What should internal audit functions do to enhance their innovative potential?
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Acknowledgements

No thesis is ever the achievement of the author alone, and this one is no different. I would like to express my warmest thanks to the following individuals and organizations:

To Björn Walrae for mentoring this thesis;  
To Steeven van der Louw for commenting on my research design;  
To Femke Dik and Anne Marie Klaarhamer for proof-reading various survey drafts and testing the survey;  
To Caroline Macefield (Aegon) for her help in piloting the survey;  
To Peter Hartog and Brigitte de Vries (IIA innovation platform), Maroesja Kuut (IIA Netherlands) and my fellow IAA students (class of 2018) for their help in distributing the survey;  
To my wife Nina for her moral support throughout the process.

This thesis marks the conclusion of a two-year journey which would not have commenced without the encouragement of Wencke Verhoeff and Mark Zantman (Aegon Netherlands) and which would not have been bearable without my former Aegon colleagues and my fellow IAA students. In no small part are you to thank (or to blame, I am not quite sure which is more appropriate) for my becoming a registered operational auditor.
Summary

The ability to innovate is widely considered a determinant of organizational success. Internal audit (IA) functions, too, need to innovate in order to continue adding stakeholder value in changing business environments.

This thesis explores which factors contribute to the audit function’s innovative potential. Based on a systematic review of recent innovation literature, it is hypothesized that eighteen predictor variables contribute to innovation, which is defined as the intentional generation and/or implementation of ideas which are new to their context of application. These variables concern characteristics of teams (7), individuals (8) and three audit function specific properties.

The hypotheses are tested through a validated survey among IA practitioners (N=52) in The Netherlands. The low response rate presents a serious limitation, which is to be addressed in future research.

Results reveal that three predictor variables exhibit a significant correlation with the successful generation of new ideas. Contrary to expectations, the data suggest that a higher proportion of staff with an accounting background results in more instead of fewer ideas being generated. Eleven predictor variables exhibit a significant correlation with the successful implementation of new ideas.

Additional regression analyses reveal that a constellation of four variables best predicts successful innovation. Creative self-efficacy, Support for innovation and Innovativeness as a job requirement best predict the generation of new ideas. The generation of new ideas, together with External communication, in turn best explains the implementation of new ideas.

The theoretical framework laid down in this study and the results presented here provide a practical roadmap for Chief Audit Executives wishing to enhance the innovative potential of their Internal Audit Function. The findings suggest that investing in relationships with other business functions and being clear on the centrality of innovativeness to the auditor’s job description are the most effective means of doing so.
Introduction

Innovation and creativity are widely regarded important factors of organizational success, even though there is surprisingly little empirical evidence supporting this assumption (Forgeard & Kaufman, 2016). Innovation is thought to offer competitive advantage by enhancing strategic fit, staying ahead of competitors and achieving optimal efficiency (Carmeli & Gelbard, 2010), all of which result in the improvement of the organization’s chances of survival in the long term (Joo et al., 2012).

Like many other business fields, the internal audit profession has embraced the notion that innovation is essential. Innovation is considered a determinant of internal audit effectiveness (PwC, 2012; Lenz 2013). Innovation is a cornerstone of the Competency Framework promulgated by the Institute of Internal Auditors (Batten, 2013). The capability to innovate is associated with the highest level of internal audit maturity (Heesakkers et al., 2018; Macrae, 2010). Innovation is actively promoted by the Netherlands chapter of the Institute of Internal Auditors (IIA) who have instituted an annual innovation award in 2014 and have nominated innovation a special theme in 2018.

All this championing the importance of innovation apparently has not been without effect. In a 2019 study, Protiviti finds that “... three out of four internal audit groups are undertaking some form of innovation or transformation effort” (Protiviti, 2019). Likewise, the number of submissions to the annual innovation award exhibits consistent growth, as does the number of innovation-related talks and presentations at professional workshops and other internal audit gatherings.

At the same time, one cannot help but feeling slightly disappointed. In the first place, the number of internal audit functions that has actually embraced a structured approach to innovation is around 30% globally, according to Protiviti’s 2019 study. This is significantly lower than in many other business functions. What is more, many of these innovations relate to concepts which have been around in the professional debate for considerable lengths of time. The concept of organizational agility was created in 2001 (Beck et al., 2001); the notion of semi-automated data analysis in the audit process, then called “computational auditing”, in 1996 (Elsas, 1996). The idea that cultural and behavioral traits influence control quality is older still, dating back to Munsterberg (1913). The fact that these topics still dominate the innovation discourse today raises hard questions as to the ability of IA functions to successfully develop and adopt new ideas and practices.

To date, the question which factors affect the ability of an IA function to innovate successfully has not been explored scientifically. Yet, the answer to this question is of strategic interest to IA executives wishing to improve the alignment of their department’s practices to the needs of their stakeholders, thereby enhancing their effectiveness. Especially in a time like the present, in which existing business realities are increasingly prone to disruption on all fronts, the ability to innovate may well be what stands between the IA function being a valuable asset and its being marginalized. IA functions which
are able to align their practices to stakeholder needs will gain authority, whereas those that continue to merely tread well-trodden paths will succeed less and less in adding stakeholder value and will eventually face disbandment.
Research objective and questions

The objective of this thesis is to explore which factors affect the ability of the internal audit (IA) function to innovate successfully.

The answer to this question is of strategic relevance to IA executives wishing to improve their function’s ability to innovate, and thereby enhance its alignment with stakeholder needs and ultimately, its overall effectiveness. The research will provide IA executives with evidence-based insight into the options at their disposal to increase the chance of innovation in their department being successful, thereby furthering IA professional maturity.

The thesis aims to provide an answer to the central question “which characteristics of the audit function facilitate innovation”, by addressing the following research questions:

I. How can innovation be defined in the context of the IA function?
II. How can innovation be measured in the context of the IA function?
III. Which variables positively correlate to successful innovation by the IA function?

Research questions I and II will be answered through a review of key literature (especially a number of recent meta analyses). Research question III will be answered through empirical research (survey amongst IA practitioners).

Theory

In the following sections, a theoretical framework for the empirical research will be provided.

Innovation

The first issue that must be tackled is how to define innovation. As is shown by both Godin (2012, 2008) and Forgeard & Kaufman (2016), the concept of innovation has a history dating back to antiquity. All sources point to Schumpeter (1934) as the earliest and most authoritative modern theorist of innovation. He defines innovation as a combinatoric activity which results in “new combinations of new or existing knowledge, resources, equipment or other factors.” (Schumpeter 1934, quoted in Shah et al. 2014, p. 3). Schumpeter is also the first to link innovation to disruption and discontinuity, stating that entrepreneurship and innovation “replaces today’s Pareto optimum with tomorrow’s different new thing” (Schumpeter 1934, quoted in Śledzik, 2013, p. 89).

In the literature following Schumpeter, innovation is consistently associated with his notions of novelty and discontinuity. In order for something to be considered innovative, it must be new in some sense and it must constitute a break of sorts with the status quo. Unfortunately, neither concept is easy to operationalize and from what little research has been done on people’s understanding of innovation, it appears that perceptions differ from study to study. This is echoed in Rogers (1983),
whose definition of innovation came to be widely used. He describes an innovation as “an idea, practice or object that is perceived as new by an individual or unit of adoption” (Rogers, 1983, p. 11). However, innovation is not just any change or novelty, but one that is intentional and designed to benefit the unit of adoption or its customers. This is captured in the definition introduced by West & Farr (1990, p. 9), who define innovation as “… the intentional introduction and application within a job, work team or organization of ideas, processes, products or procedures which are new to that job, work team or organization and which are designed to benefit the job, the work team or the organization.” The West & Farr definition will be used in this thesis because the addition of intentionality has a good fit with the ‘rational’ way in which most organizations (and indeed, most audit functions) are run. Also, one might argue that serendipitous, unintentional innovation is a different process altogether, as it does not usually aim to overcome specific problems, which is very much the context in which most IA functions innovate.

From the above, it becomes apparent that innovations can occur at the product as well as the process level. For the purposes of this thesis, no distinction will be made between the two. Namely, innovation in internal audit functions may occur at the product/service level or in the function’s processes leading up to those products/services, and both may contribute to enhancing the value of the internal audit function to the organization.

**Scope of the innovative process**

Innovations result from processes that produce them. In order to avoid terminological confusion (Garcia & Calantone, 2002), these will be referred to as innovative processes for the remainder of this thesis. Innovative processes can be viewed from two perspectives.

On the one hand, one may analyze the scope of the innovative process. This perspective concerns the matter with which the innovative process is concerned. That is, it is to be expected that the innovative process in a capital-intensive industry (mining, car manufacturing) will unfold differently from the innovative process in the creative, medical or financial industry. An alternative break-down could in in business functions rather than industries: that is, the innovative process will likely look different in customer care, HR and internal audit. Within a certain industry or business function, differences may be expected to arise depending on the particular service or (sub) process to which innovation pertains. In the case of internal audit functions, for instance, innovation of investigative techniques may have different characteristics from innovations in the way audit results are communicated.

