Visible: discovering the impact of research conducted by universities of applied sciences

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CHAPTER 6

CONCLUSION

This dissertation was driven by the need to understand the rules for critically evaluating the impact of research conducted within Dutch Universities of Applied Sciences (UASs) and how these rules can be applied.

Specifically, we sought to answer the following questions:

- What are the requirements for evaluating the research impact created by Dutch UAS research?
- How can these requirements be applied within the context of the goals of Dutch UASs?

Answering these questions has resulted in two distinct yet interlinked parts to this dissertation as we moved from theory to practice, from understanding to implementation. Firstly, we sought to delineate the rules governing the evaluation of UAS research impact. Secondly, we analysed the current practices within the contextual playing field that Dutch UASs find themselves and experimented with applying the rules to the impact evaluation process of Dutch UAS research.

To gain understanding and to achieve the objectives of this research, a multifaceted methodological framework was employed. This approach was designed to capture a broad spectrum of insights and data, ensuring a comprehensive understanding of the field.

The investigation began with a literature analysis. This analysis entailed a systematic examination of existing academic and policy literature, encompassing both quantitative and qualitative studies. By combining diverse methodologies, the review endeavoured to create a richer, more nuanced understanding of the current state of research impact evaluation for Universities of Applied Science and the research conducted by it, setting a solid theoretical foundation for the study.

While the literature analysis established theoretical grounding, interviews and dialogues offered personal, experiential insights. Further depth was added through exploratory interviews and dialogues with researchers and support staff across different themes and from various Universities of Applied Sciences. This provided valuable first hand accounts of the challenges and nuances associated with research done at UASs, as well as impact creation and evaluation. This stage was followed by the distribution of a questionnaire to a wider audience of UAS academic professionals. This questionnaire provided quantitative data regarding the perceptions, practices, and experiences related to UAS research, its researchers, its output, impact creation, and its evaluation. Workshops acted as dynamic platforms for deeper engagement and inquiry among experts and practitioners in the field. They provided a focused, practical examination of, among other things, impacts, outputs, partners and priorities. These sessions were instrumental in triangulating the results gathered in the questionnaire and refining the application process of the results identified in the literature analysis and interviews. This facilitated a collaborative environment for a further understanding of impact, impact creation, and evaluation, that was required prior to testing and enhancing possible evaluation frameworks. A detailed case study of a research project within a selected University of Applied Sciences provided a contextual, in-depth analysis of how research impact evaluation can be conducted in practice. Doing so highlighted practical challenges and opportunities, and served as a microcosm to test the applicability and efficacy of the identified rules and proposed integrations in a real-world setting. Collectively, these methods aimed to provide a well-rounded, deeply informed exploration of how research impact can be evaluated and enhanced in Dutch Universities of Applied Sciences.

In the following sections, this concluding chapter discusses the findings from each of these methods, bringing together the insights that they collectively offer. It summarize the key findings and

contributions of this research, as well as reflecting on the broader implications of these insights for the academic community and policymakers within higher education. This chapter provides practical advice on how to integrate the results of this study into practice and suggests possible areas for future endeavours in the realm of UAS research impact evaluation.

AN OVERVIEW OF THE STUDY AND ITS CONCLUSIONS

Research Impact Evaluation Theory

The initial phase of this research was dedicated to discovering the governing principles and criteria essential in assessing the impact of UAS research. This pursuit was a foundational step towards establishing a more nuanced and effective framework for evaluating UAS research impact outcomes.

By examining the theories, methodologies, standards, and metrics currently in use, this dissertation has aimed at highlighting both the strengths and limitations inherent within the existing systems. To accomplish this, an extensive literature analysis was undertaken to establish foundational rules for evaluating the research impact of Universities of Applied Sciences. As very little appears to be written about evaluating the research impact of UAS research, the results were drawn from diverse sources, including transdisciplinary and multidisciplinary evaluations, general impact evaluation literature, and practical applications within the universities themselves. The aim was to adapt theoretical understandings from various fields to the unique context of applied sciences research. The analysis provided several recommendations beginning with the importance of recognizing the philosophical foundations that influence these evaluations (Greenhalgh et al. 2016). The philosophical foundation is the perspective through which research is interpreted, shaping the link between research and impact and brings various assumptions with it. The recommended philosophical assumptions for evaluating UAS research are realist or performative (Raftery et al. 2016).

Research guided by a realist assumption seeks to unveil the context-mechanism-output-impact configuration. It strives to tackle the variability in knowledge assimilation by investigating interactions among policy makers, practitioners, and resources as impact mechanisms. Conversely, a performative assumption, grounded in Actor-Network Theory, advocates for evaluating research impact by scrutinizing the broader consequences of interactions between research and society. This entails mapping actors, activities, and resulting changes over time (Greenhalgh et al. 2016).

These theoretical recommendations underscore the importance of conducting real-time, formative evaluations that foster learning and improvement. They advocate for a flexible evaluation structure that resonates with the dynamic nature of practice-oriented research, cautioning against the constraints of a linear logic model linking objectives, input, output, and impacts. Additionally, these recommendations emphasize the importance of a co-production approach, involving stakeholders from the outset. Currently there do not appear to be any established frameworks that conform to all of these recommendations. ASIRPA (Joly et al. 2015), PIPA (van Drooge and Spaapen 2017), and Contribution Mapping (Kok and Schuit 2012) all meet several of the recommendations that could provide a starting point for evaluating the impact of UAS research. Ultimately, these recommendations underscore the need to comprehend the context and process of UAS research for an effective evaluation of its impact.

