) are appropriate for the higher education context (Osterloh, 2010) or whether intrinsic work motivation should be relied upon to lead scholars to perform excellent research. Therefore, a deeper understanding of the (mediating) relationship between intrinsic work motivation, extrinsic work motivation and job satisfaction on research performance is overdue.

**(3) Relevance of investigating organizational factors applied at different organizational levels to foster work motivation and work performance:** Another major oversight is that perceived work motivation and work performance enhancing factors as well as perceived current undesirable developments in higher education

may vary between scholars in different positions. It is crucial to give highly educated scholars the opportunity to voice their opinion (Pouliakas & Theodossiou, 2012; Somech, 2005) on this because they often strive for autonomy and job control (Dilger, 2010; McCormack, Propper, & Smith, 2014; Melo et al., 2010; Minssen & Wilkesmann, 2003). Thus, assessing the different perspectives of individuals working in higher education and research institutions adds value and is, for this reason, essential to designing an adequate performance management system at each organizational level in higher education institutions. In addition, the timeliness of the topic, the incompleteness of previous studies and the system and region specificity of this topic call for this study. Additional knowledge in this area will help meet the aim of science managers to efficiently and sustainably increase performance (Wissenschaftsrat, 2014). Moreover, deeper insights will assist in successfully adjusting New Public Management, if indication for this is given.

**(4) Relevance of investigating the influence of an assigned- versus no-goal setting on discrete emotions and, in turn, on creative performance aspects:** It is of utmost relevance to conduct research on how the assignment versus omission of a goal influences discrete emotions and, in turn, creative performance aspects for the following three reasons. First, assigned goals and target agreements are often applied in practice in knowledge-intensive organizations (Latham & Yukl, 1975) and higher education institutions (Minssen & Wilkesmann, 2003) to motivate employees toward excellent performance. Second, research on goal setting has to date neglected to test the effects of goal setting on the diverse creative performance aspects that have been described in the dual pathway to creativity model (De Dreu et al., 2008) and that are common in creativity definitions in the literature (Amabile, 1983; Hennessey & Amabile, 2010). Third, research suggests that goal setting is not entirely positive (Ordonez, Schweitzer, Galinsky, & Bazerman, 2009). Therefore, knowledge about the influence of assigned goals on each creative performance aspect is essential and has been missing in the literature to date.

### 1.1.4 Resulting research questions

This thesis' goal is to address the above-named research gaps by examining new performance measurement and performance management possibilities based on the following four research questions:

- (1) Do Facebook likes for unpublished manuscripts that are uploaded to the Internet predict the future impact of scientific work?
- (2) Does job satisfaction mediate the relationship between intrinsic or extrinsic work motivation and research performance, and do intrinsic work motivation and extrinsic work motivation mediate the relationship between job satisfaction and research performance?
- (3) What are the largest current undesirable developments in higher education institutions and what can be done to foster work motivation and work performance at different organizational levels?
- (4) How does an assigned-goal setting versus a no-goal setting influence different creative performance aspects and does anger compared to happiness mediate this relationship?

By investigating these four research questions, this thesis contributes to the management literature through the exploratory assessment and testing of theory-based assumptions on performance measurement and management in knowledge-intensive settings such as academia. This dissertation primarily draws (to different degrees, depending on the respective essay) on theories and phenomena from the following four areas to address the research questions: (1) motivation psychology (e.g., crowding-out (Deci, 1971; Gneezy & Rustichini, 2000; Lepper et al., 1973), motivation-hygiene theory (Herzberg, Mausner, & Snyderman, 1967), dual motivation (Amabile et al., 1994)), (2) performance and performance management (e.g., performance paradox (Meyer & Gupta, 1994), goal setting theory (Locke, 2000; Locke & Latham, 2002), dual pathway to creativity model (De Dreu et al., 2008)), (3) social psychology (e.g., collective wisdom (Asur & Huberman, 2010)), and (4) the psychology of emotions (e.g., mood-as-information approach (Schwarz & Clore, 2003)). The next section presents the research methods and data sources of the four essays of this thesis.

## 1.2 Research methods and data sources

### 1.2.1 General advantages and disadvantages

The essays of this thesis apply multiple data collection methods to examine the underlying research questions on the basis of primary data (Glass, 1976): the collection of data from the Internet (i.e., Internet research), an online survey, semi-structured interviews and a laboratory experiment. Primary data in comparison to secondary data are needed when no matching data set is available to analyze the present research question and when the aim is not to re-analyze an existing research question with, for example, better statistical techniques (Glass, 1976). Primary data collection has the advantage that all necessary variables for the proposed research question can be assessed. A disadvantage of primary data is that the data collection takes time and effort (Glass, 1976). The use of heterogeneous methods in this dissertation stems from the heterogeneous nature of the individual research questions (there exists no “silver bullet” method for all possible research questions).

The different possible primary data-collection methods have their advantages and disadvantages. A major advantage of laboratory experiments is the possibility to test causality, i.e., to measure the effect of a cause under controlled conditions (Antonakis, Bendahan, Jacquart, & Lalive, 2010; Spencer, Zanna, & Fong, 2005). Such controlled conditions are usually not possible in surveys and constitute one of their main disadvantages, in addition to potential response biases (e.g., social desirability (Edwards, 1957)). However, in comparison to laboratory experiments, surveys offer the benefit that the participants can be asked about their actual working situation, individual-level aspects (e.g., number of scientific publications) and individual-psychological aspects (e.g., personality traits), which renders surveying a widely acknowledged method in psychological and applied research due to the high external validity of results (Grant & Wall, 2008). In contrast to surveys and experiments, interviews are usually conducted based on a lower number of participants, among other things, due to the time-consuming nature of conducting, preparing and qualitatively analyzing them. A major disadvantage of interviews is their questionable external validity (i.e., the generalizability of the results to other

situations and individuals (Grant & Wall, 2008)). Nevertheless, interviews are very useful when current topics are being explored in depth to disentangle crucial factors. Last, Internet research has the benefit that often large amounts of data are available (Roesch, Stahl, & Gaber, 2014), but often the existing (correlational) data (Thelwall, Haustein, Larivière, & Sugimoto, 2013) do not allow testing causality. However, Internet research allows the investigation of new research avenues that arise as we shift increasing amounts of our lives online. The following paragraphs outline the respective chosen methodological approach and applied statistical analyses of each study in this dissertation.