In a related fashion, innovative processes could be classified according to the level of analysis. There are largely four levels at which innovation takes place: the national level, the organization level, the team level and the individual level. This subdivision is relevant, because different determinants of innovative success come into play at the different levels and the levels are interdependent (Hülsheger et al., 2009). The innovative process of the internal audit function can be considered a type of team-
level or work group innovation. Farr et al. (2003) argue that the work group level of analysis is fundamentally different from the national, organizational or individual level, having its own dynamic. In particular, innovative practice at the work group level is shaped more by psychological mechanisms and is less sensitive to ‘hard’ instruments such as policies, funding and the like.

Taking a yet different angle, innovative processes can be divided according to the type of innovation they aim to achieve, products or services. It has been shown convincingly that innovation of physical products behaves quite differently from service innovation (Evanschitzky et al., 2012; Storey et al., 2016). This is arguably due to so-called inseparability (Song et al., 2009): the fact that service quality, unlike product quality, is largely determined by service delivery. Storey et al. (2016, p. 530) introduce a further subdivision, between so-called explicit and tacit services. Explicit services are those which are process-based and delivered with the aid of technology. Tacit services are those which are experiential in nature and are delivered by interpersonal interactions. Internal audit services can largely be viewed as tacit services.

**Components of the innovative process**

On the other hand, one may analyze the components or temporal stages of the innovative process (Amabile, 1988). In this area, many different subdivisions have been proposed, ranging from anywhere between three to ten separate stages. In work group innovation literature, it has often been remarked that underlying all these different models there appears to be a basic dichotomy between generation and implementation of ideas (Axtell et al., 2000; Farr et al., 2003; West & Farr, 1990). During the generation phase, novel ideas are raised in the unit of adoption for the first time. In the implementation phase, the novel idea matures, is refined and implemented in the organization’s processes. What makes the basic dichotomy useful is that markedly different requirements can be assumed to govern these two stages. Whereas the awareness phase is closely associated with individual and group creativity, the implementation phase is more like other business processes in the sense that it requires a rational approach and a degree of bureaucratic tenacity (or, in terms of Kanter (1988), coalition building).

It should be noted that the distinction between the two stages does not imply a linear, sequential perspective on innovation (Godin, 2006). Although idea generation precedes implementation, models like Axtell’s subscribe to the notion that the innovative process is complex and iterative. Depending on the scope and magnitude of the innovation at hand, the process may run through a number of cycles and may in fact not have a natural end point.

**Measuring innovation**

Measuring innovation is not straightforward (Brenner & Broekel, 2011; Gault, 2018; Janger et al., 2017; Tarí & García-Fernández, 2018; Wilhelmsen et al., 2016). This is in part caused by the fact that
the notion of innovation is highly subjective. In the definition stated earlier (West & Farr, 1990), it is the ‘unit of adoption’ who gets to decide whether something is an innovation or not, which precludes the use of pre-established criteria in any measuring instrument. Whereas some inputs to innovation (R&D capacity in man hours, research budgets) and results (competitive advantage) can be measured in monetary or otherwise quantitative terms, innovation itself cannot. Moreover, economic measures of innovation tend to focus on product innovation and on the organizational level, neglecting service innovation and the team and individual levels of analysis.

Amabile (1988) introduces the notion that work group innovation can also be measured using so-called consensual assessments. With this technique, trained experts are deployed to measure innovation. Building on her work, Cropley & Kaufman (2012) introduce the Creative Solution Diagnosis Scale, which allows non-experts to measure product innovation reliably on five dimensions (relevance & effectiveness; propulsion; problematization; elegance; genesis).

For service innovation and the work group level of analysis, many studies resort to a simple but powerful measure introduced by Borrill et al. (1998). They introduce a self-report measure of ‘changes proposed’ and ‘changes implemented’ in which respondents are asked to rate the extent to which changes had been proposed and implemented in their unit of work. This measure has been used in numerous studies since its introduction and generally has good validity.

**Determinants of innovation**

Since the pioneering work of Amabile (1988), hundreds if not thousands of studies have appeared, identifying a multitude of factors that exert an influence on innovation.

Rather than embracing one particular theory, this thesis aims to build on the work available in its full breadth. This is possible thanks to a number of excellent meta-analyses at the organizational, team and individual level. Of these, determinants of innovation that were identified at the level of the organization (Evanschitzky et al., 2012; Storey et al., 2016) will not be considered further. The rationale for this decision is that those leading internal audit functions will not generally speaking be able to influence these organizational characteristics to a degree that it will enhance the innovative capacity of the audit function. Instead, we will limit ourselves to a discussion of the most influential determinants at the team and individual level, assuming that these characteristics of the IA function and the IA workforce can to some extent be influenced by those in charge.

**Team-level determinants**

At the team level, Hülsheger et al. (2009) identify seven significant and generalizable determinants of innovation, based on a corpus of 104 independent samples. Notably, their study also shows that a number of factors which are frequently assumed to impact innovation, such as tenure, team size, team longevity and generic team diversity, do not correlate with innovation in a significant and
generalizable way. The determinants that do show a significant and generalizable effect are discussed below.

**VISION.** This variable refers to “the extent to which team members have a common understanding of objectives and display high commitment to those team goals” (Hülsheger et al., 2009, p. 1131). Vision may give their job a stronger sense of purpose which is expected to motivate workers toward exhibiting more innovating behavior. In the meta-analysis, vision showed a .493 mean overall corrected correlation with innovation.

**EXTERNAL COMMUNICATION.** This variable refers to the extent to which the team engages in communication with individuals and business functions outside the team. External communication shows a .475 mean overall corrected correlation with innovation in Hülsheger’s meta-analysis. Arguably, this is because “Interactions with other functional areas enhance the likelihood of obtaining new knowledge and disclose new perspectives, which spark the development of new ideas or the adoption of new ways of doing things.” (Hülsheger et al., 2009, p. 1132).

**SUPPORT FOR INNOVATION.** This variable refers to “the expectation, approval and practical support of attempts to introduce new and improved ways of doing things in the work environment” (West, 1990, p. 315). Arguably, visible support for innovation will prompt team members to take risk in implementing new ideas, because they perceive that the organization is open to change. Support for innovation shows a .470 mean overall corrected correlation with innovation in Hülsheger’s meta-analysis.

**TASK ORIENTATION.** This variable refers to “a shared concern with excellence of quality of task performance in relation to shared vision or outcomes” (West, 1990, p. 313). According to Hülsheger et al. (2009, p. 1131), “teams high on this dimension are striving for the highest standards of performance achievable. This is evidenced by mutual monitoring and feedback and by regular appraisals of ideas and performance”. The variable shows a .415 mean overall corrected correlation with innovation in the meta-analysis.

**INTERNAL COMMUNICATION.** This variable refers to the communicative practices within the team. Hülsheger et al. (2009) found a .358 mean overall corrected correlation of this variable with innovation, arguably because the extent to which team members share knowledge and exchange new ideas is conducive to their ability to come up with new solutions and implement them successfully.

**TEAM COHESION.** This variable refers to the extent to which team members experience a sense of togetherness, both socially and task-related. Hülsheger et al. (2009, p. 1132) remark that cohesion has often been associated with innovation performance, arguably because “A high personal attraction among team members creates a psychologically safe environment in which team members feel free to challenge the status quo and explore new ways of doing things”. The variable has a .307 mean overall corrected correlation with innovation in the meta study.
**Goal Interdependence.** This variable refers to the extent to which “team members’ goals and rewards are related in such a way that an individual team member can only reach his or her goal if the other team members achieve their goals as well.” (Hülsheger et al., 2009, p. 1129). The interdependence promotes innovation, with the variable showing a .276 mean overall corrected correlation with innovation in the meta study.

**Individual-level determinants**

At the individual level, Hammond et al. (2011) identify 12 significant and generalizable antecedents of innovation based on a corpus of 88 independent samples. Of these, only eight will be considered in this study. The rationale is that the mean overall corrected correlations for the remaining four variables, while both significant and generalizable, were too weak to include in a study whose primary objective is to provide tools for practitioners to enhance the innovative capacity of their internal audit function. The determinants that will be considered are discussed below.

**Role Expectations.** This variable refers to the extent to which an individual perceives that s/he is expected to exhibit innovative behavior. Hammond et al. (2011, p. 93) note that “…if individuals believe that they are expected to engage in innovative behaviors, they may be more likely to invest time and energy in these behaviors”, which result in more innovation. In the meta-analysis, role expectations showed a .440 mean overall corrected correlation with innovation.

**Creative Self-Efficacy.** This variable refers to the extent to which an individual believes that s/he is able to exhibit creative behavior. Like role expectations, creative self-efficacy is thought to influence the individual’s motivation to engage in innovative behavior (Hammond et al., 2011, p. 92). In the meta-analysis, creative self-efficacy showed a .330 mean overall corrected correlation with innovation.

**Job Complexity.** This variable refers to the complexity of the job as perceived by its practitioner. Hammond et al. (2011) show that higher job complexity correlates positively with innovative behavior, having a .320 mean overall corrected correlation with innovation. The mechanism here is arguably that more complex jobs challenge the individual to come up with new solutions because routines are of limited use (Amabile, 1988).