Investigating the Current Context of Dutch UAS Research and Applying the Rules

The second part of this investigation was to understand what is currently happening in the field of UAS research practice and compare it to the newly understood recommendations, the rules. To do so, our focus first shifted to include examining the roles and functions of research groups within the Knowledge Triangle (KT).

Research Groups and the Knowledge Triangle

This section discussed the distribution of functions among various academic roles and their interaction within the KT. The Netherlands Association of Universities of Applied Sciences (NAUAS) currently uses a national framework for research evaluation. This Brancheprotocol Kwalitietzorg Onderzoek (Sector Protocol for Quality Assurance in Research, BKO) is a general research evaluation conducted at the research group level. Mirroring the better-known Strategy Evaluation Protocol (SEP) used by the Universities of the Netherlands (UNL), the BKO is executed ex-post every six years by an evaluation committee comprised of external and internal members. It aims to evaluate and monitor research quality for accountability purposes.

The current version of the BKO is comprised of 4 standards in which evaluation takes place. These are:

Standard 1: The research unit has a relevant, ambitious, and challenging research profile and research programme;
Standard 2: The research unit makes transparent what its contribution is to the development of Professional Practice and society at large, of Education, and of the Research domain;
Standard 3: The research unit's research complies with the standards applicable in the field with regard to conducting research; and
Standard 4: The way in which the unit is organised, the deployment of people and resources, and the internal and external partnerships, networks, and relationships, make it possible to achieve the research profile. (NAUAS 2022)

Utilizing a set of the basic indicators, "Research Staffing Realised" (Function and Time) required for Standard 4 of the BKO, principal component, and regression analysis was conducted on questionnaire results. Based on the work of Kyvik (2012), we selected four primary functions in which academics participate; Teaching, Research, Internal Organization and External Networking. Demographics such as age, gender, and education level were taken into account as they could potentially influence how the researcher groups functioned.

The analysis revealed two primary dimensions of Connectivity and Content. In this context, 'Content' refers to the teaching and research activities in which researchers participate. The activities on this dimension pertain primarily to the production and conveyance of Content. 'Connectivity' refers then to activities pertaining to Internal Organization and External Networking. These dichotomies challenge the three potential dimensions of the KT; Education, Research, and Professional Practice, and the four potential dimensions of academic functions. The results of the analysis highlighted the strategic significance of balancing involvement in Research, Education, and Practice, emphasizing the pivotal role of each member of the research group in synthesizing and disseminating knowledge.

The position of the professor appears to be a position of power. This can result in the knowledge transfer with the Professional Practice being vulnerable as they appear to be solely responsible for External Networking and matters of Internal Organization. Similarly, the link to education appears reliant on those members with the most teaching hours. The research would appear to be primarily conducted by those with more hours for research. The more hours they are given for research the more they may participate in External Networking. The innerworkings of these roles and functions reflect the hierarchy of the University research group in which the professor is the primary decision maker. The question is whether this is beneficial to research at UASs. The relative newness of UAS research means that there is still the opportunity to shape the roles and functions within the group in such a way that each area of the KT is connected. Emulating how universities have organized their research and teaching may not be sufficient to reach the UAS goals. It may, in fact, be a hindrance to it.

The results of this chapter indicate a need for clearer decisions on member functions and roles in the research group as well as at the project level to maximize the impact within the KT. It also illustrates the importance of looking beyond the standard concept of the basic indicators to reveal

more about the impact created by research done by UASs. It appears that this set of indicators can tell more about a research group's potential impact than initially realized.

Impact

Chapter 4 of this dissertation made a deeper exploration into the impacts of Universities of Applied Sciences. Through the use of questionnaire results and workshops/focus groups, this section explores how Dutch UAS researchers view their work within the themes, the impact they wish to create in those themes, and the output they create during the research process.

At the start of this study, ten themes had been discussed in the Strategic Agenda of 2016-2021. These are:

- Health Care and Vitality;
- Education and Talent development;
- Resilient Society: in Community, City and Region;
- Smart Technology and Materials;
- The Built Environment: Sustainable and Liveable;
- Sustainable Transport and Intelligent Logistics;
- Sustainable Agriculture, Water and Food Supply;
- Energy and Energy Supply;
- Art and Creative Industries; and
- Business: Responsible and Innovative.
  (NAUAS 2015)

Aligned with the United Nations Sustainable Development Goals (United Nations 2015) and the Dutch Research Agenda, and believed to reflect the research work conducted by UAS researchers (NAUAS 2021), the NAUAS has indicated twelve themes in which they wish to make impact. The current Strategic Research Agenda 2022-2025 has added Security, and Tourism and Hospitality (NAUAS 2021). Because of the timing of this study only the first ten have been taken into consideration.

Both a questionnaire and workshops were utilized to facilitate a comprehensive understanding of: the impacts researchers wish to create; the actual outputs created to facilitate this impact; and the themes in which they strive to do it. Our study reveals that researchers find it challenging to align their work with a single theme. They often engage in multidisciplinary research with a wide variety of stakeholders which requires flexibility in indicating multiple themes. Project-level evaluations may better capture theme-specific impacts. This is especially true as stakeholders play a crucial role in impact creation, and the choice of theme often depends on project-specific stakeholders.

Further, this part of the study revealed a disconnect between the intended impacts and actual outputs. This was particularly true for both educational impact and outputs, and economic impacts and outputs. These results suggest that perhaps the impact is not purely created through the outputs but through the people who are involved. Harkening back to the results of Chapter 3, this would appear to emphasize the importance of personal engagement in translating research findings into tangible impacts.