### **1.2.2 Applied methodology and statistical analyses**

The studies of Essay one investigate whether Facebook likes for unpublished manuscripts that are uploaded to the Internet can be used as an early indicator of the future impact of the scientific work. To investigate this research question, data were collected through Internet research. Specifically, the Facebook likes of manuscripts uploaded to the Harvard Business School (HBS) website ( $N = 170$ ) and the bioRxiv website ( $N = 270$ ) were compared with traditional impact indicators (i.e., journal article citations, Impact Factor and Immediacy Index), which were collected from Thomson Reuters' Web of Science. The data analysis of the explorative study was based on regression analyses. Using data from the Internet to examine the research question was suitable because the research question addresses online behavior and is based on bibliographic data available on the Internet (bibliometry is the study of how research performance can be evaluated (Moed, Burger, Frankfort, & Van Raan, 1985)). Moreover, online data usually has the advantage of providing larger amounts of existing data (i.e., also often referred to as big data (Bentley, O'Brien, & Brock, 2014; Conte et al., 2012)). Furthermore, analyzing online data is an established method, for example, it is used in the new discipline of computational social science (Conte et al., 2012; Lazer et al., 2009). Internet research further constitutes a highly useful methodological approach because it allows the exploration of behavior based on the quantitative data offered by new information and communication technologies (e.g., social media).

To study the influence of job satisfaction, intrinsic work motivation and extrinsic work motivation, as well as their interrelated effects on research performance, Essay two reports a cross-sectional survey in which young scholars from the fields of business and economics were the participants ( $N = 995$ ). The proposed mediation models were tested by performing regression-based mediation analyses based on the recommended procedures of Preacher and Hayes (2008). Using a survey for this research question has the focal advantage of providing the opportunity to assess the individual-level variables work motivation, job satisfaction and the research performance of scholars (i.e., real life settings). Additionally, conducting a survey to investigate psychological topics is consistent with the selected approach in a high percentage of existing research in psychology and management (Gu, Lin, Vogel, & Tian, 2011; Hackman & Oldham, 1975).

The study described in Essay three was conducted to gain deeper insights into current undesirable developments in higher education institutions and to provide empirically informed recommendations on how to foster work motivation and work performance at different organizational levels. To this end, semi-structured interviews with individuals working in different positions in higher education and research institutions ( $N = 12$ ) in the field of business and economics or the field of social sciences and sociology were conducted. The interview data were analyzed based on the consensual qualitative research approach (Hill, Thompson, & Williams, 1997). In particular, two coders independently categorized the data based on a coding scheme. Subsequently, an auditor determined how to categorize inconsistent categorizations of the two coders. Semi-structured interviews have the key advantage of being reasonably objective while still allowing a thorough understanding of the interviewees' statements regarding a broad topic in an explorative manner (Borg & Gall, 1983). In addition, interviews are also frequently chosen by a vast majority of researchers with a similar interest in broad and novel topics (Melo et al., 2010; Schneider & Sadowski, 2010).

The study described in Essay four examines the influence of assigned goals versus no goals on aspects of creative performance (i.e., cognitive persistence, creative fluency, cognitive flexibility, originality and appropriateness) by conducting a laboratory experiment with 101 student participants. The hypotheses were tested

using a regression-based mediation analysis according to Preacher and Hayes (2008). Using a laboratory experiment to analyze the research question has the chief advantages that the independent variable can be manipulated under controlled conditions so that causality can be inferred and an assessment of the immediate emotional reactions is possible. Moreover, in the goal setting and creativity literature, laboratory experiments are methodologically well established (De Dreu et al., 2008; Mohnen & Ostermaier, 2013; Mossholder, 1980; Shalley, 1991).

## **1.3 Structure, key findings and contributions**

### **1.3.1 Structure of this dissertation**

The following four chapters (Chapter two to five) comprise the main part of this thesis and contribute to the examination of how performance can be measured and managed in knowledge-intensive settings such as academia. Each chapter separately describes one essay. Given that each essay is an independent academic contribution, each introduces the respective research topic, theoretical background, methodology and data analyses and discusses the study findings. Specifically, Chapter two is based on current debates and findings on the definition and measurement of scientific performance (Aguinis et al., 2012b; Meyer & Gupta, 1994; Priem et al., 2012), the phenomenon of collective wisdom (Asur & Huberman, 2010), as well as new possibilities from information and communication technologies. This basis enables the exploration of whether Facebook likes can serve as an altmetric (i.e., an alternative indicator to measure the impact of scholarly work based on activities in the Internet (Priem et al., 2012)) to promptly predict the future impact of scholarly work. Chapter three is based on the concept of progress (Lawler & Hall, 1970) and the crowding-out effect (Frey, 1994; Gneezy & Rustichini, 2000; Lepper et al., 1973) to explore the indirect influence of intrinsic work motivation, extrinsic work motivation and job satisfaction on research performance. Chapter four reflects on New Public Management (Lange, 2008; Whitley, 2011) and current developments in academia. Recommendations are generated on how to foster work motivation and work performance at each organizational level by drawing on the theory of Herzberg et al. (1967). Chapter five primarily builds on the so-called “dual pathway to

creativity” model (De Dreu et al., 2008), goal setting theory (Locke, 2000; Locke & Latham, 2002) and the mood-as-information approach (Schwarz & Clore, 2003) to test and explain how an assigned-goal setting versus a no-goal setting affects the multitude of creative performance aspects depending on the elicited emotion. Chapter six concludes the present thesis by summarizing the findings described in Chapter two to five, highlighting implications and offering directions for further research. The key findings and contributions of the studies comprised in Chapter two to five are briefly outlined in the following.

### **1.3.2 Key findings and contributions**

Chapter two builds on three aspects: First, it is based on current heated, yet unresolved, debates and new empirical insights about the multidimensionality and measurability of scientific performance (Aguinis et al., 2012b; Priem et al., 2012) that resulted in the call for altmetrics (Torres, Cabezas, & Jiménez, 2013). Second, this chapter is based on the phenomenon of collective wisdom (Asur & Huberman, 2010), according to which crowds (i.e., through social media content) can predict real-world attributes (Kosinski, Stillwell, & Graepel, 2013). Third, the chapter builds on new possibilities in information and communication technologies that bring about societal change and enable new research streams such as computational social science (Conte et al., 2012; Lazer et al., 2009). Addressing these unsolved problems and new possibilities, Chapter two explores whether the Facebook likes of unpublished manuscripts uploaded to the Internet may be a valuable early indicator of the impact of scientific work. The results show that, for manuscripts from the HBS website with one or more Facebook likes, the more Facebook likes the manuscript receives, the more citations the manuscript receives. The Harvard Business School manuscripts were subsequently categorized as psychological and non-psychological, and it was found that the Facebook likes of the psychological but not of the non-psychological manuscripts predict citations. The Impact Factor and Immediacy Index were not influenced by (non-zero) Facebook likes. For manuscripts from the bioRxiv website, it was observed that Facebook likes and non-zero Facebook likes do not predict traditional impact indicators (i.e., citations, Impact Factor, Immediacy Index). In sum, these results indicate an interdisciplinary difference in the predictive value of Facebook likes: Facebook likes predict citations in the psychological area but not in