**Job Autonomy.** This variable refers to the extent that the individual perceives an amount of autonomy in the way in which s/he can perform the tasks related to the job. Hammond et al. (2011) corroborates the hypothesis that autonomy positively correlates with innovative behavior, arguably because the need and motivation for creativity and innovation is greater if a person has more degrees of freedom in the way s/he approaches the work at hand. In the Hammond et al. meta-analysis, job autonomy showed a .320 mean overall corrected correlation with innovation.

**Leader-Member Exchange.** Leader-member exchange or LMX refers to the quality of the relationship between leaders and team members. It has been argued in LMX theory that subordinates who have a relationship with their superior that is characterized by mutual trust and respect rather than formal
hierarchy take more risk in solving job-related tasks, which leads to more creativity and innovation. Indeed, Hammond et al. (2011, p. 97) report a .290 mean overall corrected correlation of LMX with innovation, which is one of the stronger effects in their study.

**JOB SELF-EFFICACY.** Like creative self-efficacy, this variable reflects the extent to which a person believes s/he is able to perform the tasks related to the job. Being confident about one’s abilities arguably prompts the subject to take more risk in leaving the well-trodden path and explore new solutions to job-related questions, resulting in more innovation. In the meta-analysis, job self-efficacy showed a .260 mean overall corrected correlation with innovation.

**OPENNESS TO EXPERIENCE.** This variable reflects the extent to which a person is open to new experiences. Hammond et al. (2011, p. 92) notes that “…Individuals high on openness have high intellectual curiosity, imagination, independence, and sensitivity to the arts and, as such, are less likely to shy away from new experiences and change that are part and parcel of innovation. Further, individuals higher on openness may be more likely to engage in divergent thinking which may be a precursor to some sorts of creativity and innovation”. In the meta-analysis, openness to experience had a .240 mean overall corrected correlation with innovation.

**INTRINSIC MOTIVATION.** This variable reflects the extent to which a person is intrinsically motivated in his or her job. Hammond (2011: 92) remarks that “Intrinsic motivation is conducive to the processing of divergent information, allowing the individual to explore different solutions to the problem or different approaches to the task.” With a .240 mean overall corrected correlation with innovation, their study shows a weak but significant and generalizable effect.

**Determinants specific to internal audit**

In addition to the variables that were identified as significant and generalizable precursors of innovation in the meta-analyses discussed above, there are a couple of variables that are of specific interest to the context in which internal audit functions operate.

**ACCOUNTING PREDOMINANCE.** The first is the academic background of the IA workforce. Namely, there is some evidence to suggest that accountants are less creative than those working in other professions (Birkey & Hausserman, 2018; Bryant et al., 2011). Given the strong link that exists between creativity and innovation, and given the fact that a good proportion of internal auditors has a background in accountancy, we assume that the proportion of staff with an accounting background has an impact on innovation. More specifically, we hypothesize that a predominance of team members who trained as accountants negatively impacts the number of ideas generated.¹

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¹ With regard to this variable, it should be noted that ‘job-relevant diversity’ was identified as a significant but non-generalizable precursor of innovation by Hülsheger et al. (2009). There, it was claimed that a diversity of skills and experience in the team is conducive to innovation because a diverse team is likely to come up with equally diverse solutions to problems.
LEVEL OF IAF STANDARDIZATION. The second potential audit-specific determinant of innovation is the primary orientation of the internal audit function. That is, there is some evidence from accountancy studies to suggest that more regulated domains of accountancy lead to a lesser display of creativity and innovation by its practitioners (Al-Beraidi & Rickards, 2006); likewise, an early study by Getzels & Csikszentmihalyi (1976) shows that ‘presented problems’ require less creativity and will therefore require less innovation that ‘discovered problems’. Both insights could be translated to the IA function typology of Bos et al. (2017) who distinguish ‘standardizing’ and ‘tailoring’ IA functions. Standardizing IA functions require less creativity and innovation, because all problems need to be solved in the same manner to preserve comparability. Tailoring IA functions, on the other hand, may prompt creativity and innovation in order to best meet the client’s needs.

LEVEL OF INDUSTRY REGULATION. The third factor that could be relevant is the industry in which the IA function operates. There is ample literature to suggest that regulatory pressure and red tape impact negatively on the ability to innovate (Caniëls & Rietzschel, 2015; Hirst et al., 2011). This would entail that internal audit functions which operate in more regulated industries, particularly the financial industry, exhibit less innovative capacity.
Hypotheses

In the light of the theoretical framework laid out in the previous section, we can now formulate the following hypotheses.

**HYPOTHESIS 1.** Individual-level variables are significantly and positively correlated with successful innovation in internal audit functions.

1a. Role expectations  
1b. Creative self-efficacy  
1c. Job complexity  
1d. Job autonomy  
1e. Leader-member exchange  
1f. Job self-efficacy  
1g. Openness to experience  
1h. Intrinsic motivation

**HYPOTHESIS 2.** Team-level variables are significantly and positively correlated with successful innovation in internal audit functions.

2a. Vision  
2b. External communication  
2c. Support for innovation  
2d. Task orientation  
2e. Internal communication  
2f. Team cohesion  
2g. Goal interdependence

**HYPOTHESIS 3.** IAF-specific variables are significantly and negatively correlated with successful innovation in internal audit functions.

3a. Accounting predominance  
3b. Level of standardization of work  
3c. Level of industry regulation

A second group of hypotheses is related to the complex interplay between the variables. As was indicated earlier, the innovative process consists of two components, idea generation and idea implementation. Previous studies (Axtell et al., 2000) have shown that the influence of determinants of innovation differs between these two stages. Also, idea generation will influence idea implementation, for the obvious reason that ideas need to be generated before they can be implemented.

**HYPOTHESIS 4A.** Determinants at the individual level exert a stronger influence on the idea generation stage than on the implementation stage.  
**HYPOTHESIS 4B.** Determinants at the team level exert a stronger influence on the idea implementation stage than on the idea generation stage.
HYPOTHESIS 5. Idea generation has a mediating influence on idea implementation.

The hypotheses are graphically depicted below.
**Research design**
This chapter describes the research design.

**Dependent variables**
The dependent variables in the study are the extent to which ideas were generated and successfully implemented. Following Axtell et al. (2000), these variables will be measured using the method developed by Borrill et al. (1998), using a five-point Likert scale. In order to enhance practical applicability of the results, the dependent variables will be measured separately for the various stages of the Internal Audit value chain (identification and prioritization of engagements, engagement design, data collection and analysis, communicating results, issue monitoring, quality assurance and improvement).

In the case of the internal audit function, a useful subdivision could be to specify in which phases of the internal audit value chain innovation occurs: identification and prioritization of engagements, engagement design, data collection and analysis, communicating results, issue monitoring, quality assurance and improvement. It is likely that during different phases of the internal audit value chain, different factors come into play that determine the success of innovation.

**Independent variables**
The independent variables for the research will be taken from Hülsheger et al. (2009) and Hammond et al. (2011), respectively. A choice has been made to include the 15 variables which in their respective studies show the strongest significant and generalizable correlations with innovation.

**Individual-level variables**

**Role expectations.** Role expectations will be measured using the 5-item “innovativeness as a job requirement” scale (Yuan & Woodman, 2010, a=.85).

**Creative self-efficacy.** Creative self-efficacy will be measured using the 8-item “general self-efficacy” scale developed by Chen et al. (2001) and adapted for creativity by Carmeli & Schaubroeck (2007, a=.92).

**Job complexity.** Job complexity will be measured using the 3-item “problem-solving demand” scale developed by Jackson et al. (1993, a=.59).²

**Job autonomy.** Autonomy will be measured using the 3-item “job autonomy” scale by Sims et al. (1976, quoted in Llopis & Foss 2016, a=.74).

² The low value of Cronbach’s alpha for this measure in the original study is problematic, as the author also points out. Yet, in subsequent studies where the same measure was used, higher alphas resulted. For instance, Wall et al. (1996) reports a=.71 for the same measure, while (Zhou et al., 2012) reports a=.76. In this light, we consider the measure sufficiently reliable.
LMX. Leader-member exchange will be measured using the 6-item LMX-6 scale (Schriesheim et al., 1992, a=.84).

JOB SELF-EFFICACY. Job self-efficacy will be measured using the 8-item “New General Self-Efficacy” (NGSE) Scale (G. Chen et al., 2001, a=.92).

OPENNESS TO EXPERIENCE. Openness to experience will be measured using the 10-item “openness to experience” subscale from the Big Five personality scale (John & Srivastava 1999, quoted in X. Chen et al., 2019, a=.78).

INTRINSIC MOTIVATION. Intrinsic motivation will be measured using a 6-item scale developed by Kuvaas & Dysvik (2009, a=.90).

**Team-level variables**

VISION. Vision will be measured using the 4-item "vision" scale of the shortened Team Climate Inventory instrument (Kivimaki & Elovainio, 1999, a=.85).

EXTERNAL COMMUNICATION. External communication will be measured using the 4-item “Boundary Spanning” subscale of Faraj & Yan (2009, a=.81).

