Academic engagement as knowledge co-production and implications for impact: evidence from Knowledge Transfer Partnerships

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Abstract

Researchers have argued that management academics' engagement with non-academic stakeholders involves knowledge co-production rather than simple knowledge transfer from the former to the latter. This study suggests that the conceptual lens of knowledge co-production not only more fittingly describes academic engagement but also enables a clearer understanding of how academic engagement produces impact beyond academia. Building upon qualitative evidence on collaborations between management academics and businesses in the United Kingdom, the study supports the characterisation of academic engagement as knowledge co-production and argues that its impact (i) strongly depends on sustained knowledge co-producing interactions, (ii) 'ripples out' serendipitously, indirectly benefiting many stakeholders in ways that often cannot be anticipated, and (iii) unfolds and persists over a long period. These findings have implications for impact assessment and the development of the impact research agenda.

Keywords: academic engagement; management research; impact; knowledge co-production; knowledge transfer; Knowledge Transfer Partnership

1. Introduction

Academic engagement with stakeholders outside the academic community has recently prompted intense debate, particularly in the management literature. The growing awareness of a gap between management research and business practice, which are often thought to operate in separate spheres, has led to calls to improve the relevance of the former (British Academy, 2010; Starkey & Madan, 2001; Tranfield, Denyer, Marcos, & Burr, 2004). Approaches like 'engaged scholarship' (Van de Ven, 2007), 'relational scholarship of integration' (Bartunek, 2007) and 'mode 2' research (MacLean, MacIntosh, & Grant, 2002) have shown that relevant and impactful management research requires close interaction between academics and external stakeholders, especially practitioners. The evidence suggests that management researchers engage with non-academic stakeholders through numerous channels, including consultancies, research contracts, research collaborations, academic entrepreneurship, and informal interactions (Perkmann et al., 2013). In a context where academics are increasingly called to account for the non-academic impact of their work in order to secure research funding (Benneworth & Jongbloed, 2010) and, in some cases, through formalized assessment processes (Hessels & van Lente, 2008; Manville, Guthrie, Henham, Garrod, Sousa, Kirtley, Castle-Clarke & Ling, 2015), the literature must seek a deeper understanding not only of how academic engagement helps management academics develop practitioner-relevant research but also of how it generates broader impact on external stakeholders.

Many of the conceptual frameworks developed to describe and capture the impact of academic engagement view it, implicitly or explicitly, through the theoretical lens of knowledge transfer (Knight & Pettigrew, 2007; Roux, Rogers, Biggs, Ashton, & Sergeant, 2006), and this view has profoundly influenced policy

approaches to impact assessment (Hughes & Martin, 2012). Knowledge transfer is commonly defined as a process whereby knowledge is transmitted unidirectionally from academics to external stakeholders, who benefit by using such knowledge for their own objectives (Rossi & Rosli, 2015; Roux et al., 2006). However, this study argues that the concept of 'knowledge co-production' provides a more accurate description of the engagement process of management academics, as well as a more suitable theoretical framework with which to characterise how academic engagement generates impact, making it useful for the design of more effective approaches to impact assessment. Gaining increasing prominence in management research, as Osborne and Strokosch (2013) indicate, knowledge co-production refers to academics' active and participatory involvement with multiple stakeholders from business, government, and society through 'deep interactions' (Cunliffe & Scaratti, 2017; McCabe, Parker, & Cox, 2016) in which all parties leverage distinct resources to generate new knowledge collaboratively (Wu, Lii, & Wang, 2015), ultimately solving specific socioeconomic challenges (Armstrong & Alsop, 2010; Brudney & England, 1983).

Recent research calls for a refinement of the conceptualisation of knowledge co-production and for greater scrutiny of specific cases (Osborne & Strokosch, 2013), which could pave the way for a greater understanding of how they generate impact. While some studies investigate how knowledge co-production processes occur (Tranfield et al., 2004) and examine their drivers and barriers (Fenwick & McMillan, 2013), few seek to identify their broader impact beyond academia, and relevant empirical evidence is scant (Knight & Pettigrew, 2007). By integrating a review of the literature on knowledge co-production with original empirical findings, this study

provides a richer theoretical understanding of how academic engagement as knowledge co-production generates impact in the 'real world'.