the non-psychological area of business and not in the area of life sciences. Thus, Facebook likes, at least in part, resemble something other than the impact measured by traditional impact indicators. This study contributes to the existing literature on the definition and measurement of scientific performance (Aguinis et al., 2012b; Meyer & Gupta, 1994; Priem et al., 2012) and collective wisdom (Asur & Huberman, 2010) in that the findings show that new performance measurement options arise through social media and that collective wisdom is also evident in the scientific area. The results offer two primary contributions. First, the Facebook likes of unpublished manuscripts are suggested as a new performance indicator to promptly predict the impact of scientific work. In particular, Facebook likes could be integrated as an additional metric (i.e., “addmetric”) in the performance measurement portfolio of scientometry (which studies how science and technology can be evaluated (Priem et al., 2012; Thelwall et al., 2013)). The reason for this advice is that diverse metrics help to counter the shortcomings of single indicators and prevent the manifestation of a performance paradox (Meyer & Gupta, 1994). Second, the findings contribute to the literature by evaluating the benefits and limitations of Facebook likes as an early indicator of the impact of scientific work. The fact that Facebook likes express a clear positive semantic meaning increases the value of this indicator and should heighten further investigations of this measure.

Chapter three is based on research on progress (i.e., the comparison of the present and intended goal achievement state (Lawler & Hall, 1970)) and the crowding-out effect (Frey, 1994; Gneezy & Rustichini, 2000; Lepper et al., 1973) to quantitatively test whether job satisfaction mediates the effects of intrinsic and extrinsic work motivation on research performance and whether intrinsic work motivation and extrinsic work motivation mediate the effect of job satisfaction on research performance. The results from an online survey of young scholars indicate that intrinsic work motivation, extrinsic work motivation and job satisfaction are direct individual psychological predictors of research performance. Furthermore, an association between intrinsic work motivation and job satisfaction exists, while extrinsic work motivation did not influence job satisfaction. The chapter’s main contributions to the management literature are as follows. First, the study contributes by extending empirical studies on research performance in academia that have disregarded job satisfaction as a mediator of the relationship between work

motivation and research performance. Second, the findings empirically support arguments on the crucial role of intrinsic work motivation, extrinsic work motivation and job satisfaction in academia (Lam, 2011; Tien, 2000). The study further contributes by demonstrating that both motivational orientations, i.e., intrinsic work motivation and extrinsic work motivation, exist in academia and are positively related. This finding supports research by Amabile et al. (1994) according to which intrinsic work motivation and extrinsic work motivation can simultaneously exhibit high levels. According to Amabile et al. (1994), this so called dual motivation can lead to additive synergistic motivational effects, resulting in enhanced overall performance. Our finding, thus, appears to contradict crowding-out theory, according to which extrinsic motivators decrease intrinsic motivation (Frey & Jegen, 2001; Murayama, Matsumoto, Izuma, & Matsumoto, 2010). However, the survey results revealed that intrinsic work motivation, unlike extrinsic work motivation, is positively interlinked with job satisfaction and may, thus, potentially cause less turnover behavior (Huang, 2011) and elicit more beneficial long-term effects than extrinsic work motivation.

Chapter four illustrates the current most significant undesirable developments at higher education institutions and offers recommendations on how to foster work motivation and work performance at each organizational level by drawing on the theory of Herzberg et al. (1967). It is important to investigate this topic because high academic research performance strengthens innovation-based economies (Altbach & Teichler, 2001; Cooke, 2002). Moreover, years after the introduction of New Public Management (Lange, 2008; Whitley, 2011), it is necessary to evaluate the effects of this strategic managerial change (Schimank, 2005). Furthermore, previous literature has indicated that the performance management in academia is confronted with serious problems (Osterloh et al., 2015; The Economist, 2013). Thus, this study investigates in an explorative manner the following research questions: (1) what are the greatest current undesirable developments in higher education institutions and (2) what can be done to foster work motivation and work performance at different organizational levels of higher education institutions. Semi-structured interviews with individuals working in different positions at higher education and research institutions indicate that deficient funding (which is particularly often mentioned by Ph.D. students) is the most significant current undesirable development. The interviews also indicate that to foster work motivation and work performance at the chair level, a

good leadership style and interpersonal acknowledgment is beneficial, whereas at the faculty level, beneficial framework conditions and cooperation are most often identified. At the institutional level, appropriate organizational structures and an appropriate leadership culture may foster motivation and performance. The results make the following main contributions to the existing literature on New Public Management (Lange, 2008; Whitley, 2011). First, the results highlight current undesirable developments from the perspective of individuals with different job positions and reveal deficient funding as a current major problem that may harm (long-term) research and the ability of scholars to plan their lives. The findings demonstrate that the judgments of individuals working in higher education or research institutions vary, for example, depending on their job position. This circumstance renders interviewing different individuals in-depth an important prerequisite for a participative management style (Pouliakas & Theodossiou, 2012; Somech, 2005), which is highly required for managing higher education institutions. Second, the findings suggest that the motivation-hygiene theory (Herzberg et al., 1967) can be applied to science and may explain behavior in that monetary incentives may dissatisfy when not sufficiently present, while their presence may not motivate for high performance. Third, the study contributes to the literature by revealing the importance of distinguishing between formal acknowledgment and interpersonal informal acknowledgment. According to the findings, specifically interpersonal informal acknowledgment should be used. All in all, the findings suggest that New Public Management needs to be adjusted for excellent research to take place.