SUPPORT FOR INNOVATION. Support for innovation will be measured using the 3-item “support for innovation” scale of the shortened Team Climate Inventory instrument (Kivimaki & Elovainio, 1999, a=.80).

TASK ORIENTATION. This variable will be measured using the 3-item “task orientation” scale of the shortened Team Climate Inventory instrument (Kivimaki & Elovainio, 1999, a=.85).

INTERNAL COMMUNICATION. This variable will be measured using the 3-item and 4-item “knowledge collecting” and “knowledge donating” subscales from Lin (2007, a=.78 and .80 respectively).

TEAM COHESION. Team cohesion will be measured using the 6-item "team cohesion" scale developed by Mathieu (1991, a=.90).

GOAL INTERDEPENDENCE. This variable will be measured using the 5-item modified “goal interdependence” scale developed by Tjosvold et al. (2004, a=.76).

**IA-specific determinants**

ACCOUNTING PREDOMINANCE. To measure this variable, respondents will be asked to rate the proportion of team members with an accounting background.

STANDARDIZATION. To measure this variable, respondents will be asked to indicate whether their audit function predominantly employs standardized work programmes, or whether audit engagements are predominantly tailored to the client’s needs.
**Regulated Industry.** Respondents will be asked to indicate the industry in which their organization operates according to the EU NACE category codes (21 options). The level of regulation is derived from the NACE category, whereby financial institutions, governmental agencies, health care and food processing are categorized as heavily regulated industries. All other NACE categories are treated as 'normally' regulated industries.

**Scale construction**
All variables were measured on a 5-point Likert scale in the original sources, some of which were fully labelled while others use end-point labelling. Scale construction should aim to minimize cognitive load and the concomitant misinterpretation risk, while at the same time striking a proper balance between evoking either Extreme Response Style (ERS) or Acquiescence Response Style (ARS). In doing so, the following factors must be considered: scale polarity, scale parity, scale length, labelling style, and questionnaire software limitations.

**Scale polarity.** Bipolar scales have higher cognitive loads, higher risk of misinterpretation and are more prone to ERS. Moreover, none of the concepts underlying the variables in this study are inherently bipolar. Consequently, we opt for a unipolar scale.

**Scale parity.** Scales without a midpoint tend to solicit higher levels of ERS. However, scales with a midpoint are more prone to ARS, especially in untrained respondents who are either less familiar, less involved in or less comfortable with the matter of the study (Weems & Onwuegbuzie, 2001). Since these circumstances likely apply in the present case, a choice is made for midpoint-less scales, accepting the increase of ERS risk entailed in doing so.

**Scale length.** Scale length represents a trade-off between misinterpretation risk and lack of precision. The longer a scale becomes, so does its cognitive load and the risk of the respondent misinterpreting the choices. Weijters et al. (2010) recommend a scale length of 5 for mixed populations, which can be extended to 7 for populations with a higher average level of education. In view of the audit population generally being well-educated and in view of the previous arguments against using a midpoint, a 6-point scale will be used in this study.

**Labelling style.** There are generally three options to label Likert-type scales: to label endpoints only, to label all answers, or to label endpoints with lexical anchors and use numerical markers for the intermediate levels. Moors et al. (2014) present evidence that endpoint labelling induces ERS, while either of the other labelling styles attenuates ERS in respondents. In addition, there is evidence that since there are some indications in the literature that both full lexical labelling and end-point-only
labelling increase cognitive load and misinterpretation risk, a choice is made to use lexical end-point and numerical intermediate labels in this study.3

SOFTWARE LIMITATIONS. The questionnaire software that was used for this study had some limitations in the way in which questions could be formatted. It proved impractical to arrive at a format that exactly fitted our needs as described above. In the end, it was decided that questions would take the following format:

![Figure 1. Sample questionnaire item](image)

**Item construction**

Original items from English were in question form for some scales and in assertion form for others; in addition, some scales had reverse-coded items. In order to minimize cognitive load, items from all instrument were converted to assertion form and reverse-coded items were re-reversed.

All items were translated to Dutch by the author using the assertion form. Where a literal translation resulted in stylistically awkward or ambiguous wording, the original source of the instrument was consulted to arrive at the best possible stimulus for the construct at hand. All translations were subsequently pretested for interpretability by a mixed audience of auditors and non-auditors from the author’s organization (N=5). The translated items were not validated in a separate pilot study, in order not to exhaust the pool of potential respondents for the main study.

**Questionnaire construction**

The questionnaire was set up in Qualtrics© in five separate blocks:

I. Introduction, control questions and demographics  
II. Items measuring idea generation and idea implementation  
III. Items measuring individual-level variables  
IV. Items measuring team-level variables  
V. Closing questions

In order to improve reliability, items belonging to a scale were randomly interspersed with items from other scales within blocks III and IV. With the exception of control questions and the items in block II,  

3 Interestingly, Weijters et al. (2010, p. 245) suggest that studies which aim to establish linear relations between variables should use end-point labelling because “respondents seem to use this format in a way that better conforms to linear models, thus providing higher criterion validity.” This quite probably relates to a finding by Hamby & Levine (2016) who present evidence that endpoint-labelled scales tend to be interpreted as interval.
none of the questionnaire items were mandatory in order to avoid forced choices that do not accurately reflect respondents' views.

The full questionnaire consisted of 106 items (including control questions and general information). Since all original scales were in English, it was decided to offer the questionnaire in both languages so that respondents could select the language which suited them best.

**Pilot run**

The questionnaire was tested on the author’s fellow students and former co-workers (N=11) to identify any technical difficulties and to assess scale reliability and average completion time. Given the overall length of the questionnaire, it was decided beforehand to drop any variable of which scale reliability would prove below .70 (Cronbach’s alpha).

The pilot run uncovered no technical problems or scale reliability issues.
Results

This chapter describes the results.

Response – raw data to final sample

The questionnaire yielded 101 responses. Of those, 27 did not meet eligibility criteria (minimally two years of total working experience, minimally one year in the respondent’s current audit function). The remaining 74 responses were scrutinized for any signs of lacking reliability. In particular, responses with significantly shorter completion times than average were examined for any suspicious data patterns using SPSS’s unusual cases identification functionality. Also, responses with a completion rate <60% were filtered out. Both procedures resulted in a final sample of 52 useable cases. The limitations of this number of responses will be addressed in the discussion chapter.

Scale reliability

Prior to conducting any analyses, scale reliability of all complex variables used in the research was verified. The table below summarizes the results (N=52).

<table>
<thead>
<tr>
<th>Variable</th>
<th>Abbr</th>
<th># items</th>
<th>Cronbach’s alpha</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Dependent variables</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ideas generated</td>
<td></td>
<td>6</td>
<td>.830</td>
<td>Reliable</td>
</tr>
<tr>
<td>Ideas implemented</td>
<td></td>
<td>12</td>
<td>.844</td>
<td></td>
</tr>
<tr>
<td><strong>Independent variables – Individual-level</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Innovativeness as a job requirement</td>
<td>IJR</td>
<td>5</td>
<td>.849</td>
<td>Reliable</td>
</tr>
<tr>
<td>Job complexity</td>
<td>JC</td>
<td>3</td>
<td>.271</td>
<td>Not reliable – dropped5</td>
</tr>
<tr>
<td>Creative self-efficacy</td>
<td>CSE</td>
<td>8</td>
<td>.877</td>
<td>Reliable</td>
</tr>
<tr>
<td>Job autonomy</td>
<td>JA</td>
<td>3</td>
<td>.651</td>
<td>Not reliable – dropped</td>
</tr>
<tr>
<td>Job self-efficacy</td>
<td>JSE</td>
<td>8</td>
<td>.868</td>
<td>Reliable</td>
</tr>
<tr>
<td>Leader–member exchange</td>
<td>LMX</td>
<td>6</td>
<td>.856</td>
<td>Reliable</td>
</tr>
<tr>
<td>Openness to experience</td>
<td>O2E</td>
<td>10</td>
<td>.783</td>
<td>Reliable</td>
</tr>
<tr>
<td>Intrinsic motivation</td>
<td>IM</td>
<td>6</td>
<td>.842</td>
<td>Reliable</td>
</tr>
<tr>
<td><strong>Independent variables – Team-level</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Vision</td>
<td>V</td>
<td>4</td>
<td>.826</td>
<td>Reliable</td>
</tr>
<tr>
<td>External communication</td>
<td>EC</td>
<td>3</td>
<td>.720</td>
<td>Reliable5</td>
</tr>
<tr>
<td>Support for innovation</td>
<td>S4I</td>
<td>3</td>
<td>.772</td>
<td>Reliable</td>
</tr>
<tr>
<td>Task orientation</td>
<td>TO</td>
<td>3</td>
<td>.732</td>
<td>Reliable</td>
</tr>
<tr>
<td>Knowledge collection</td>
<td></td>
<td>4</td>
<td>.770</td>
<td>Reliable</td>
</tr>
<tr>
<td>Knowledge donation</td>
<td></td>
<td>3</td>
<td>.796</td>
<td>Reliable</td>
</tr>
<tr>
<td><strong>Internal communication</strong></td>
<td>IC</td>
<td>7</td>
<td>.819</td>
<td>Reliable</td>
</tr>
</tbody>
</table>

4 Average completion time was found to be 632 seconds.
5 For both job complexity and job autonomy, none of the constituent scale items had a significant correlation with either of the dependent variables. For that reason, the variables were dropped altogether from the analysis.
6 Item EC4 was dropped to achieve sufficient scale reliability. The item did not exhibit any significant correlations with the dependent variables.
7 The independent variable internal communication is made up of two subscales, knowledge collection and knowledge donation. Both the separate subscales and the overall scale have satisfactory reliability scores.
It can be concluded from the table that the majority of composite variables exhibits good scale reliability (alpha> .700) in this study as in their respective original sources. The lacking scale reliability of job autonomy and job complexity is somewhat disappointing, as these two variables show strong significant correlations with innovation in the meta-analysis by Hammond et al. (2011) from which they were taken. However, as none of their constituent scale items showed significant correlations with either dependent variable in the present study, it is justifiable to drop them completely.