Chapter 4 also discusses the desired form of impact, *doorwerking* or micro impacts, that Dutch UASs wish to evaluate. The concept of 'impact' for UASs has evolved over time. Currently, the term *doorwerking*, translated as 'effect' in English, is widely used in UAS policy discussions. The current definition, as per the BKO, describes 'effect' as the influence of both the research process, and its results on Education, Professional Practice, and the Research domain, encompassing implicit and explicit changes during research and dissemination (NAUAS 2022). According to Brouns et al. (2023) it is fostered by ongoing interactions among individuals and their output. Andriessen (2019) suggests that these interactions and outputs facilitate knowledge transfer across the spheres of the Knowledge Triangle.

Initially, Dutch UASs used the term 'valorisation,' to describe focusing on creating economic and societal value from knowledge. Internationally, 'valorisation' is often associated solely with the economic value of research impact, overlooking non-economic aspects (de Jong 2016). The limitations of the economic focus include a one-directional flow of knowledge from science to society (Etzkowitz 1998), contrasting with the KT model that acknowledges the interconnectedness of Higher Education, the business sector, and society (van Vliet 2022).

Within Dutch UASs, the term doorwerking appears to be preferred over 'valorisation' or 'impact.' Doorwerking implies an ecosystem where minute developments lead to a succession of adaptive changes, akin to Sivertsen and Meijer's (2020) concept of 'Normal impact'—everyday interactions creating scientifically robust and socially relevant impact. Sivertsen and Meijer differentiate between 'Normal' and 'Extraordinary' impact; Normal impact stems from daily interactions, while Extraordinary impact, though rare, has a widespread effect on society.

Lykke et al. (2023), further build on this differentiation between Normal and Extraordinary by suggesting that Normal impact is made up of micro impacts that occur throughout the research process, contributing to expected and unexpected, planned and unplanned effects. Budtz Pederson and Hvidtfeldt (2023) suggest that these micro impacts may lead to macro level impacts and require different tools for evaluating the different types of impacts. They suggest that the evaluation of macro impacts is better suited to indicators and a narrative while micro impacts are best made visible using a contribution analysis.

Contribution Analysis

The final stage of this study was a case study aimed at applying and evaluating the effectiveness of contribution analysis as a micro impact, or doorwerking, evaluation tool in the context of Universities of Applied Sciences. Structured around Kok and Schuit's (2012) Contribution Mapping framework, we evaluated a transdisciplinary project based in the Netherlands. While many forms of contribution analysis are based on a Realistic perspective, Contribution Mapping was selected because of its Performative assumption. This assumption is based in Actor-Network Theory. As such, it focuses on the actors, interactions, activities and outputs throughout the research process. It aligns with other recommendations for evaluating UAS research impact in that it is formative and stresses the importance of stakeholders throughout the evaluation process in co-production.

The use of stakeholders in research and its evaluation have come to take on many different terms such as co-production, co-creation, societal engagement, citizen science (Cohen 2022). While these terms have come to be used interchangeably, a systematic literature review conducted by Voorberg et al. (2015) suggests that there are, in fact, three forms of stakeholder participation that are addressed in the literature. These are co-implementor, co-designer, and co-initiator. They suggest that the use of stakeholders in co-creation is best defined as co-designer, and co-initiator and co-production as co-implementation.

Regardless of how these words are precisely used, the use of stakeholders in research and evaluation comes with positives and negatives. Stakeholder inclusion is seen as fostering synergy (Brandsen and Pestoff 2006) and long-term commitment, leading to a power shift where stakeholders play a leading role (Bovaird 2007). However, potential risks and challenges also come with it in the form of, among other things, extra costs (Boaz et al. 2021), bias (Oliver et al. 2019), or the possibility of excluding important participants (Pel et al. 2023).

In line with co-production, semi-structured interviews with each member of the research team including stakeholders were conducted. A focus group with the whole research team was also held. These were conducted following the completion of the project, making use of the Contribution Mapping framework in its original ex-post form. Conducting this case study led to several observations, challenges, limitations. It indicated the need for modifications to Contribution Mapping in order for it to be fully useable and able to tell a broader narrative around context and impact.

While effective as a starting point, Contribution Mapping itself presented challenges, such as time intensity, the necessity of insider involvement, and results that often lacked depth and contextual richness. These findings led to recommendations for enriching contextual details in the mapping and adopting an iterative, non-linear evaluation approach conducted in real-time. Chapter 5 demonstrated the practical challenges and potential of using novel evaluation methods in real-world settings, suggesting that Contribution Mapping's effectiveness in the UAS context depends on addressing its limitations and refining the approach.

APPLYING THE CONCLUSIONS

Collectively, the chapters of this dissertation outline the rules for evaluating the impact of research conducted by Universities of Applied Sciences. It examines impact within the current context of Dutch UAS research and experiments with putting those rules into practice. As previously indicated, these findings lead to several conclusions that are closely connected. What do these findings mean for the research group, policy maker, executive boards, the Netherlands Association of University of Applied Sciences and even UAS researchers? Let's make this practical.