Chapter five is mainly based on the dual pathway to creativity model (De Dreu et al., 2008), goal setting theory (Locke, 2000; Locke & Latham, 2002) and the mood-as-information approach (Schwarz & Clore, 2003) to explain how the setting or omission of a goal affects diverse creative performance aspects in knowledge-intensive settings. Examining the influence of assigned-goal setting on creative performance aspects is of utmost importance because targets are assigned to employees in practice at knowledge-intensive organizations (Latham & Yukl, 1975). This situation makes empirical knowledge on how these performance management tools actually affect creative performance aspects essential. Existing studies suggest that goal setting can have harmful effects; for example, areas that are not identified

as goals may be neglected, or unethical behavior may arise (Mossholder, 1980; Ordonez et al., 2009). In this vein, it is plausible that assigned goal setting can contribute to some aspects of creative performance, whereas it may detract from others. The assumption that was tested in a laboratory experiment with student participants was that having an assigned goal versus having no goal leads anger to outweigh happiness, which in turn increases cognitive persistence and creative fluency, while it decreases cognitive flexibility, originality and appropriateness. Chapter five contributes to the current knowledge in management research in four main ways. First, the chapter contributes to the existing literature by demonstrating that the mood-as-information approach (Schwarz & Clore, 2003) and the dual pathway to creativity model (De Dreu et al., 2008) seem to be in part appropriate frameworks for explaining and predicting the influence of assigned-goal setting versus a no-goal setting via discrete emotions on the multitude of creative performance aspects. By taking into account the elicited emotion, the models can at least in part explain and predict why assigned goal setting can have negative as well as positive effects on different creative performance aspects, which may initially appear to be contradictory. Second, the findings further imply that more quantitative aspects of creative performance (e.g., creative fluency), in comparison with more qualitative aspects of creative performance (e.g., originality), are positively influenced by assigned-goal setting versus no-goal setting (via the difference in perceived discrete emotions). Accordingly, the appropriateness of the ideas (which may be regarded as a qualitative creative performance aspect) was in fact negatively influenced by assigned-goal setting versus no-goal setting. Third, based on the literature (Amabile, 1983; Hennessey & Amabile, 2010) and the present study results, there is indication that the creative performance dimension “appropriateness of ideas” should be added to the dual pathway to creativity model (De Dreu et al., 2008). A reason for this suggestion is that the “appropriateness of ideas” appears to be an independent and important creative performance aspect. Thus, the dual pathway to creativity model needs to be adapted. Fourth, the proposed two pathways in the dual pathway to creativity model (De Dreu et al., 2008) should be reconsidered because the distinction of which creative performance aspect precedes another is questionable based on the measurement (i.e., operationalization) of the creative performance aspects.

The next chapters of this dissertation (Chapter two to five) comprise the four essays. Following the four essays, a conclusion (Chapter six) summarizes the findings of the dissertation, discusses implications, and offers future research avenues.

## 2 Essay 1: I like, I cite? Do Facebook likes predict the impact of scientific work?<sup>2</sup>

Due to the increasing amount of scientific work and the typical delays in publication, promptly assessing the impact of scholarly work is a huge challenge. To meet this challenge, one solution may be to create and discover innovative indicators. The goal of this paper is to investigate whether Facebook likes for unpublished manuscripts that are uploaded to the Internet could be used as an early indicator of the future impact of the scientific work. To address our research question, we compared Facebook likes for manuscripts uploaded to the Harvard Business School website (Study 1) and the bioRxiv website (Study 2) with traditional impact indicators (journal article citations, Impact Factor, Immediacy Index) for those manuscripts that have been published as a journal article. Although based on our full sample of Study 1 ( $N = 170$ ), Facebook likes do not predict traditional impact indicators, for manuscripts with one or more Facebook likes ( $n = 95$ ), our results indicate that the more Facebook likes a manuscript receives, the more journal article citations the manuscript receives. In additional analyses (for which we categorized the manuscripts as psychological and non-psychological manuscripts), we found that the significant prediction of citations stems from the psychological and not the non-psychological manuscripts. In Study 2, we observed that Facebook likes ( $N = 270$ ) and non-zero Facebook likes ( $n = 84$ ) do not predict traditional impact indicators. Taken together, our findings indicate an interdisciplinary difference in the predictive value of Facebook likes, according to which Facebook likes only predict citations in the psychological area but not in the non-psychological area of business or in the field of life sciences. Our paper contributes to understanding the possibilities and limits of the use of social media indicators as potential early indicators of the impact of scientific work.

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<sup>2</sup> Acknowledgment: This paper contains elements of joint work with Dr. Jutta Wollersheim and Prof. Dr. Isabell M. Welpel.

### 3 Essay 2: Work motivation and job satisfaction as antecedents of research performance: Investigation of different mediation models<sup>3</sup>

Knowledge of the factors that influence the quality and quantity of research productivity is vital for governments, universities, departments, and research groups. Using a data set of 995 young scholars in academia from the fields of business and economics, we investigate the influence of job satisfaction, two different types of work motivation, and their interrelations on research performance. Our cross-sectional data reveal that intrinsic work motivation, extrinsic work motivation and job satisfaction have a direct influence on research performance without control variables in the model. Our data support models that suggest job satisfaction as a mediator of the relationship between intrinsic work motivation and research performance. The findings also support models that demonstrate that intrinsic work motivation mediates the relationship between job satisfaction and research performance. Our findings empirically support conceptual arguments on the crucial role of intrinsic and extrinsic work motivation and job satisfaction in an academic context and thus should be considered for the tailoring of appropriate incentive systems at universities. The paper provides a discussion of these findings.

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#### **4 Essay 3: Current developments at higher education institutions and interview-based recommendations to foster work motivation and work performance<sup>4</sup>**

Providing empirically based recommendations on how to improve scholars' individual work motivation and work performance is important, for example, to foster the research output of higher education institutions and, thus, to strengthen innovation-based economies that heavily rely on the generation of scientific knowledge. Therefore, we conducted twelve semi-structured interviews with individuals working in different positions of higher education and research institutions to gain deeper insight into current undesired developments in higher education institutions and to provide empirically informed recommendations. Our interview data indicate the following major results: (1) deficient funding is especially often cited by Ph.D. students as the most significant current undesirable development at higher education institutions. (2) At the chair level, good leadership style (e.g., constructive feedback) and interpersonal acknowledgment may motivate and enhance performance, whereas at the faculty level, conducive framework conditions (e.g., the provision of laboratories) and cooperation (e.g., exchange between researchers, chairs, faculties) may increase motivation and performance. Finally, at the institutional level, appropriate organizational structures (e.g., decentralized responsibility and autonomy) and an appropriate leadership culture (e.g., creating trust) may foster motivation and performance.

**Current status:** Accepted for publication as: Ringelhan, S., Wollersheim, J., & Welpe, I. M. Current developments at higher education institutions and interview-based recommendations to foster work motivation and work performance. In J. Frost, F. Hattke & M. Reihlen (Eds.), *Multi-level governance in universities: Strategies, structures, controls*. Springer Science, Series Higher Education Dynamics. (See also Appendix C).

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<sup>4</sup> Acknowledgment: This paper contains elements of joint work with Dr. Jutta Wollersheim and Prof. Dr. Isabell M. Welpe.