No confirmatory factor analyses were performed to verify whether the scales used in the research exhibit acceptable psychometric properties (in particular, construct validity). It was just assumed that they do, given that all scales were derived from earlier research where psychometric evaluations showed positive results.

**Descriptives**

Scale items were averaged to derive composite variable scores, following Norman (2010). The resulting descriptives are recorded in the table below. In addition to means and standard deviations, a Shapiro-Wilk test was conducted to assess normality.

![Table](https://example.com/table.png)

As is argued in Norman (2010) on the basis of an extensive literature review, parametric tests that make assumptions about the underlying population are “sufficiently robust to yield largely unbiased answers that are acceptably close to ‘the truth’ when analysing Likert scale responses”. Consequently, “parametric methods can be utilized without concern for ‘getting the wrong answer’”. Especially when combined with an appropriate bootstrapping technique, this warrants the decision to use parametric statistics in this situation.
From the above it may appear that, on average, the means of both dependent variables appear to be very close together. However, a one-sample t-test reveals that idea implementation has a significantly higher mean than idea generation ($t(49)=35.251$, $p=.000$). This warrants the conclusion that on average, audit functions are better at implementing new ideas than they are at generating them.

For the independent variables, it is of interest to point out that respondents report higher levels of internal communication, vision, job self-efficacy and leader-member exchange, while lower levels are reported of creative self-efficacy, openness to experience, support for innovation and innovativeness as a job requirement. The lower-scoring variables especially are in keeping with the stereotypical picture often painted of internal audit functions as conservative and unimaginative.\(^9\)

There is a fair number of variables which, based on the significance of the Shapiro-Wilk test statistic, appear to display characteristics of non-normality. To offset any adverse effects of non-normality, it was decided to run all subsequent analyses using a stratified bias-corrected accelerated bootstrap sample of 2000 cases, following best practices described in Gignac (2019).

**Conclusions**

The descriptive statistics warrant the following conclusions.

1. Internal audit functions are better at implementing new ideas than they are at generating them.
2. Mean scores on independent variables that explicitly address concepts of creativity and innovativeness are notably lower than on other independent variables

---

\(^9\) Regulated industries and standardization are dichotomous variables.

\(^{10}\) In this context, it should also be mentioned that during data collection, the researcher received various communications of respondents who expressed their surprise and, in some cases, their dismay over the questionnaire items. One of them in fact stated that he could not justify to his superiors cooperating with a research design that asks about auditor creativity.
Correlations analysis

As a first step, the dependent and independent variables in the study were correlated using Pearson’s correlation coefficient. The correlations of the independent variables with both dependent variables – ideas generated and ideas implemented – are given in the table below.¹¹ In addition, it was established using Steiger’s Z test whether the correlations of the independent variables with both of the dependent variables differed significantly.¹²

<table>
<thead>
<tr>
<th>Variable</th>
<th>Ideas generated</th>
<th>Ideas implemented</th>
<th>Difference (Steiger’s Z)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ideas generated</td>
<td>1</td>
<td>.540**</td>
<td></td>
</tr>
<tr>
<td><strong>Individual-level variables</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Innovativeness as a job requirement</td>
<td>.389**</td>
<td>.258</td>
<td>.960</td>
</tr>
<tr>
<td>Creative self-efficacy</td>
<td>.317*</td>
<td>.325*</td>
<td>.059</td>
</tr>
<tr>
<td>Job self-efficacy</td>
<td>.202</td>
<td>.299*</td>
<td>-.696</td>
</tr>
<tr>
<td>Leader-member exchange</td>
<td>.247</td>
<td>.363*</td>
<td>-.853</td>
</tr>
<tr>
<td>Openness to experience</td>
<td>.221</td>
<td>.215</td>
<td>.042</td>
</tr>
<tr>
<td>Intrinsic motivation</td>
<td>.119</td>
<td>.361*</td>
<td>-.1782</td>
</tr>
<tr>
<td><strong>Team-level variables</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Vision</td>
<td>.134</td>
<td>.347*</td>
<td>-.1556</td>
</tr>
<tr>
<td>External communication</td>
<td>.196</td>
<td>.400**</td>
<td>-.1522</td>
</tr>
<tr>
<td>Support for innovation</td>
<td>.280</td>
<td>.416**</td>
<td>-.1025</td>
</tr>
<tr>
<td>Task orientation</td>
<td>.156</td>
<td>.380**</td>
<td>-.1659</td>
</tr>
<tr>
<td>Internal communication</td>
<td>.161</td>
<td>.453**</td>
<td>-.2253*</td>
</tr>
<tr>
<td>Team cohesion</td>
<td>.195</td>
<td>.369*</td>
<td>-.1280</td>
</tr>
<tr>
<td>Cooperative goal interdependence</td>
<td>.182</td>
<td>.313*</td>
<td>-.943</td>
</tr>
<tr>
<td><strong>IAF-specific variables</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Accounting predominance</td>
<td>.314*</td>
<td>.135</td>
<td>1.290</td>
</tr>
<tr>
<td>Regulated industries</td>
<td>-.040</td>
<td>-.089</td>
<td>.336</td>
</tr>
<tr>
<td>Standardization</td>
<td>-.119</td>
<td>-.194</td>
<td>.523</td>
</tr>
</tbody>
</table>

Table 3: Pearson correlations (r) of the independent with the dependent variables and results of Steiger’s Z test. A * means that the statistic is significant at the .05 level; ** means the statistic is significant at the .001 level.

From the table above it can be concluded that in general, both the team-level and individual-level independent variables correlate more strongly with ideas implemented than with ideas generated. Also, all of the correlations between team-level variables and ideas implemented are (strongly) significant, while none of the correlations between those variables and ideas generated are significant. Interestingly, the reverse is not the case. In general, the correlations of individual-level independent variables with either dependent variable are weaker than those of the team-level variables.

¹¹ It should be noted that correlations between independent variables are in many cases significant (and quite strong) as well, which is an indication of multicollinearity. However, multicollinearity statistics (variance inflation factors, tolerance) are all amply within acceptable ranges. This is a potential issue for follow-up research.

¹² Steiger’s Z was used instead of the more common Hotelling’s T, because the latter statistic tends to become inflated for non-normally distributed data (Steiger, 1980). All correlations were run using stratified Bias-corrected accelerated bootstrapping (k=2000) in order to remedy non-normality issues that were identified for several of the variables involved (Gignac, 2019).
It should also be noted that only very few of the correlations of an independent variable with the dependent variables differ significantly. In fact, only the correlation of internal communication is significantly stronger with ideas implemented than it is with ideas generated. Contrary to findings by Axtell et al. (2000), the data therefore does not give evidence of the fact that individual-level variables correlate stronger with idea generation, while team-level variables correlate stronger with idea implementation. If anything, the data seem to suggest that hardly any of the independent variables gives particularly insightful information about idea generation.\textsuperscript{13}

At any rate, the correlations analysis provides sufficient evidence to refute hypothesis 4: the correlation of individual and team level variable and successful innovation in internal audit functions is not significantly different for both stages of the innovative process.

**Conclusions**

The bivariate correlations between the variables warrant the following conclusions.

1. With the exception of openness to experience, all team-level and individual-level characteristics considered in this study exhibit a significant correlation with either stage of the innovative process. This means that a chief audit executive interested in enhancing her department’s innovative potential could usefully consider enhancing any of these variables, in addition to any other changes she may be considering.

2. With the exception of accounting predominance, none of the IAF-specific variables exhibits a significant correlation with either stage of the innovative process. This could suggest that the innovative process is not sensitive to the audit function being a prototypical ‘standardizing’ or ‘non-standardizing’ audit function (although the non-significant correlations do seem to suggest that standardization and being in a regulated industry correlate negatively with innovation). It is particularly interesting, and contrary to the author’s expectations, that accounting predominance shows a positive significant correlation with ideas generated. This clearly refutes Hypothesis 3a.