The rest of this paper proceeds as follows. Section 2 focuses on conceptual development by contrasting the literature on knowledge transfer to that on knowledge co-production. Section 3 presents the study's research context and methodology based on qualitative interviews with participants in Knowledge Transfer Partnerships (KTPs), a university–industry collaboration scheme supported by the government of the United Kingdom (UK). An analysis and findings are presented in section 4. Section 5 concludes by outlining both theoretical and managerial implications for the practice of impact assessment and for the development of a research agenda aimed at further uncovering how impact occurs across a range of academic engagement processes. Pursuing this agenda can help management academics and their institutions design more effective and impactful strategies and foster the development of more appropriate policy approaches for supporting and assessing their impact.

2. Academic engagement as knowledge co-production and the impact agenda

2.1. Academic engagement as knowledge transfer and the implications for impact assessment

Academic engagement comprises 'knowledge-related collaborations' between academics and external stakeholders through interactions such as collaborative research, consulting, academic entrepreneurship, and informal activities like ad-hoc advice (Perkmann et al., 2013). Scholars have developed several conceptual frameworks to describe and capture the impact of academic engagement (Arza, 2010;

Bozeman, 2000; Perkmann, Neely, & Walsh, 2011), and these have influenced policy approaches to impact assessment (Hughes & Martin, 2012).

Some argue that organisations that engage with academia benefit by accessing scientific knowledge (Guan & Zhao, 2013), innovative scientific equipment (Arza, 2010), academic networks and business opportunities (Broström, 2012), and different perspectives on solutions to problems (Heidrick, Kramers, & Godin, 2005), as well as by influencing the direction of scientific research and identifying new R&D projects. Nuñez-Sánchez, Barge-Gil, and Modrego-Rico (2012) suggest that these benefits can involve technical, economic, input-related, and intangible improvements (e.g. learning, training, knowledge sharing). Perkmann, Neely, and Walsh (2011) describe the non-academic benefits of academic engagement as access to new ideas (e.g. new R&D projects planned or initiated), solution concepts (e.g. new designs representing solutions to particular problems), innovations (e.g. product or process improvements), and human capital (e.g. recruitment of staff from university, building network capital, learning of techniques). The benefits can also be socially oriented – for example, when linked to policy development (Hughes & Martin, 2012; Klautzer, Hanney, Nason, Rubin, Grant, & Wooding, 2011; Trencher, Bai, Evans, McCormick & Yarime, 2014). These pertain mainly to stakeholders such as public sector bodies, non-profit organisations, socioeconomic communities, and specific user groups (Meagher, Lyall, & Nutley, 2008; Olmos-Peñuela, Castro-Martínez, & D'Este, 2014), whom universities often perceive as being less salient (Benneworth & Jongbloed, 2010). Academics may also benefit from engagement activities (Arza, 2010; Broström, 2012) via intellectual resources (e.g. ideas for new scientific projects, academic publications, scientific discoveries) and economic gain (e.g. funds for laboratories and research, contacts with firms). Bozeman (2000) suggests that benefits

may accrue not only to the parties directly involved in the engagement process but also to the regional or national economy, as well as to other stakeholders who may indirectly benefit from better networking opportunities and improvements in scientific and technical skills and infrastructures. Barnes, Pashby, and Gibbons (2002) emphasise that academic engagement can be considered successful if all parties benefit and achieve an appropriate balance between academic objectives and organisational priorities.