The Recommendations for UAS Research Impact Evaluation

The rules or recommendations for evaluating the research impact of UAS research indicate that there are several principles that need to be kept in mind when evaluating the impact of UAS research.

a. The Philosophical assumption: This evaluation should utilize one of two options for assumptions. One option is a Realist philosophical assumption that includes context-mechanism-output-impact (CMOI). A performative perspective based on Actor-Network theory, is also applicable with the result that theoretically speaking, both assumptions are applicable. However, from a practical perspective, a Realist assumption risks being too linear as this is the nature of the CMOI formation. Regardless of the assumption it is based on, the evaluation should be a co-production model without making use of a preformulated logic model which supports linear thinking.

b. Real-time evaluation: Impact creation and its evaluation start at the beginning of a research project. This is when a researcher and group should be considering the desired impacts (micro and macro) and how these are going to be realized. It is important to be aware of the framework chosen, i.e. it is applicable to the desired impact (micro, macro, or a specific sort of impact), and the research the evaluation strives to evaluate. It is important to be aware of the assumptions on which the evaluation is based, as these are reflected in how the research and impact evaluation process are viewed. Also, the level of evaluation should be taken into consideration; is it at a research group level, a project level, or, if possible, at a theme level?

c. Prefabricated logic-models: It is important to be aware of becoming too rigid in ‘pathways’ to impact. The ‘what’ and ‘how’ is not cast in stone. One of the joys of practice-oriented research is its non-linearity and the feedback loops that take place in order to accomplish the research. The stakeholders also play a fundamental role in this process and often contribute to the messiness of the research process. Likewise, the impact created throughout the research process occurs in both predictable and unpredictable ways. This stresses the need to regularly monitor what is taking place in projects and goes beyond looking at only outputs as a form of impact. It includes both the deliberate and unintentional interactions and activities that take place before, during, and after a project as well as the people involved.

d. Formative: While a summative evaluation may remain relevant for evaluating research as a whole, impact evaluation should be formative. The aim is to learn from the evaluation. The implication is that impact is always being made. What is to be

accomplished through evaluation is making the impact visible so that it can be built on for further impact and improvement in the future.

e. Co-production: The inclusion of stakeholders is a fundamental part of UAS research. Stakeholders should be included at both the start of the project and the evaluation. It is, however, important to recognize that there are blatant and hidden costs for all those involved. 'Participation' for the stakeholder means something different than participation for the researcher and the research team. It is, thus, necessary to ensure that stakeholders are compensated for both the research and the evaluation in a reasonable manner that is beneficial to them as well as the researcher.

These recommendations for evaluating the research impact created by UASs could be translated into criteria for evaluation. The NAUAS and policy makers should consider how to implement these recommendations to aid in making UAS research impact visible. Equally, these recommendations are applicable to the researchers and their teams because it concerns evaluating the research impact itself. By implementing these recommendations into their evaluation practices, researcher groups can make their impacts more explicit.

Roles, Functions, and Impact

The results of our study emphasize the importance of team composition, as could be expected from a functional Knowledge Triangle. The roles and functions of each member of the research group have a direct influence on the impact created. Those with significant teaching time link to impacting education while those with much research time create impact through their research and output with some impact through networking. This may indicate the links between Education and Research may be weaker than expected. The more hours a member has for teaching, the stronger their link to education. Similarly, the more time researchers have for researching, the more research they do. Those with high numbers of hours for research may also make steps towards External Networking. However, the role and function of the professor is primarily responsible for the link to practice through External Networking and Internal Organizational matters. This is the biggest risk to the efficacy of this model as it means that the link to the Professional Practice falls solely on that role. The result is that the flow of knowledge through the Knowledge Triangle is dependent on the people involved, making the Knowledge Triangle vulnerable. In order to mitigate this vulnerability, it is important researchers and professors are aware of their position in the Knowledge Triangle. Each position is a vital part of ensuring the knowledge transfer happens in each area. In doing so, the purpose of UAS research is fulfilled.

It is important for research teams, and those who support them, to be aware of the various roles and functions that are present in the team as well as in each of the projects in which that team participates. Ideally, these decisions are determined together as a team. Each role and function contributes to the impact created as well as the knowledge transfer that occurs. Knowing who does what enables well informed decisions to be made when deciding what impacts are desired to be created, the activities and outputs used to facilitate this.

While technically each project should contribute to each area of the KT, there are justifiable reasons for not requiring this. Cases where this does not occur should be the result of a conscious decision rather than one born out of chance and/or poor planning. The vision, mission and plan for a research group and the support structure is an essential tool for facilitating impact as a research group at both micro and macro levels. By having a clear vision and mission, choices for impacts can be explained. It will also assist the group in working towards building micro impacts into desired macro impacts which require regular monitoring of the work at both a project level and research group level.

The gap between research conducted by research groups and the education component of the KT is large. Researchers want to create educational impact, but this is not significantly accomplished through the output created. Instead, it appears that this impact is accomplished through the people involved. The results of this study show the importance of not only focusing on output for impact creation, as it now appears to be the case within the BKO, but also on people.

Ensuring the right person with the right role and function is involved is necessary to maximize impact, in particular balancing research and educational tasks and ensuring the connection between them. This can then be seen through the additional use of the basic indicator of the BKO as a potential indication of impact.

The BKO's basic indicators for "Research Staff Realised" can be used to ensure that the staffing required to make the desired micro and macro impacts are available. Knowing who and what is available can also help the decision-making process when trying to determine what micro and macro impacts the group wishes to make as a project team and research group. For example, choosing to make educational impact while not having someone in the team who teaches can make it more difficult. These considerations should also be made when forming project teams.