3. Findings reporting by Axtell et al. (2000) could not be reproduced. Notwithstanding the significance of individual correlations, the comparative strength of the correlation of individual-level variables with ideas generated is not significantly different from that with ideas implemented; conversely, the correlation of team-level variables with ideas implemented is not significantly stronger than with ideas generated, either. This leads to the refutation of Hypothesis 4.

\textsuperscript{13} As is pointed out by Hülsheger et al. (2009), many of the studies on which her meta-analysis was based do not distinguish overly clearly between idea generation and idea implementation, but rather employ a single dependent variable ‘innovation’. This may in part explain what we find in this study.
Bivariate regression analyses

While correlations as described in the previous section yield some preliminary insight into the interdependence of predictor variables with *ideas generated* and *ideas implemented*, they do not provide any information as to the direction in which the interdependence works. To that end, a number of bivariate regression analyses were performed, in which all predictor variables were regressed onto *ideas proposed* and *ideas implemented*, respectively.

Bivariate regression of predictors onto *ideas generated*

First, the predictor variables were regressed onto the dependent variable *ideas generated*. The results are given in the table below.

<table>
<thead>
<tr>
<th>Predictor</th>
<th>Model Fit</th>
<th>Model Significance (ANOVA)</th>
<th>Coefficients</th>
<th>95% Bca confidence interval</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>R²</td>
<td>Adj R²</td>
<td>F(DFₐ, DFₑ)</td>
<td>Sig</td>
</tr>
<tr>
<td>Individual-level predictors</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>IJR</td>
<td>.169</td>
<td>.152</td>
<td>F(1,50)=10.143</td>
<td>.002**</td>
</tr>
<tr>
<td>CSE</td>
<td>.117</td>
<td>.099</td>
<td>F(1,54)=6.611</td>
<td>.013*</td>
</tr>
<tr>
<td>JSE</td>
<td>.077</td>
<td>.058</td>
<td>F(1,50)=4.159</td>
<td>.047*</td>
</tr>
<tr>
<td>LMX</td>
<td>.098</td>
<td>.080</td>
<td>F(1,50)=5.417</td>
<td>.024*</td>
</tr>
<tr>
<td>O2E</td>
<td>.031</td>
<td>.012</td>
<td>F(1,50)=1.613</td>
<td>.210</td>
</tr>
<tr>
<td>IM</td>
<td>.074</td>
<td>.056</td>
<td>F(1,50)=4.001</td>
<td>.051</td>
</tr>
<tr>
<td>Team-level predictors</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>V</td>
<td>.088</td>
<td>.069</td>
<td>F(1,50)=4.804</td>
<td>.033*</td>
</tr>
<tr>
<td>EC</td>
<td>.076</td>
<td>.058</td>
<td>F(1,50)=4.129</td>
<td>.047*</td>
</tr>
<tr>
<td>S4I</td>
<td>.112</td>
<td>.095</td>
<td>F(1,50)=6.324</td>
<td>.015*</td>
</tr>
<tr>
<td>TO</td>
<td>.064</td>
<td>.045</td>
<td>F(1,49)=3.350</td>
<td>.073</td>
</tr>
<tr>
<td>IC</td>
<td>.046</td>
<td>.026</td>
<td>F(1,49)=2.358</td>
<td>.131</td>
</tr>
<tr>
<td>TC</td>
<td>.070</td>
<td>.051</td>
<td>F(1,49)=3.707</td>
<td>.060</td>
</tr>
<tr>
<td>CGI</td>
<td>.056</td>
<td>.037</td>
<td>F(1,49)=2.905</td>
<td>.095</td>
</tr>
<tr>
<td>IAF-specific predictors</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>AcPred</td>
<td>.070</td>
<td>.051</td>
<td>F(1,49)=3.675</td>
<td>.061</td>
</tr>
<tr>
<td>RegInd</td>
<td>.001</td>
<td>-.019</td>
<td>F(1,50)=.038</td>
<td>.847</td>
</tr>
<tr>
<td>StandIAF</td>
<td>.013</td>
<td>-.008</td>
<td>F(1,47)=6.007</td>
<td>.440</td>
</tr>
</tbody>
</table>

Table 4. Bivariate regressions of predictor variables onto *ideas generated*. A * means that F is significant at the .05 level; ** indicates significance at the .01 level.

It can be concluded from the table above that innovativeness as a job requirement, creative self-efficacy, job self-efficacy, leader-member exchange, vision, external communication and support for innovation all significantly predict the amount of *ideas generated*.

Mediated bivariate regression of predictors onto *ideas implemented*

Second, the predictor variables were regressed onto the dependent variable *ideas implemented*. In addition to the independent variables, the dependent variable *ideas generated* was also included in this step as a mediator, given the necessary causality between those variables: ideas must be generated prior to being implemented. Mediation analyses were performed using the procedure developed by
Preacher & Hayes (2004), with a Bias-corrected accelerated bootstrapping sample of k=2000. The results are summarized in the table below.

<table>
<thead>
<tr>
<th>Predictor</th>
<th>Model Fit (ideas generated as mediator)</th>
<th>Model Significance (ANOVA)</th>
<th>Effect sizes + type of association</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td>R²</td>
</tr>
<tr>
<td>Individual-level predictors</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>IR</td>
<td>590</td>
<td>348</td>
<td>.233</td>
</tr>
<tr>
<td>CSE</td>
<td>600</td>
<td>360</td>
<td>.314*</td>
</tr>
<tr>
<td>JSE</td>
<td>631</td>
<td>399</td>
<td>.495**</td>
</tr>
<tr>
<td>LMX</td>
<td>639</td>
<td>408</td>
<td>.439**</td>
</tr>
<tr>
<td>O2E</td>
<td>601</td>
<td>362</td>
<td>.299</td>
</tr>
<tr>
<td>IM</td>
<td>661</td>
<td>436</td>
<td>.431**</td>
</tr>
<tr>
<td>Team-level predictors</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>V</td>
<td>638</td>
<td>407</td>
<td>.304*</td>
</tr>
<tr>
<td>EC</td>
<td>677</td>
<td>458</td>
<td>.391**</td>
</tr>
<tr>
<td>S4I</td>
<td>654</td>
<td>427</td>
<td>.361**</td>
</tr>
<tr>
<td>TO</td>
<td>664</td>
<td>440</td>
<td>.336**</td>
</tr>
<tr>
<td>IC</td>
<td>670</td>
<td>448</td>
<td>.468**</td>
</tr>
<tr>
<td>TC</td>
<td>648</td>
<td>420</td>
<td>.298**</td>
</tr>
<tr>
<td>CGI</td>
<td>621</td>
<td>386</td>
<td>.228*</td>
</tr>
</tbody>
</table>

Table 5. Regression of Individual-level and Team-level variables onto ideas implemented, mediated by ideas generated. An * indicates that the effect is within the 95% Bca confidence interval; ** indicates that the effect is within the 99% Bca confidence interval.

As the table shows, regressing a single predictor onto ideas implemented with ideas generated as a mediator results in (strongly) significant R² values, due to the very strong correlation between ideas implemented and ideas generated. It also sheds more light on the interplay between the predictor variables, ideas generated and ideas implemented. For instance, the effect of intrinsic motivation on ideas implemented is a direct effect, while the effect of creative self-efficacy on ideas implemented is fully mediated by ideas generated. Finally, multiple predictors exhibit partial mediation. For example, support for innovation contributes both to ideas generated as well as to ideas implemented directly.

Overall, the table shows that a regression model that includes external communication mediated through ideas generated explains the largest amount of variance (45.8%). In such a model, an increase in external communication significantly contributes to increases in ideas implemented both directly (28%) as well as through ideas implemented (11%).

Incidentally, the mediation analysis above also presents further evidence for the refutation of hypothesis 4. That is, if one hypothesizes Individual-level variables to primarily be predictors of ideas generated, and Team-level variables of ideas implemented, one would not expect there to be mediation effects in Team-level variables, nor direct effects for Individual-level variables. However, both occur in the data.
Conclusions
Judging from the bivariate regressions present in this paragraph the following conclusions are warranted.

1. Seven predictor variables predict significant amounts of ideas generated in their own right. A chief audit executive interested in increasing the amount of ideas generated and looking to change just a single team-level or individual characteristic, would be best off enhancing the extent to which her team members perceive innovativeness to be an essential part of their job requirements. This would have the strongest impact on the amount of ideas generated.

2. With the exception of innovativeness as a job requirement and openness to experience, all individual-level and team-level variables significantly predict the success with which ideas are implemented. Various mediating effects occur. A chief audit executive interested in enhancing the success of ideas being implemented and looking to change just a single characteristic at team level or at the individual level, would be best off enhancing the extent to which the team engages in communication with individuals and business functions outside the team.

3. None of the other variables that were considered as potential predictors of innovation have a significant influence. This would suggest that strategies to enhance innovation in internal audit functions need not be tailored to either a) the predominance of staff with an accounting background, b) whether or not the audit function’s organization operates in a regulated industry or not or c) whether or not the audit function’s audit processes are predominantly standardized or not.