## 5 Essay 4: Give me a goal to be creative: Investigating goal setting and creative performance<sup>5</sup>

Taking into account the dual pathway to creativity model, we conducted an experiment ( $N = 101$ ) to investigate the influence of goals on creative performance aspects (cognitive persistence, creative fluency, cognitive flexibility, originality and appropriateness). Our experiment revealed that having an assigned goal versus having no goal caused anger to outweigh happiness, which led to more cognitive persistence and creative fluency. Regarding cognitive flexibility and originality, we observed no influence. An assigned goal led to less appropriate ideas than having no goal, whereas an indirect effect was not observed. Our findings suggest that the dual pathway to creativity model needs to be adapted and that goals should be applied depending on whether it is strived for an open-minded in-depth ideation or appropriate ideas.

**Current status:** Working paper. (See also Appendix D).

Presented at: Workshop “Outcomes in Academia: Leistungsmessung und –Steuerung in der Hochschule”, Tübingen (Germany), 06-07 March 2014; 16. Jahrestagung der Wissenschaftlichen Kommission Hochschulmanagement, Bremen (Germany), 21-22 February 2014; Abschlusstagung “Innovation, Leistungsmessung und Anreizsysteme in Wissenschaft und Wirtschaft – Governance wissensintensiver Organisationen”, München (Germany), 14-15 January 2014.

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<sup>5</sup> Acknowledgment: This paper contains elements of joint work with Dr. Jutta Wollersheim, Prof. Dr. Isabell M. Welpel and Prof. Dr. Matthias Spörrle.

## 6 Conclusion<sup>6</sup>

### 6.1 Summary of findings

This thesis set out to contribute to the management literature by analyzing how performance can be measured and managed in knowledge-intensive settings such as higher education institutions. For this purpose, the present thesis drew on current debates, empirical findings, and theories and phenomena from social psychology, cognitive psychology and general psychology. In specific, mainly the following in this research area prominently represented and knowledge expanding theories and phenomena were used: motivation-hygiene theory (Herzberg et al., 1967), the crowding-out effect (Frey, 1994; Gneezy & Rustichini, 2000; Lepper et al., 1973), dual motivation (Amabile et al., 1994), goal setting theory (Locke, 2000; Locke & Latham, 2002), the performance paradox (Meyer & Gupta, 1994), the mood-as-information approach (Schwarz & Clore, 2003), the dual pathway to creativity model (De Dreu et al., 2008) and collective wisdom (Asur & Huberman, 2010). The thesis' four main chapters (Chapter two to five) analyze in an exploratory way and test and extend theory for performance measurement and management in knowledge-intensive settings. The present thesis demonstrates that the management literature benefits from the integration of psychological research and theory. The results and contributions of the studies of each essay are summarized in the following.

Chapter two (i.e., Essay one) builds on current unsolved debates and empirical insights into the multidimensionality (Aguinis et al., 2012b; Priem et al., 2012) and measurability of scientific performance (Baum, 2011), the publication delay (Amat, 2008) and the citation gap (Peng & Zhu, 2012), as well as the wisdom of crowds in predicting real-world attributes (Conte et al., 2012; Lazer et al., 2009); this chapter investigates the use of Facebook likes as an altmetric. An example of previous research in this area is the study by Thelwall et al. (2013), who contrasted eleven altmetrics (e.g., Tweets) with citations of published articles. However, conclusions regarding the predictability of traditional impact measures cannot be drawn from their

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<sup>6</sup> This section is partly based on Ringelhan et al. (2015a), Ringelhan et al. (2013), Ringelhan et al. (forthcoming) and Ringelhan et al. (2015c).

study, and the value of the investigated altmetrics as an early indicator of scientific impact is uncertain because the investigated indicators do not advance journal publications. Moreover, the investigated indicators do not represent a clear positive attitude of the reader. Chapter two demonstrates that Facebook likes of scientific manuscripts uploaded to the Internet predict citations for psychological manuscripts uploaded on the HBS website. Notably, Facebook likes do not predict citations for non-psychological manuscripts on the HBS website nor do they predict citations for manuscripts uploaded on the bioRxiv website (i.e., the area of life sciences). The findings of Chapter two contribute to the literature on the green road of open access (Harnad et al., 2004) by revealing that Facebook likes of manuscripts uploaded to the Internet may in some disciplines have a predictive value for citations of the manuscripts subsequently published in journals. The findings support the literature, which reports interdisciplinary differences regarding social media behavior in science; for example, it has been reported that articles from the social sciences and humanities were most often found in social media compared to articles from the natural sciences (Haustein, Costas, & Larivière, 2015). Additionally, the results contribute to the literature by supporting the ability of the scientific community to jointly act as a search engine (Ball, 2011) to reduce information overload, which supports the existence of collective wisdom (Asur & Huberman, 2010) in science. Another outcome is that Facebook likes cannot predict journal-level indicators (Impact Factor or Immediacy Index), except for the Facebook likes for non-psychological manuscripts from the HBS website, which negatively predict the Impact Factor. Taken together, the findings contribute to the impact assessment of scientific work and support arguments on using such an indicator as an addmetric rather than an altmetric (Hoffmann, Lutz, & Meckel, 2014; Torres et al., 2013) to display the variety of scientific performance depending on the stakeholders' perspective (Aguinis et al., 2012b). All in all, Facebook likes at least in part resemble a facet of impact that differs from traditional indicators. Furthermore, a critical reflection on this indicator should be kept in mind because, for example, Facebook likes can be manipulated.

Chapter three theoretically departs from the concept of progress in one's goals (Lawler & Hall, 1970), the motivation-hygiene theory (Herzberg et al., 1967) and the crowding-out effect (Deci, 1971; Frey, 1994; Gneezy & Rustichini, 2000; Lepper et