Most of these conceptual frameworks view academic engagement implicitly as a process of unidirectional knowledge transfer from academics to external stakeholders, who benefit by using such knowledge for their own objectives (Rossi & Rosli, 2015; Roux et al., 2006). Here, the conceptualisation of knowledge is that it is at least partly codifiable into tangible items (such as prototypes, artefacts, or patents), although some tacit knowledge may be needed for effective transfer (Crossick, 2009). This perspective has several implications for the description and capture of impact. First, the categories of impacted stakeholders and their benefits should be clearly identifiable in general terms, independent of analyses of specific cases. Second, academic engagement should most heavily impact the stakeholders directly involved in knowledge transfer (Penfield, Baker, Scoble, & Wykes, 2014). Third, the benefits these stakeholders receive from this process should be quantifiable, albeit not always in monetary terms. Hence, impact analysis in a knowledge transfer perspective focuses on categorising and measuring the transferred outputs, rather than on capturing the processes through which the transfer occurs (Roux et al., 2006). Finally, the benefits of academic engagement should be available within a limited timespan that often coincides with the completion of the academic engagement process (Pickerill, 2014).

2.2. Academic engagement as knowledge co-production in the management research literature

A growing number of studies exploring the connections between management research and practice are investigating how the interactions between academics and practitioners work (Knight & Pettigrew, 2007). The evidence suggests that such interactions involve the co-production of knowledge[1] rather than a simple transfer of knowledge from one party to another (Antonacopoulou, 2010b). In knowledge co-production, all stakeholders are active participants in a process of knowledge construction, validation, and adaptation (Brudney & England, 1983). This process involves deep interactions (Cunliffe & Scaratti, 2017; McCabe, Parker &Cox, 2016) between stakeholders that demand extensive commitment, mutual trust (Molas-Gallart, Tang, & Morrow, 2000), regular and interactive communication (Cherney, 2013), and substantial resource contributions in the taking and sharing of risks (Wu, Lii, & Wang, 2015). Knowledge co-production begins from the conceptualisation and design of academic engagement activity and continues throughout the completion, translation, and dissemination of its outcomes (Cherney, Head, Povey, Boreham, & Ferguson, 2015; Farr, 2016).

Current research on academic engagement highlights some of the features of the process through which knowledge co-producing interactions generate broader impacts on non-academic stakeholders (e.g. Antonacopoulou, 2010a; Armstrong & Alsop, 2010). These features differ from conceptualisations of the impact of knowledge transfer processes in several ways. First, while the view of academic engagement as knowledge transfer conceptualises impact in terms of the benefits

[1] While scholars often apply the knowledge co-production framework to specific cases of collaborative research, one can argue that most forms of academic engagement involve interactions with stakeholders that imply the co-production of new knowledge (Cherney et al., 2015; Roux et al., 2006) although with different degrees of practitioner involvement (Starkey & Madan, 2001).

received by the stakeholders involved and often attempts to quantify them, the knowledge co-production approach emphasizes that the impact produced is often intangible and non-quantifiable. Management academics co-produce knowledge that is often conceptual, descriptive, and critical (British Academy, 2010; Cunliffe & Scaratti, 2017). Actors transform, appropriate, and incorporate such knowledge into individual thinking and attitudes via self-reflection, thus impacting the conceptual sphere (Hessels & van Lente, 2008; Meagher, Lyall, & Nutley, 2008). Changes in thinking and attitudes might then lead to changes in individual practices, which might in turn influence organisational processes and structures (Spaapen & van Drooge, 2011), leading to instrumental impact. For example, academic engagement with practitioners and consultants may lead to improvements in practices that affect wellbeing in the workplace as well as economic performance. Nonetheless, even when the changes are visible (such as changes in organisational practices), they often remain very difficult to quantify.