Multivariate regression analysis
Methodological considerations
In addition to the bivariate regression analyses described above, a number of hierarchical multiple regression analyses were conducted to determine whether certain combinations of individual-level, team-level and IAF-specific independent variables predict any significant amount of variance in ideas generated and ideas implemented. This would translate to the practical scenario in which a chief audit executive would be willing to change not just a single, but multiple characteristics of her audit function in order to maximally enhance its innovative potential.

To identify predictors for both dependent variables, an ‘enter mode’ hierarchical regression analysis was conducted such that individual-level and team-level variables were added in separate blocks in the order of the strength of their direct effect, as established in the bivariate regressions discussed in the previous paragraph.
All hierarchical regressions were run using stratified Bias-corrected accelerated bootstrapping (k=2000) in order to remedy non-normality issues that were identified for several of the variables involved.\textsuperscript{14}

All results were tested for heteroscedasticity by estimating the correlation between the standardized predicted values and the absolute standardized residuals. As none of the models’ resulting correlations were statistically significant, it can be concluded that the data meets the homoscedasticity assumption. In order to assess multicollinearity, the SPSS variance inflation factors (VIF) were examined. All VIF values were well under 3, suggesting that multicollinearity does not affect the regression models’ stability.

**Regression model of ideas generated**

It was found that three variables (innovativeness as job requirement; creative self-efficacy; support for innovation) explain a significant amount of variance in the amount of idea generation. (F(3,48)=5.120, \(p<.05\), \(R^2=.242\), \(R^2_{Adj}=.195\)). In other words, the three variables mentioned above account for 19.5\% of the variance in ideas generated, with the remaining 80.5\% attributable to other circumstances.

The analysis shows that all three variables significantly predict idea generation. The standardized Beta coefficients and the corresponding intervals are given in the table below.

<table>
<thead>
<tr>
<th>Model</th>
<th>Unstandardized Coefficients</th>
<th>Standardized Coefficients</th>
<th>Bootstrapping</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>B</td>
<td>Std. Error</td>
<td>Beta</td>
</tr>
<tr>
<td>3</td>
<td>.745</td>
<td>.407</td>
<td>.070</td>
</tr>
<tr>
<td>Innovativeness as a job requirement</td>
<td>.129</td>
<td>.065</td>
<td>.187</td>
</tr>
<tr>
<td>Creative self-efficacy</td>
<td>.193</td>
<td>.091</td>
<td>.226</td>
</tr>
<tr>
<td>Support for innovation</td>
<td>.167</td>
<td>.059</td>
<td>.264</td>
</tr>
</tbody>
</table>

*Table 6. Multiple regression model of ideas generated.*

**Regression onto ‘ideas implemented’**

It was found that three variables explain a significant amount of variance in the amount of innovations implemented (F(3,45)=14.393, \(p<.001\), \(R^2=.490\), \(R^2_{Adj}=.456\)). These variables were support for innovation and external communication; in addition, innovations proposed contributes significantly to innovations implemented, which is not surprising given the necessary causality that holds between those variables.

The standardized Beta coefficients and the corresponding intervals are given in the table below.

---

\textsuperscript{14} Stratification was applied in order for the bootstrapped samples to adequate reflect the overall sample. The strata variables were role (whether the respondent is an auditor or has a managerial role), regulation (whether the respondent’s audit function operates in a regulated industry) and function size.
<table>
<thead>
<tr>
<th>Model</th>
<th>Unstandardized Coefficients</th>
<th>Standardized Coefficients</th>
<th>Bootstrapping</th>
</tr>
</thead>
<tbody>
<tr>
<td>B</td>
<td>Std. Error</td>
<td>Beta</td>
<td>Sig.</td>
</tr>
<tr>
<td>3</td>
<td>(Constant)</td>
<td>-.363</td>
<td>.525</td>
</tr>
<tr>
<td>Ideas generated</td>
<td>.620</td>
<td>.155</td>
<td>.457</td>
</tr>
<tr>
<td>External communication</td>
<td>.229</td>
<td>.099</td>
<td>.283</td>
</tr>
<tr>
<td>Support for innovation</td>
<td>.136</td>
<td>.098</td>
<td>.174</td>
</tr>
</tbody>
</table>

Table 7. Multiple regression model of ideas implemented.

In sum, we can account for 45.6% of variance in ideas implemented with the variables external communication, support for innovation and ideas generated. We can in turn account for 19.5% of variance in the latter variable with the variables support for innovation, creative self-efficacy and innovativeness as a job requirement.

It should be noted that this multivariate regression model has (marginally) less explanatory power compared to the mediated regression model discussed in the previous paragraph. There, it was shown that a model with external communication as the predictor and ideas generated as the mediating variable was capable of accounting for 45.8% of variance of ideas implemented.

Another point that is worth emphasizing is that the data reveals no significant influence of the audit-specific independent variables that were considered in the study. The proportion of staff with a background in financial auditing, whether or not the audit function operates in a regulated environment, the level of work programme standardization and the use of different bodies of standards: none of these variables significantly predicts the amount of innovation proposed or implemented. This is a clear indication that, at least in the area of innovation, Chief Audit Executives need not differentiate their strategies according to the environment in which their IAF operates.
Conclusions

This chapter conclusions for each of the hypotheses formulated in chapter 2.

**HYPOTHESIS 1.** Individual-level variables are significantly correlated with successful innovation in internal audit functions.

<table>
<thead>
<tr>
<th>Independent variable</th>
<th>Idea generation</th>
<th>Idea implementation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Role expectations</td>
<td>Confirmed (1)</td>
<td>Refuted</td>
</tr>
<tr>
<td>Creative self-efficacy</td>
<td>Confirmed (2)</td>
<td>Confirmed (3)</td>
</tr>
<tr>
<td>Job complexity</td>
<td>Not measured</td>
<td>Not measured</td>
</tr>
<tr>
<td>Job autonomy</td>
<td>Not measured</td>
<td>Not measured</td>
</tr>
<tr>
<td>Leader–member exchange</td>
<td>Refuted</td>
<td>Confirmed (1)</td>
</tr>
<tr>
<td>Job self-efficacy</td>
<td>Refuted</td>
<td>Confirmed (4)</td>
</tr>
<tr>
<td>Openness to experience</td>
<td>Refuted</td>
<td>Refuted</td>
</tr>
<tr>
<td>Intrinsic motivation</td>
<td>Refuted</td>
<td>Confirmed (2)</td>
</tr>
</tbody>
</table>

*Table 8: Conclusions on hypothesis 1. Numbers between () indicate the rank order of the independent variables.*

**HYPOTHESIS 2.** Team-level variables are significantly correlated with successful innovation in internal audit functions.

<table>
<thead>
<tr>
<th>Independent variable</th>
<th>Idea generation</th>
<th>Idea implementation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Vision</td>
<td>Refuted</td>
<td>Confirmed (6)</td>
</tr>
<tr>
<td>External communication</td>
<td>Refuted</td>
<td>Confirmed (3)</td>
</tr>
<tr>
<td>Support for innovation</td>
<td>Refuted</td>
<td>Confirmed (2)</td>
</tr>
<tr>
<td>Task orientation</td>
<td>Refuted</td>
<td>Confirmed (4)</td>
</tr>
<tr>
<td>Internal communication</td>
<td>Refuted</td>
<td>Confirmed (1)</td>
</tr>
<tr>
<td>Team cohesion</td>
<td>Refuted</td>
<td>Confirmed (5)</td>
</tr>
<tr>
<td>Goal interdependence</td>
<td>Refuted</td>
<td>Confirmed (7)</td>
</tr>
</tbody>
</table>

*Table 9: Conclusions on hypothesis 2. Numbers between () indicate the rank order of the independent variables.*

**HYPOTHESIS 3.** IAF-specific variables are significantly and negatively correlated with successful innovation in internal audit functions.

<table>
<thead>
<tr>
<th>Independent variable</th>
<th>Idea generation</th>
<th>Idea implementation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Accounting predominance</td>
<td>Refuted</td>
<td>Refuted</td>
</tr>
<tr>
<td>Regulated industries</td>
<td>Refuted</td>
<td>Refuted</td>
</tr>
<tr>
<td>Standardization</td>
<td>Refuted</td>
<td>Refuted</td>
</tr>
</tbody>
</table>

*Table 10: Conclusions on hypothesis 3.*

Regarding the significance of the correlation between *idea generation* and *accounting predominance*, it should be pointed out that the correlation was expected to be negative: that is, strong predominance of IA staff with an accounting background was expected to correlate with lower levels of innovativeness. Instead, the correlation turns out to be significant, yet positive: a stronger predominance of IA staff with an accounting background results in higher levels of innovativeness.
**HYPOTHESIS 4.** The correlation of individual and team level variables and successful innovation in internal audit functions is moderated by the stage of the innovative process.

**HYPOTHESIS 4A.** Determinants at the individual level show a significantly stronger correlation with idea generation than with idea implementation.