The gap between research and education may reflect an historical consequence as research at Dutch UASs is relatively young. It may be that the connection between research and education continues to flow primarily through student research assignments rather than the research groups themselves. It is important to recognize this now and assess the need for change as research at Dutch UASs reaches new levels of professionalization. It is especially relevant to take this into account given the current implementation of the professional doctorate, the UAS counterpart of an academic PhD.

Similarly, despite the strong focus on entrepreneurship in policy, the actual research activities and processes steering this type of impact are currently limited compared to other types of output and impacts realized. It is important to remember that all forms of research impact are valid. However, if economic impact is viewed as important, new means of support should be created to facilitate this type of impact creation.

It may be advisable for institutional policy makers and the NAUAS to consider strengthening policy around the Knowledge Triangle. It is important to ensure that responsibilities for the KT are not dependent on single members of the research group; otherwise, the Knowledge Triangle becomes fragile. Specifically, a formally recognized job description or profile for Associate Professor may help reduce the responsibility of the professor as primary link to the Internal Organization and External Networking. A formal description of how research is coupled with Practice and Education, and what kinds of processes it goes through, should also be part of the discourse.

Impact and the Themes

The NAUAS's previous two strategic agendas have indicated a desire to make impact in specific themes, while leaving room for how this should be evaluated and monitored. As indicated in Chapter 4, in the opinion of researchers, their research often falls into multiple themes. The results of the analysis in Chapter 4 raise questions concerning the validity of using the ten (or twelve) themes. In order to incorporate them into the impact evaluation as set out by the NAUAS, this study suggests a more project-based evaluation approach. This would allow for a tailored assessment of impact. Evaluating at this level will allow for multiple themes to be taken into account for each project and each research group as well as the stakeholders involved. A project evaluation can then serve to feed a research group evaluation such as the BKO.

Wrestling with Research Impact Evaluation Theory, Our results and the Dutch UAS BKO

These recommendations appear to differ from what the NAUAS currently uses for indicating the potential impact that their research creates. The Brancheprotocol Kwalitietzorg Onderzoek (Sector Protocol for Quality Assurance in Research, BKO) is a general research evaluation conducted at the research group level. Mirroring the better-known Strategy Evaluation Protocol (SEP) used by the Universities of the Netherlands (UNL), the BKO is executed ex-post every six years by an evaluation committee comprised of external and internal members. It aims to evaluate and monitor research quality for accountability purposes. The BKO suggests it serves "as a source for further development of research" (NAUAS, 2022, 5). This statement may be interpreted as a formative evaluation. However, the preceding BKO's were summative (van Drooge et al. 2016).

The exact philosophical assumption underpinning the BKO is difficult to assess because there is little information available. It is perhaps a Positivist assumption. According to the work of Greenhalgh et al. (2016) this assumption suggests that 'facts, especially statements on relationships between variables, are independent of researchers and transferable to new contexts' (Greenhalgh et al. 2016, 3). Research findings are then disseminated, taken up and used for societal benefits in what appears to be a linear means through the indicator categories of Output, Use and Valuation.

The specific impact component of the BKO evaluation is situated in Standard 2 wherein institutions are required to create indicators to demonstrate impact in the areas of the Knowledge Triangle, Research, Education and Professional Practice. There is to be a minimum of 3 indicators per area of the KT. The indicators are further substantiated with a narrative written by the research group itself. This may point to a dichotomy between current evaluation tools of indicators and a narrative, and the form of impact, doorwerking or micro impacts, that is to be evaluated. While the BKO strives to evaluate the doorwerking or micro impacts of Dutch UASs, it provides indicators and narratives as the tools of choice which are typically used for the evaluation of macro impacts (Budtz Pederson & Hvidtfeldt (2023). Consequently, the current BKO tools provide insufficient information concerning the impact resulting from the interactions, activities and outputs created through the researchers and stakeholders involved in the project. These actions occur throughout the process of Normal micro impact creation.

Collectively, these observations suggest that the BKO is perhaps not the correct tool for evaluating the impact of UAS research. It may also suggest that the BKO is insufficiently grounded in theory.

That said, the NAUAS has provided a guide to facilitate the use of the BKO. One of its suggestions is making use of https://doorwerking-hbo-onderzoek.nl/. Initiated by the research group "doorwerking practice oriented research," this website provides, and explains potential tools for research impact evaluation. It can be a great resource for both researchers and policy makers. However, the guide provides very little additional information for aligning these tools with those of the BKO itself. With additional help, researchers, groups and support staff could select an appropriate tool from this site to comply with the recommendations for evaluating the impact created by UASs allowing for bottom-up development that is context specific.

A Possible Starting Place

Contribution Mapping is one of these tools that can be considered to help accomplish this evaluation. As our study suggests, Contribution Mapping has illustrated that impact creation is dependent on networks of intertwining organizational and personal contexts that occur at different moments in time, and in different roles. The needs and expectations of different types of stakeholders differ as well. While the overarching thinking within impact evaluation is currently in favour of impact pathways, and Theory of Change as theoretical models, the reality is that the directionality of these impact methods appears insufficient in capturing the complexity and intricacies of impact creation in UAS research. By focusing too much on pathways, hypothesis and planning, the more important Normal impact that takes place can be missed. The linearity of these pathways also counters the knowledge transfer that takes place in multiple directions through the KT. A narrative may aid in making these transfers visible, as well as potentially augmenting the mapping of the interviews to describe individual stories and overlap in contributions.