al., 1973). In practical terms, the chapter departs from the perceived inefficiencies in the academic system (Franck & Schönfelder, 2000; Muller-Camen & Salzgeber, 2005). These complaints brought forth the introduction of New Public Management, with the transfer of management instruments from the private for-profit industry to academia. However, the recently introduced performance management tools in the realm of New Public Management (Manning & Barrette, 2005) might not be entirely adequate for academia because significant differences are posited to exist between the sectors. Thus, the effect of the introduced performance management tools on performance in academia may not be as expected. So far, few studies have investigated the individual psychological antecedents of research performance (Hedjazi & Behravan, 2011). For example, Bland, Center, Finstad, Risbey, and Staples (2005) found a relationship between motivation and research performance; however, motivation was only measured by one item and no differentiated examination of different motivational orientations was undertaken. The results of Chapter three demonstrate that young scholars who are highly intrinsically motivated experience greater satisfaction with their jobs and report higher research performance. This finding is consistent with the argument that intrinsic motivation produces more effort and progress (Lawler & Hall, 1970), which appears to result in increased job satisfaction and high research outcomes. With regard to extrinsic work motivation, the findings show that although highly extrinsically motivated young scholars are not more satisfied with their job, they also report higher research performance. Furthermore, highly intrinsically motivated and more satisfied young scholars report fewer conference publications. Similarly, highly extrinsically motivated young scholars tend to have fewer conference publications. The negative effect on the number of conference publications may be explained by the fact that young scholars highly satisfied with their job may strive for quality rather than quantity and, therefore, may publish fewer conference papers that are, however, of higher quality. With regard to the second model, the results showed that young scholars who are highly satisfied with their jobs are more intrinsically (but not extrinsically) motivated, which leads to higher research performance. The chapter contributes to the management literature by indicating that crowding-out (Frey, 1994; Gneezy & Rustichini, 2000; Lepper et al., 1973) may not occur, and it further hints at the concept of dual motivation (Amabile et al., 1994) in science in that both intrinsic

and extrinsic work motivation can coexist. However, intrinsic work motivation may be more beneficial in the long run, as it is associated with job satisfaction.

In Chapter four, the current most significant undesirable developments at higher education institutions are reported and recommendations on how to increase work motivation and work performance at different organizational levels are offered by drawing on the motivation-hygiene theory of Herzberg et al. (1967). Years after the strategic managerial change (Schimank, 2005) from introducing New Public Management to academia, it is necessary to evaluate its effects. This investigation is particularly indispensable, as previous literature has stated that the performance management of higher education institutions is confronted with serious problems (Osterloh et al., 2015; Ringelhan et al., 2015b). However, there have been no studies that explored and compared current undesirable developments from the perspective of individuals working in different positions at higher education and research institutions or on how to foster scholars' work motivation and work performance at different organizational levels. The interview results empirically demonstrate that Ph.D. students, in particular, perceive deficient funding (e.g., temporary contracts) to be the most significant current undesirable development. This undesirable development may at least in part be caused by New Public Management, which attempts to increase competition for funding among institutions and scholars. The competition may increase the short-term quantitative output, but longitudinal research approaches may be disregarded. Regarding what can be done to improve work motivation and work performance, the results show that at the chair level, a good leadership style and motivation through interpersonal informal acknowledgment are fruitful. The interview results extend our knowledge on interpersonal acknowledgment, a major motivator in academia (Ahsan, Abdullah, Fie, & Alam, 2009; Wollersheim et al., 2014), by revealing that interpersonal acknowledgment may be particularly valuable at the chair level. At the faculty level, beneficial framework conditions and cooperation are recommended to increase motivation and performance, whereas at the institutional level, good organizational structures and a mission statement are called for. With regard to the importance of cooperation, the results support existing studies (Bland et al., 2005; Gu et al., 2011) and add knowledge by revealing that the faculty level should nurture cooperation. Moreover, the interviewees seldom named monetary incentives when asked what can be done

to foster work motivation and work performance. At the same time, they stated that monetary incentives should be transferred from industry to science, which initially appears to be contradictory. However, drawing on the theory of Herzberg et al. (1967), the results become plausible in that monetary incentives in academia may not enhance work motivation and work performance but may play a role in meeting basic needs and, if present, may diminish dissatisfaction.

Chapter five combines several theoretical streams, in particular, the dual pathway to creativity model (De Dreu et al., 2008), goal setting theory (Locke, 2000; Locke & Latham, 2002), and the mood-as-information approach (Schwarz & Clore, 2003). From a practical point of view, Chapter five is relevant because assigned targets are currently applied in knowledge-intensive organizations (Latham & Yukl, 1975), although existing studies suggest that goal setting can have harmful effects (Motowildo, Borman, & Schmit, 1997), such as the neglect of non-goal areas or displays of unethical behavior (Mossholder, 1980; Ordonez et al., 2009). Moreover, it is possible that goal setting may contribute to some aspects of creative performance, whereas it may detract from others. The results of the study described in Chapter five demonstrate that there are different influences from assigned-goal setting versus no-goal setting on diverse creative performance aspects. Further, the difference in emotions turned out to be a mediator of the positive relationship between assigned-goal setting versus no-goal setting and cognitive persistence and tended to be a significant mediator of the positive relationship between assigned-goal setting versus no-goal setting and creative fluency. Thus, the mood-as-information approach (Schwarz & Clore, 2003) and the dual pathway to creativity model (De Dreu et al., 2008) represent useful frameworks to at least partly predict and explain the effects of goal setting. Regarding cognitive flexibility and originality, no influence of assigned-goal setting versus no-goal setting via the emotions anger compared to happiness was observed. Moreover, having an assigned goal leads to less appropriate ideas than having no goal, while no indirect effect via the difference in emotions was observed. Chapter five contributes to the literature by suggesting an adaption and extension of the dual pathway to creativity model by adding the creative performance aspect “appropriateness of ideas” (Amabile, 1983; Hennessey & Amabile, 2010). The results suggest that theory and research have not been precise enough in defining and predicting creative performance aspects.

## 6.2 Implications

This dissertation provides a number of practical implications. First, the findings of this dissertation have demonstrated that Facebook likes may be a contemporary and rapid solution to measuring and predicting the impact of unpublished scientific work in the psychological but not in the non-psychological area of business or in the life sciences area. Thus, adding Facebook likes to the portfolio of indicators may be advantageous because Facebook likes provide additional insight into the manifold aspects of scientific performance. Due to the complexity of scientific performance, a few mutually agreed-upon, traceable impact indicators may not be accomplishable. Therefore, stakeholders of science need to open up to diverse performance indicators to assess the multitude of aspects of scientific performance according to the different perspectives. This practical suggestion is generally in line with Neylon and Wu (2009), who state that the impact of scientific work is complex, whereby different stakeholders need different sources of information. In addition, using Facebook likes of manuscripts uploaded to the Internet makes the evaluation of science possible for non-researchers. Mark Zuckerberg, founder and CEO of Facebook, aptly says about the possibilities to depict different stakeholder opinions: “[...] Right now, with social networks and other tools on the Internet, all of these 500 million people have a way to say what they're thinking and have their voice be heard” (Heussner, 2010). Accordingly, the Internet has become a crucial tool for information distribution, filtering and collection (Curme, Preis, Stanley, & Moat, 2014). Using Facebook likes of unpublished manuscripts may also solve the problems arising from the citation gap (Peng & Zhu, 2012), i.e., long time lags until the impact of one's work starts to become evident. Facebook likes of scientific work may enable a rapid advancement of science in that it may avoid parallel research on the same topic and gives rapid feedback to authors regarding recent work. Moreover, as done by Frontiers, additional journal websites and Google Scholar might consider implementing the Facebook like button for articles on their websites. A German startup realized the potential of Facebook likes and worked on a business model to assess reputation in science via Facebook likes (Kuhrt, 2013). As is already being done in some universities, training might be required for scientists and science managers to foster knowledge about the possible benefits and shortcomings of scientometrics (e.g., performance quality is often neglected (Baum, 2011)) and to

provide guided research evaluation (Maner, 2014). Moreover, Facebook likes may also resemble a modern and prompt way of assessing work output in other knowledge-intensive settings, such as in the open innovation processes of companies.