<table>
<thead>
<tr>
<th>Independent variable</th>
<th>$\rho_{\text{Ideagen}} &gt; * \rho_{\text{Ideimpl}}$</th>
</tr>
</thead>
<tbody>
<tr>
<td>Role expectations</td>
<td>Refuted</td>
</tr>
<tr>
<td>Creative self-efficacy</td>
<td>Refuted</td>
</tr>
<tr>
<td>Job complexity</td>
<td>Not measured</td>
</tr>
<tr>
<td>Job autonomy</td>
<td>Not measured</td>
</tr>
<tr>
<td>Leader-member exchange</td>
<td>Refuted</td>
</tr>
<tr>
<td>Job self-efficacy</td>
<td>Refuted</td>
</tr>
<tr>
<td>Openness to experience</td>
<td>Refuted</td>
</tr>
<tr>
<td>Intrinsic motivation</td>
<td>Refuted</td>
</tr>
</tbody>
</table>

*Table 11. Conclusions on hypothesis 4a. The comparison of correlations has been made using Steiger’s Z as explained in chapter 4.*

As is shown in the table, the correlations of the individual-level variables with idea generation are not significantly stronger than those with idea implementation.

**HYPOTHESIS 4B.** Determinants at the team level show a significantly stronger correlation with idea implementation than with idea generation.

<table>
<thead>
<tr>
<th>Independent variable</th>
<th>$\rho_{\text{Ideimpl}} &gt; * \rho_{\text{Ideagen}}$</th>
</tr>
</thead>
<tbody>
<tr>
<td>Vision</td>
<td>Refuted</td>
</tr>
<tr>
<td>External communication</td>
<td>Refuted</td>
</tr>
<tr>
<td>Support for innovation</td>
<td>Refuted</td>
</tr>
<tr>
<td>Task orientation</td>
<td>Refuted</td>
</tr>
<tr>
<td>Internal communication</td>
<td>Confirmed</td>
</tr>
<tr>
<td>Team cohesion</td>
<td>Refuted</td>
</tr>
<tr>
<td>Goal interdependence</td>
<td>Refuted</td>
</tr>
</tbody>
</table>

*Table 12. Conclusions on hypothesis 4b. The comparison of correlations has been made using Steiger’s Z as explained in chapter 4.*

As is shown in the table, the correlations of the team-level variables with idea implementation are not significantly stronger than those with idea generation, with *internal communication* as the sole exception.
HYPOTHESIS 5. Idea generation has a mediating influence on idea implementation.

<table>
<thead>
<tr>
<th>Independent variable</th>
<th>Mediation effect of ideas generated?</th>
</tr>
</thead>
<tbody>
<tr>
<td>Role expectations</td>
<td>Refuted</td>
</tr>
<tr>
<td>Creative self-efficacy</td>
<td>Confirmed</td>
</tr>
<tr>
<td>Job complexity</td>
<td>Not measured</td>
</tr>
<tr>
<td>Job autonomy</td>
<td>Not measured</td>
</tr>
<tr>
<td>Leader–member exchange</td>
<td>Confirmed</td>
</tr>
<tr>
<td>Job self-efficacy</td>
<td>Refuted</td>
</tr>
<tr>
<td>Openness to experience</td>
<td>Refuted</td>
</tr>
<tr>
<td>Intrinsic motivation</td>
<td>Refuted</td>
</tr>
<tr>
<td>Vision</td>
<td>Refuted</td>
</tr>
<tr>
<td>External communication</td>
<td>Confirmed</td>
</tr>
<tr>
<td>Support for innovation</td>
<td>Confirmed</td>
</tr>
<tr>
<td>Task orientation</td>
<td>Refuted</td>
</tr>
<tr>
<td>Internal communication</td>
<td>Refuted</td>
</tr>
<tr>
<td>Team cohesion</td>
<td>Confirmed</td>
</tr>
<tr>
<td>Goal interdependence</td>
<td>Confirmed</td>
</tr>
</tbody>
</table>

Table 13. Conclusions on hypothesis 5.

As is shown in the table above, either a full or a partial mediation effect of ideas generated is present for six of the thirteen independent variables.

Research questions

Turning now to answering the research questions, we can conclude as follows:

I. Innovation in the internal audit function can meaningfully be defined as any practice or product which is in some sense new in the context of its application and whose application is intentional.

II. Innovation in the internal audit function can meaningfully be measured in terms of the ‘new ideas’ that are generated and implemented, respectively. Again, newness is compared to the context of application.

III. Of the 15 individual-level and team-level independent variables considered in this study, and the three IAF-specific variables that were hypothesized to be relevant as well, all exhibit a significant correlation with either the number of ideas generated, ideas implemented, or both. From additional regression analyses it can be concluded that external communication, support for innovation, creative self-efficacy and innovativeness as a job requirement explain the most variance and can therefore be identified as the strongest predictors of innovation in the internal audit function.
Central question

Finally, turning back to the central question, the model below summarizes which factors are most decisive in enhancing the internal audit function’s innovative potential. The figure can be seen to represent a comprehensive strategy for those internal audit functions seeking to optimize their innovative potential. As can be seen there, of the 15 predictors originally considered, four are significant predictors of the amount of ideas generated and ideas implemented.

In answer to the central question, the figure shows that a Chief Audit Executive seeking to optimize her department’s innovative potential should consider enhancing its following characteristics:

1. The extent to which the team engages in communication with individuals and business functions outside the team (external communication);
2. The expectation, approval and practical support of attempts to introduce new and improved ways of doing things in the work environment (support for innovation);
3. The extent to which individuals are confident in their ability to exhibit creative behavior (creative self-efficacy);
4. The extent to which staff members perceive that they are expected to exhibit innovative behavior (innovativeness as a job requirement).

Moreover, as has been remarked several times in the previous chapters, the results of the present study suggest that it is not necessary to differentiate between different types of internal audit functions when optimizing innovative potential. Whether the internal audit function’s tasks are predominantly standardized or no; whether the internal audit function operates in a regulated industry or no; whether the internal audit function is predominantly populated by staff with an accounting background or no; none of these factors appear to have much influence on the innovative potential.
Discussion
This chapter discusses some implications of the present study, some perspectives for future research and some limitations.

Practical implications
While the conclusions presented here may provide a reasonably straightforward agenda of things to take on in order to boost the innovative potential of the internal audit function, not all of these may be easy to implement. It is likely that the perception of the internal audit function by its stakeholders, as well as the internal audit profession by many of its practitioners, will resist a radical focus on ‘being creative’. Yet, the more auditors will succeed in thinking of and presenting themselves as problem solvers instead of fault-finders, the more likely will they be to meet both the organization’s current and future assurance needs. Chief Audit Executives should lead this change in thinking instead of feeding the ‘classical’ image of the internal audit function.

Issues for future research
The research presented in this thesis prompts numerous follow-up questions; a few particularly salient ones will be briefly addressed below.

Accounting for correlation in independent variables. Even though none of the usual tests for multicollinearity resulted in anything notable, it is still a fact that correlations between the independent variables in this study are rampant. A future attempt should be made to account for these correlations in order to increase our understanding of how team-level and individual-level characteristics interact; better insight in these interactions may be leveraged in attempting to promote innovation. Alternatively, it may be possible that the complexity and number of independent variables may be reduced considerably by collapsing them in overarching constructs. Factor analyses of responses from a greater number of participants could be used to achieve this.

Moderation effects. It would be very interesting to see whether any of the effects found in this study are moderated by other variables. In particular, size of the internal audit function would be a likely candidate to show moderation effects. Likewise, while this study has shown that level of standardization, level of industry regulation and predominance of accounting staff have no direct effect on innovative potential, it is quite possible that these variables may strengthen or weaken the effect of other independent variables.

IA value chain effects. The present study has not differentiated between innovative potential in the various parts of the internal audit value chain. In order to facilitate a more targeted innovation enhancement strategy, it would be interested to see whether effects reported here are stronger (or weaker) for particular parts of the internal audit operating model.

Cultural differences. The data used in this study only comes from internal audit functions based in the Netherlands. It would be very interesting to compare the Dutch results to other countries.
Competing and complementing explanations. Finally, it should be noted that the model presented above explains roughly half of the observed variance. This leaves room for additional variables to be considered in order to arrive at a fuller understanding of what drives innovation. For example, technological and product-oriented factors have not been considered in this study.

Limitations

The most obvious limitation of the research presented here regards the response rate. As has been pointed out in the results chapter, the author has only been able to secure 52 useable responses.

This number is problematically low to perform any statistical analysis on, especially regression. In his survey of sample size theories, Gignac (2019) argues that recent insights require 105 cases for regression at the very least. He also argues that, as correlations between variables are stronger (as is the case here), much larger samples are needed. Quoting an extensive simulation study by Maxwell (2000), he shows that, for a study with five predictors (the current study has more than twice as many), anywhere between 191 and 2752 cases are necessary to arrive at reliable results.

It will be clear from the above that results from the regression sections in this thesis should be taken with more than the proverbial grain of salt. Nevertheless, it has been decided to perform the analyses and report their results here. This has been deemed justifiable because the author believes that the final sample is fairly representative of the population of internal auditors in the Netherlands. If that is true, bootstrapping is a legitimate procedure to inflate the sample to the size necessary to perform regression in a meaningful way. Also, the author thinks that the results presented here are useful as a starting point for further research, even if their statistical validity is not particularly convincing. Not reporting them would be a waste of valuable information.
References