Second, the knowledge transfer view assumes that academic engagement most heavily impacts the stakeholders directly involved in the transfer; however, viewing academic engagement through the lens of knowledge co-production reveals that the intangible changes produced often indirectly impact individuals and organisations beyond those involved in the initial engagement process (Molas-Gallart & Tang, 2011). Although the co-produced knowledge sometimes becomes codified into articles, policy briefings, and even processes and policies that allow for broader circulation (Olmos-Peñuela et al., 2014), it very often remains tacit (Roux et al., 2006), and its diffusion beyond the initial participants often requires further interactions that support ongoing dialogue between stakeholders (Wilkinson, Gallagher, & Smith, 2012). The achievement of a broader impact therefore relies on

'distributed networks' of relationships (Murray, 2009) and on collective action involving many individuals engaging in formally organized and institutionalized activities (Pestoff, 2014). Finally, while the knowledge transfer view implies that the benefits of academic engagement occur mainly during the transfer process, the knowledge co-production view suggests that benefits can persist over time (Pestoff, 2014), and often over a timespan much longer than the duration of the initial academic engagement activity (Penfield et al., 2014).

Due to the prominent role of interactions, the variety of stakeholders involved, the intangible nature of the changes generated, and the extensive timespan over which they occur, the impact of knowledge co-production is difficult to capture comprehensively, even retrospectively (Wilkinson, Gallagher & Smith, 2012), a problem worsened by the challenge of attributing cause and effect (Klautzer et al., 2011; Spaapen & van Drooge, 2011) resulting from the difficulty of proving that certain changes (e.g. in practice, organisation, culture, technology) that have led to broader benefits over time flow from activities that may have occurred several years earlier.

Table 1 contrasts the characteristics of knowledge transfer to those of knowledge co-production processes as they emerge from a critical reading of the policy literature on the impact of academic engagement (section 2.1) and of the management literature on knowledge co-production (section 2.2). While the knowledge co-production literature unpacks some of the features of how academic engagement generates impact, primary evidence on how knowledge co-producing interactions generate broader impact remains scant (Knight & Pettigrew, 2007). Extending knowledge in this field is important for two reasons. First, in line with calls to enhance the relevance of management research, knowing more about how

academic engagement as knowledge co-production generates non-academic impact will enable better process design. Second, more knowledge of impact generation will assist in the shaping of the policy discourse on impact (Penfield et al., 2014) and the resultant policy interventions for supporting, assessing, and rewarding impactful academic engagement.

<<TABLE 1 ABOUT HERE>>

3. Research setting and design

This study employs a qualitative and interpretive approach using semi-structured interviews with management academics collaborating with non-academic organisations. This approach allows an analysis of knowledge co-production in its real-world context, exploring the nature and complexity of impact generation processes via 'how' and 'why' questions (Yin, 2014).

3.1 The empirical context: Knowledge transfer partnerships

The KTP scheme, launched in 2003, funds collaborative partnerships involving a university (academic partner) and an external organisation (business partner) who work together to deliver a project of strategic value to the latter, with the support of a recently recruited graduate (associate). Business partners can include firms, charities, and public or public–private bodies. The associate works under the joint supervision of an academic advisor (who is an academic working for the academic partner) and a business advisor (working for the business partner). Interestingly, the name of the scheme and its stated aim of facilitating 'knowledge transfer and business innovation'

(Ternouth, Garner, Wood, & Forbes, 2012) suggest that the policymakers who designed it envisaged the process as a way to allow academics to transfer their knowledge to business. However, the scheme is better characterised as a process of supporting knowledge co-production between multiple stakeholders (Schofield, 2002; Wu, Lii, & Wang, 2015). In particular, many KTPs embody 'double hurdle' knowledge co-production processes (Starkey & Madan, 2001), which simultaneously deliver 'practitioner relevance and scholarly excellence', (Pettigrew, 2001): on one hand, the KTP scheme is designed to facilitate business innovation by addressing complex business challenges; on the other, it supports academic research, offering academics the opportunity to discover, integrate, and apply their industry experience to teaching and research (Ternouth et al., 2012).