Second, this thesis demonstrated that intrinsic work motivation (via job satisfaction) and job satisfaction (via intrinsic work motivation) tend to have an indirect effect on research performance, whereas extrinsic work motivation only has a direct effect on research performance. With regard to developing an appropriate incentive system, the findings support intrinsic work motivation as a highly important type of work motivation in academia (Amabile, 1997; Miner, 2003) but also indicate that extrinsic work motivation is adequate for increasing aspects of research performance. However, because highly extrinsically motivated scholars may not be very satisfied, they may show more turnover behavior (Huang, 2011) than highly intrinsically motivated scholars. Thus, practical starting points for science managers may be to foster a perfectly challenging, interesting and autonomous work environment to keep intrinsic work motivation high as well as implementing a good leadership style that fosters job satisfaction (i.e., by building trusting relationships, a good team climate). In other words, monetary incentives may not be sufficient for the development of excellent research performance. Practitioners need to become aware of differences in the effects from inciting different work motivations in academia to manage research performance adequately. In addition to focusing on beneficial work conditions for intrinsic work motivation and job satisfaction, the literature has indicated that science managers should keep in mind supporting opportunities for scholars to develop relevant work skills (Chlosta, Pull, Fiedler, & Welp, 2010).

Third, this thesis has revealed that deficient funding is reported particularly often by Ph.D. students as the most substantial current undesirable development at higher education institutions. This finding makes an important practical contribution in that New Public Management requires a modification to ensure the aim of excellent research performance. For example, the time frame of third-party funded projects could be prolonged. Such adaptations may, in addition, positively affect the current perception regarding the misallocated working time of scholars, which arises from a large amount of time allocated to administrative and bureaucratic tasks rather than

research (Melo et al., 2010). Simultaneously the findings imply that monetary incentives do not motivate high work performance. To motivate work performance, practitioners instead need to show and implement a good leadership style and interpersonal informal acknowledgment at the chair level, cooperation (i.e., social capital) and beneficial framework conditions at the faculty level and a mission statement and good organizational structures at the institutional level. Another starting point for fostering work motivation in academia is to give scholars the opportunity to hire additional employees. According to the interviewees, this opportunity would represent a more suitable performance management tool than a reduction in teaching load. However, to hire additional employees is only effective if the benefits of hiring outweigh the additional work and responsibilities that often go along with additional employees. It may also be advisable for other knowledge-intensive settings (e.g., R&D departments) to take into account different performance management tools depending on the respective organizational level.

Fourth, the present dissertation has demonstrated that having an assigned goal versus having no goal causes anger to outweigh happiness, which increases cognitive persistence as well as creative fluency (with control variables in the equation). Regarding cognitive flexibility and originality, there is no influence observed with and without the difference in emotions as a mediator. Furthermore, having an assigned goal in comparison to having no goal decreases the appropriateness of ideas, while anger compared to happiness does not mediate the relationship. The findings offer multiple implications with regard to the management of creative performance in knowledge-intensive settings. One implication is that goal setting should be used with care as a performance management tool, for example, in Management by Objectives programs, because an assigned goal can lead to less appropriate ideas. In particular, an informed decision should be made on whether an assigned goal or no goal should be set for knowledge workers in a given work context. For instance, when an enhanced idea is required, an assigned goal may be advisable because an assigned goal can foster cognitive persistence (i.e., the in-depth elaboration of a topic). Such enhanced ideas may be needed, when, for example, a new digital marketing strategy is being brainstormed. In such work contexts, existing norms and expectations should be neglected for the moment so that radical innovations can arise. Radical new ideas that may be crazy or unrealistic

at first glance may, however, convert to a unique selling proposition or competitive advantage because of its new approach and uniqueness. Experience has taught us that the usefulness of an idea (e.g., radical or crazy ideas) might not be instantly obvious and might also evolve through the adaptation of a product by its customers rather than by experts in an organization (Johnson, Scholes, & Whittington, 2011). In contrast, setting no goal might be adequate when highly appropriate ideas are sought for that require a judgment concerning their usefulness and value. For example, no goals should be set when researchers brainstorm about appropriate statistical methods for their data analyses. In such a work context, the researchers need to scrutinize whether the method fulfills the necessary statistical requirements (Flickinger, Tuschke, Gruber-Muecke, & Fiedler, 2014). Such a deliberate brainstorming procedure may lead to an incremental rather than a radical innovation but may be what is needed in such a work context. Thus, performance management tools need to be deliberately chosen and guidelines on goal setting should be provided to managers in knowledge-intensive settings to allow them to enable knowledge workers to achieve excellent work output.

In sum, this dissertation demonstrates that there are new ways to measure performance in knowledge-intensive settings and, in particular, in science, which should be accommodated as addmetrics to the existing bibliometrics. Furthermore, this dissertation demonstrates that both intrinsic and extrinsic work motivation exist in academia. However, science managers would be best advised to rely on intrinsic work motivation in the long run. Hence, New Public Management and its performance management tools may not be entirely adequate for academia. Regarding extrinsic motivators, practitioners should rely on interpersonal informal acknowledgment at the chair level. Last, assigned goals may be helpful as a performance management tool depending on which aspect of creative performance is desired. In conclusion, performance indicators and output governance may be applied in practice to fulfill the pressing and in part justified demand for transparent, objective and efficient work output from knowledge workers (e.g., scholars). At the same time, the shortcomings of performance indicators and output governance should be kept in mind, and the advantages of input governance and bottom-up management should also be taken into account. As a result, a careful mixture of governance approaches may appear feasible to govern experts (e.g., scientists) in

knowledge-intensive settings, remembering that these experts often have and also need high degrees of autonomy.

### **6.3 Directions for future research**

This thesis has revealed the usefulness and importance of adequate performance measurement and performance management in knowledge-intensive settings such as academia. The obtained findings propose several future research directions.