By modifying Contribution Mapping to be used in real-time, these complexities can be highlighted beyond the linear, showing the links to all aspects of the Knowledge Triangle and connecting the partners with impact in mind. By doing it in real-time both micro impacts and macro impacts can be considered while allowing the freedom of the research to take its natural course through all the feedback loops. This requires subtle research management to achieve maximum impact. Real-time impacts should be continually monitored and evaluated by a capable research manager. This could be done within a project alone or, it could be executed by someone within the research group. That individual can take the real-time impact of all the projects into account thereby building a narrative for the group as a whole, establishing it as powerful tool for making both the micro and macro impacts visible.

However, Contribution Mapping is not the complete answer as it requires modifications such as timing, roles and terminology, and supplementary information about stakeholders, impact level, and context to produce a fuller, more complete story. It is crucial to keep in mind that while there is theoretically a position for the stakeholder and users, in practice their contribution to both research and evaluation remains limited. In order for research to be demand driven and in co-creation where stakeholders play a significant role, something that is more stakeholder centred may be required whereby co-design, co-implementation and co-evaluation are instead achieved. In this way, innovation may also be supported.

It is important to be aware that the use of research management tools such as Elsevier's PURE and other commercial Current Research Information Systems cannot assist in showing the impact of UAS research because they simply cannot capture the outputs, or more importantly the interactions and activities throughout the process of impact. As this study would suggest, impact through UAS research happens not only through output but through the research process and the personal interactions that take place between research, practice, and education. Networks are crucial. This cannot be captured in a commercial research information system.

Alternatively, this study recommends that new or altered tools combining qualitative and quantitative sources be integrated into the BKO framework to reflect upon the intricacies of impact creation in UASs. This may require modifying existing evaluation tools within the BKO framework to better assess the impact of Dutch UAS's research. Investigating ways to merge project-based evaluations with a BKO research group-based framework could involve developing a hybrid model to capture the full range of impacts. By aligning these tools with both micro and macro level impacts, UASs can better demonstrate and enhance the real-world impact of their research.

Reflections for the Future

This journey began by examining scientific literature in order to learn the rules of how to evaluate the impact of UAS research. There was little to go on. Throughout the process of writing this dissertation it became increasingly difficult to find scientifically based information about areas of importance for UAS research and policy. This search on my part may be reflective of something larger than this study. As the results of this study have shown, it may reflect the priorities of UASs in creating output and networks that serve the purpose of their stakeholders and their professional partners. As UASs continue to mature it is important that they make clear decisions concerning their vision, mission and polices to ensure that they maintain their identity and commitment to impact creation. It is not about gradually evolving into a university. Maturity does not mean doing it as others do. UASs need to embrace what makes them unique. It means carving out your own space, not comparing but learning from each other. Instead, there needs to be an acknowledgment that each are a valid and valued contributor to the academic process. In order to alleviate the current tension that appears to exist between UASs and Universities, it should be recognised that each is an important link in the binary system.

At the same time, part of claiming that space involves entering in the national and international dialog. In a binary system where scientific output has long been the priority, often associated with 'good research', the other half of the system cannot easily see what UASs are doing. Both UASs and Universities would benefit from an open dialog and exchange. According to what defines UAS research, it can by nature contribute to a better understanding of transformative, mission driven research because UASs are by definition, transdisciplinary. The outputs and the mandate to create impact mean that UASs can make a constructive contribution to the recognition and rewards discussion, specifically making a valuable contribution to initiatives like the Coalition for Advanced Research Assessment (CoARA) working group 'Towards Transformations: Transdisciplinarity, Applied/Practice-Based Research.

Additionally, what UASs are researching, creating and evaluating may be applicable for universities. This is especially true as universities become more focused on topics like citizen science and public engagement. As universities strive to create more impact through their research, it may be beneficial for them to learn from the more than 20 years' experience UASs have in making an impact on society throughout the knowledge triangle. At the same time, it is important to

recognise the many different facets of impact that this study has explored. Normal and extraordinary, micro and macro impacts, and doorwerking, highlight the potential differences implied in the word 'impact'. The impact within these two different contexts may not always be the same. Likewise, many of the impact frameworks and words to define impact were developed in the universities context and, as this study illustrates, may not mean the same in the UAS context. Yet they have inspired this research through the literature.

And what does that mean for the future of impact evaluation at UASs? It means developing a research impact framework(s) that works for UAS's research, ensuring that the underlying aim of the evaluation remains to make the impact being created through UAS research visible. That is their mandate, to create impact through their research. By making the impact of UAS research visible, it ensures UASs are accomplishing what they are mandated to do. This evaluation needs to be done in an open, transparent and honest way wherein advocacy, analysis and accountability are the drivers: advocacy in the sense that by showing what is being realised it garners, more research, more resources and more respect; analysis in terms of being able to show the impacts that are being realised, or not being realised and assessing how those impacts can be built on and enhanced; and accountability not in the sense of bureaucratic under the thumb thinking but making visible what is occurring to reflect what is happening. As the recommendations discussed throughout this dissertation state, it is formative. We are not asking "have you done what you are supposed to?" We are stating, "We know you have made an impact through your research, show us what you have done and how we can build on that in the future". Through good, systematic impact evaluation we can strive to maximise the positive impacts while being aware of the potential negatives. Once it is realized, UASs can go a step further to see what can be learned from both the evaluation and the process leading to it. This can result in increased research quality at UASs. It can also result in strategic choices being made, ones that align with the vision, mission and policy of UAS research. The results of our research show, this can also result in efficient use of the people in a research team, the stakeholders included in research projects and networks and the range of output created (people, activities, interactions and outputs).

SCIENTIFIC RELEVANCE

This study examines the impact evaluation of research done at UASs. It aims to contribute to the field of academic research, particularly in addressing several aspects within scientific inquiry. Firstly, this research aims to address a knowledge gap. There is a noticeable scarcity in existing scientific literature concerning the rules, requirements, or recommendations for evaluating the impact created by UAS research. By focusing on this area, the study hopes to enrich current academic understanding by filling a void that currently exists in contemporary research literature.

In addition, this study intends to deepen the knowledge base by providing insights on specific subjects. These subjects include: the pro's and con's of logic models; the theory and practice of impact pathways; the connection between previously disparate concepts such as Normal impact, doorwerking, and micro/macro impacts. The practical implications of these theories, in the context of UAS research, is also examined.

This research also aims to provide an in-depth comparison and analysis of different evaluation frameworks and their appropriateness for evaluating specific types of research. With respect to the relevance of research on impact evaluation at Dutch UASs, this research strives to contribute to creating a foundation for future studies, enriching the scientific narrative around applied research, and translating it into concrete recommendations. It is hoped that these outcomes will guide future UAS research towards societal needs and challenges, thereby increasing their visibility and relevance in affecting positive social change.

Furthermore, by offering a systematic approach to evaluating the impact of research conducted at these institutions, this study provides a foundation of recommendations for implementing an appropriate framework for subsequent scholarly endeavours. These recommendations can be instrumental in guiding future research, enabling a more structured and insightful examination of the ways in which Universities of Applied Sciences contribute to broader

scientific knowledge, innovation, and impacts on society. The methodologies and insights derived from this study have the potential to influence and steer future studies, marking a significant step in academic research related to Universities of Applied Sciences.

Additionally, the findings of this study strive to enrich the scientific narrative surrounding UAS research. Research from these institutions are often overlooked or undervalued in wider scientific discussions. This study, by highlighting and scrutinizing the impacts of UAS research, brings these contributions into view. It facilitates a broader and more inclusive conversation about the role and significance of UAS research in driving societal and scientific progress. This is especially true in view of the current policies focusing on transformative changes of science, technology and innovation with regard to sustainable transitions that are further supported by the global SDG's. The integration of this research into larger scientific dialogues can contribute to UASs being appropriately recognized and valued. This in turn promotes a more diverse and comprehensive understanding of science and its applications in society.

This study is intended to bridge a knowledge gap and create new paths for future research. It enriches the overall narrative of scientific inquiry, particularly highlighting the unique and impactful contributions of Universities of Applied Sciences.

SOCIETAL RELEVANCE

The societal relevance of this dissertation, which focuses on the impact evaluation at UASs, extends significantly beyond the academic realm, touching on various aspects of societal development and enhancement. Primarily, this research equips UASs with a deeper and more precise understanding of how to increase the visibility of their impact on society. This enhanced awareness is critical as it informs and guides the strategic decisions, policymaking, and future research trajectories of these institutions. By having a clearer picture of how their work affects society, UASs can make better informed choices that align with their social objectives and mission. This clarity also assists UASs in demonstrating their societal value, potentially increasing support, collaboration, and funding opportunities.

Moreover, UASs have a specific mandate to generate societal impacts. This study aids in providing clarity on how effectively these institutions can meet this responsibility. It sheds light on the tangible ways through which UASs contribute to societal impact, thereby enabling them to refine and optimize their roles and societal contributions. This, in turn, assists the efforts of UASs to be more closely aligned with societal needs, leading to enhanced social welfare and progress.

A significant aspect of this dissertation's societal relevance is how it assists UASs in demonstrating their value and relevance to society. Through this research, UASs can showcase their impact in a transparent and comprehensive manner, thereby reinforcing their legitimacy and importance in the public eye. This enhanced visibility not only bolsters societal support but also opens doors for greater collaborative opportunities and potentially increases access to funding sources. The ability to explicitly demonstrate their impact assists UASs in securing the necessary resources and partnerships to further their societal contributions.

By outlining the impacts of UAS research and proposing methodologies for their evaluation, this study offers a template that can assist in shaping future studies and initiatives at UASs. This template can provide guidance for upcoming research to be more closely tailored to address contemporary societal challenges and needs, leading to more impactful outcomes for communities. By making the impacts of UAS research more visible and comprehensible, this dissertation contributes to the recognition of the role UASs play in society. It highlights how these institutions are not just academic entities but are crucial players in driving social change and advancement. This increased understanding of UASs' roles and impacts fosters a more favourable environment for these institutions to affect positive change.

LIMITATIONS

This dissertation, focusing on the impact evaluation at Dutch UASs, has certain limitations that are important to acknowledge for a comprehensive understanding of its scope and applicability.

Firstly, the research is specifically tailored to the Dutch context. The Netherlands features a unique binary system of higher education, including Universities of Applied Sciences. While other countries also have similar institutions within their binary systems, the execution and integration of UASs can differ significantly across different national educational landscapes. Due to these variations, the direct applicability of all the findings and methodologies of this study to other countries may be limited. Each nation's higher education system has its own set of policies, cultural contexts, and operational frameworks, which can influence how research impacts are evaluated and perceived. Therefore, while the ideas and concepts derived from this study are broadly relevant and can offer valuable insights, their one-to-one application in different countries or systems may require careful adaptation and contextualization.