First, future research could investigate the interdisciplinary differences in the predictive value of Facebook likes. Differences between disciplines in social media behavior have been reported in the literature (Costas, Zahedi, & Wouters, 2014). For example, papers from the social sciences and humanities are more often found in social media than papers from the natural sciences (Haustein et al., 2015). In particular, future research should investigate whether differences in likes for a scientific manuscript arise from a different acceptance of social media or a different readership of the online content (e.g., compared to those who read and cite scientific journal articles). It would initially be interesting to analyze those individuals who give Facebook likes (e.g., their job position, personality characteristics) and assess their attitudes toward social media as well as their reasons for liking scientific manuscripts. Moreover, research could examine the information value of Facebook likes. For example, Facebook likes may indicate the content's timeliness and practical relevance rather than its novelty. In other words, diverse indicators may cover different aspects of performance in knowledge-intensive settings from the perspective of different stakeholders and, accordingly, may only partly overlap.

Second, future research is needed to further investigate altmetrics and addmetrics, such as post-publication reviews and comments. On the one hand, posting a comment may require more reflection and a more thorough reading than liking a manuscript, thus, these indicators could correspondingly be more valuable. On the other hand, the frequency of comments cannot necessarily be equated with a positive acknowledgment by the scientific community because comments might also contain critiques. This demonstrates the challenge of using information from comments in a quick and time-efficient way and rather calls for qualitative semantic

analysis. Another future research idea might be to assess the number of in-text-citations of an article rather than solely checking whether an article occurs in the reference list. The number of in-text-citations may better reflect how important and influential a cited article is than whether the article appears in the reference list. This is an oversight in the literature, as it has already been demonstrated that not all citations are equally important for a paper (Zhu, Turney, Lemire, & Vellino, 2015), and relying on an appearance in the reference list to demonstrate its importance neglects important information. To address the multiple aspects of scientific performance, it would also be interesting to compare Facebook likes to other external impact measures of scholarly work, for instance, Google entries about the scholarly work on academic and non-academic servers. The impact measure Google entries was already applied by Aguinis et al. (2012b) at the author level and demonstrated a difference in the internal and external impact of scholars.

Third, future research should analyze whether the positive influence of intrinsic work motivation and extrinsic work motivation on research performance differs in the short- versus long-term. The fact that extrinsic work motivation is not related to job satisfaction yet is positively related to (qualitative) research performance is puzzling because the literature has shown how important job satisfaction is to many work aspects, such as job performance (Bowling, 2007) and turnover decisions (Lee, 1988). As a result of the nonexistent relationship to job satisfaction, it could be the case that highly extrinsically motivated scholars quit jobs more often, which is highly ineffective for knowledge-intensive settings such as higher education institutions because these heavily rely on their human capital (Aguinis et al., 2012a; Powell & Snellman, 2004). Losing knowledge workers can be striking for such institutions because the knowledge may to a large extent be present in their knowledge workers and not entirely physically transferred, i.e., written up in papers (Starbuck, 1992). Another possible result of the lack of association with job satisfaction and potential turnover behavior may be that extrinsic work performance-oriented knowledge workers may strive for short-term rather than long-term performance outcomes and, thus, may neglect potentially adequate methods, such as longitudinal study designs.

Fourth, future research could examine the generalizability of the interview results by comparing scientific systems or contrasting the reported interview findings

with scientific systems in countries where New Public Management was introduced earlier, such as in the United Kingdom (Melo et al., 2010). Analyzing a scientific system that has adopted New Public Management earlier could better demonstrate the influence of New Public Management, as some effects might take time to manifest. For example, incremental innovation might still occur under New Public Management (Osterloh et al., 2015), while the neglect of longitudinal research agendas might not be traceable, which harms basic groundbreaking knowledge generation. Last, future research should assess whether the recommendations for higher education institutions can also be transferred to universities of applied sciences, as these institutions differ, for example, in their main tasks and aims.

Fifth, future research should broaden the empirical investigations of this dissertation by studying the interaction of goal setting and monetary incentives on the different creative performance aspects in knowledge-intensive settings. This appears to be a highly interesting research avenue because goal setting in knowledge-intensive organizations often includes monetary incentives (Carroll Jr & Tosi, 1970). Nevertheless, it is unclear how these two performance management techniques may operate in combination on creative performance. On the one hand, it could be that monetary incentives motivate performing a requested task to obtain the proposed incentive, thus, goal commitment may be enhanced (Locke & Latham, 2002). This increased motivation and positive attitude towards the task may subsequently lower anger compared to happiness and may, in turn, decrease cognitive persistence and creative fluency while increasing the appropriateness of the ideas. In other words, the effect might be reversed compared to that from just an assigned goal. On the other hand, it also seems highly plausible that adding monetary incentives to assigned goals in comparison to just assigning a goal may lead to a decrease in motivation and an increase in anger due to the lowered perceived self-determination when incentives turn a knowledge-intensive task into a means to an end (Lepper et al., 1973). If such a crowding-out effect sets in, monetary incentives may reinforce the obtained effects of assigned-goal setting versus no-goal setting on creative performance aspects. These assumptions need to be empirically tested to make practical recommendations about the combined application of assigned-goal setting and monetary incentives to fostering creative performance aspects. Additionally, other goal-setting types, such as participative-

goal setting (Latham, Mitchell, & Dossett, 1978), should be investigated; the degree to which knowledge workers such as scholars set their own goals in a task should also be considered (Chlosta & Pull, 2010).

Last, further open questions for future research undertakings remain, for instance, (1) what are central factors that elevate the legitimacy of knowledge-intensive work so that a pure quantitative output measurement can be reduced? (2) What are the possibilities for evaluating performance quality in knowledge-intensive settings as objectively as possible in a time-efficient, modern manner? (3) How can open innovation or open access publication further increase the knowledge exchange between higher education institutions, business organizations and society? Progress in these research areas may aid the design of a sound performance measurement and performance management in knowledge-intensive settings.

In conclusion, based on multiple empirical studies, the present thesis provides evidence on the need to reconsider and adapt the measurement and management of performance in knowledge-intensive settings such as academia to strengthen knowledge-based economies (European Commission, 2010, 2014a). The present thesis intends to inspire further research in knowledge-intensive settings by offering several future research avenues, which encompass the discovery of improved performance measures for diverse stakeholders and the extension of our understanding of the effects of performance management and individual psychological antecedents on crucial performance aspects. In sum, this dissertation aims to extend knowledge on how to assess and spark ideas in knowledge-intensive settings.

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## Appendix

### Appendix A (reference for Chapter two)

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### Appendix B (reference for Chapter three)

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### Appendix C (reference for Chapter four)

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### Appendix D (reference for Chapter five)

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