While this dissertation offers insights and contributes to the understanding of research impact evaluation at Dutch UASs, its specific focus on the Dutch context and the timing of the study relative to the fast-paced evolution in the field are potential limitations. These aspects highlight the necessity for ongoing research and adaptation of the study's findings to maintain their relevance and applicability in a rapidly changing academic and professional environment.

Secondly, the timing of the study presents another limitation. The dissertation captures the state of Dutch UAS research during the particular period of 2018-2023. However, the field of UAS research in the Netherlands is rapidly evolving and maturing. For example, the professional doctorate, as a relatively new development, signals a shift in how research is conducted and perceived in the applied sciences landscape. This evolution marks a significant step towards the professionalization of research within these institutions. It fosters a more practitioner-oriented, industry-focused approach to research.

Given this evolving context, this study's findings, while insightful and significant at the time of research, may not fully capture these recent developments and their implications for research impact evaluation. The speed at which changes are occurring in Dutch UAS research suggests that some of the dissertation's conclusions and recommendations may need revisiting or updating to stay relevant and effective.

Thirdly, this dissertation's journey was influenced by the COVID-19 pandemic, leading to alterations in the research process. The necessary shift from live workshops and focus groups to an online environment was not just a simple change of medium. It represented a fundamental modification in how the research was conducted. This transition potentially affected the dynamics of interactions and engagement with participants and even the approaches to data collection, potentially differing from what might have been achieved in person.

Conducting this research amidst a global crisis underlined the crucial role of resilience and flexibility in academic endeavours. This research was in the focus group and workshop stage when the first lockdown occurred. At that point the use of online platforms such as MS Teams or Zoom were rarely accessible. The constraints and possibilities inherent in the online interactions likely had an impact on the nature of the discussions, the depth of the analysis, and possibly the research outcomes.

In conclusion, the adaptation to the conditions imposed by the COVID-19 pandemic was more than just a logistical shift; it represented a comprehensive transformation of the research process. This experience has highlighted the need for adaptability and resilience in research, offering critical lessons for conducting impactful studies in times of crisis or unexpected challenges.

DIRECTIONS FOR FUTURE RESEARCH

Future research, building upon the findings of this study, opens up several promising directions to enhance the understanding and evaluation of research impact, particularly within the context of UASs. This study has produced a significant body of research that can be utilized for future research. This includes a database of stakeholders that participate in UAS research and questionnaire data on Open Science, Networking, and other impact related topics.

A significant area for future investigation is the refinement and evolution of Contribution Mapping. Contribution Mapping is acknowledged as a valuable tool for understanding the impact of research, but in its current form presents some challenges for practical, everyday application. To address this, future studies should explore how this tool can be adapted to provide a more comprehensive and nuanced understanding of research impact. This could involve simplifying its methodology for easier application in various settings or enriching its framework to capture more information about context and a broader range of detail.

Another key area for future research is a deeper exploration of the role of stakeholders and networks within UASs. Stakeholders (including students, industry partners, academics, and the wider community) play a crucial role in shaping and experiencing the impact of research. Understanding their perspectives, needs, and contributions can provide a more holistic view of the impact created by UASs, as well as the operationalization and intricacies of transdisciplinary research. Additionally, examining the networks within which these stakeholders operate can shed light on the broader systemic and relational aspects influencing research impact. This exploration could involve case studies, surveys, or network analysis to uncover how these relationships function and contribute to the generation of impact.

Investigating the network component of the BKO framework is another intriguing direction for future research. The BKO is instrumental in evaluating and understanding UAS research, but there is potential to deepen this understanding of impact by examining how networks within and beyond UASs contribute to and amplify this impact. For instance, how do collaborations, partnerships, and community engagements facilitated by UASs extend the reach and significance of their research outcomes? This is of particular relevance for the Research-Education axis within a UAS, as well as for the entrepreneurial component of UAS activities. Exploring these dimensions could lead to a more dynamic and interconnected understanding of impact, moving beyond traditional metrics and evaluations.

In summary, future research should aim to:

1. Enhance and adapt Contribution Mapping to make it more applicable and representative in various contexts;
2. Delve into the roles, perceptions, and contributions of stakeholders within UASs to gain a more complete view of impact creation; and
3. Investigate the network dynamics around UAS research groups, examining how these connections shape and extend the impact of their work.

By doing so, the future BKO can be enhanced by taking these mechanisms of impact into consideration. Such research will not only provide a richer understanding of how impact is created and experienced in the UAS context but also offer practical insights for improving impact evaluation and strategy in these institutions. In the meantime, it would be advisable that at the strategic level, be it the Boards of UASs or the NAUAS, time and effort is expended into discussing and solidifying how impact can be strengthened within the Knowledge Triangle. By doing so we not only follow the rules, but make the impact created by UAS research visible.

I set out on this journey to discover the rules for evaluating the research impact of Dutch UASs. I have a strong aversion to engaging in activities without understanding the underlying reasoning. In my opinion, this study has provided sufficient information for me to avoid blindly adhering to the practices of universities, complying with policy directives, or mimicking others who may be following instructions without a deep understanding of the details. While there is certainly

more to uncover, I hope this work will assist both myself and others in making informed decisions, complex decisions about what we mean in the words we use, the policies we write, the tools we offer. These are impactful decisions about who we involve in our research, the output we generate, and the research process itself. These are weighty decisions about our expectations for researchers, institutions, and the future of Practice Oriented research. By understanding and implementing these rules, my aspiration is not only to contribute to impacting society through the research UASs do but also to make this impact visible. It is through this visibility that we can learn, adapt, and further enhance our impacts, potentially influencing the future of the world.