The scheme's current manager is InnovateUK, a government agency that also manages the programme's impact assessment, whereby each completed KTP must produce a final report describing its impact. Here, the business advisor reports on the effect of the KTP on the organisation's performance by providing quantitative data on improvements in turnover, exports, profit before tax, and investments directly attributable to the KTP, as well as a description of how the KTP led to strategic changes, enhanced staff knowledge and capabilities, improved internal operations, and improvements in organisational performance. The business advisor must also reflect more broadly on the significance of the KTP's impact, by ticking whether the KTP had a low, high, or medium impact on the organization's performance (including stakeholder satisfaction, improved efficiency or productivity, and reputation) and by ticking areas of broader socioeconomic impact (including recreation, culture, heritage, health and wellbeing, education, and the environment).

Similarly, the academic advisors must report on how the KTP impacts their teaching (e.g. curriculum development, case studies material) and research (e.g. publications, research projects initiated). Along with the business advisor, they must specify any plans for further cooperation and answer questions about the governance of the KTP (e.g. frequency of meetings, level of satisfaction with the support provided) and any difficulties they may have experienced.

Consistent with the view of academic engagement as knowledge transfer, the impact assessment of the KTP programme relies on the identification of predetermined categories of stakeholders that are likely to benefit from the KTP and of the types of benefits they are likely to obtain; it also emphasizes the provision of quantitative data and standardized qualitative information. The assessment of the overall impact of the KTP programme uses only the quantitative indicators included in the final reports (InnovateUK, 2015).

3.2 Data collection and data analysis

The data used for this study are the products of 38 in-depth interviews, each lasting between 45 to 90 minutes, conducted over a 12-month period. All interviews are in English, audio recorded, and transcribed by an independent third party. The study selects interview participants (see Table 2) based on the extent of their involvement with KTPs. The interview selection employs purposeful sampling, through snowballing, which ensures that all participants have the experience necessary to describe how their KTP engagement produces impact. The main criteria for interviewee selection are the following: (i) the participant has been involved in one or more KTPs as an academic advisor, business advisor, associate, or administrator

responsible for managing KTPs at the university or regional level; and (ii) the participant has been involved in KTPs working in the academic field of Management Science. These sampling techniques allow the repeated comparison of data across participants and over time (Glaser & Strauss, 1967). Two of the researchers have been KTP advisors, which is helpful in checking the accuracy and adequacy of the data (Lincoln & Guba, 1985). None of the interview participants is acquainted with any of the interviewers.

The semi-structured interviews employ open-ended questions that encourage the participants to relate their specific KTP experience. The questions are divided into four categories: i) descriptions of the KTP and the interviewee's involvement (e.g. Have the KTP objectives been achieved? Why has the KTP been used as the mechanism to solve the problem?); ii) descriptions of the KTP's (immediate and emergent) impact (e.g. What is the interviewee's perception of the overall impact of the KTP? In particular, are they aware of any long-term impact of the KTPs, and/or of unexpected outcomes that had not been envisaged at the start of the project?); iii) determinants of the KTP's impact (e.g. What has worked well in the project?); and iv) the specificities of KTPs in management science (e.g. What is the specific contribution of this type of KTP? How would the interviewee suggest measuring/assessing this contribution?). The questions encourage the participants to reflect on periods both during and after their KTPs to allow for a greater depth of understanding about how the KTP generated impact. They emphasise reflexivity, focusing on values and beliefs (Eisenhardt & Graebner, 2007).

The data analysis follows the approach of Gioia, Price, Hamilton, and Thomas (2010). First, the study identifies relevant concepts and codes the data into categories. These first-order codes refer to terms and language similar to those the interview

participants use wherever possible. Next, the study searches for relationships between the codes and categorises them into higher-order themes (Gioia, Corley, & Hamilton, 2012). To ensure both internal consistency and discrete categories between themes, the study employs the questions used by Jarzabkowski (2008): 'Is this code similar to that code? Are these codes different from those codes?' (p. 626). The findings presented in the next section are corroborated across multiple informants. All authors are involved in the data analysis to ensure the credibility of the findings and enhance their reliability. Two of the authors independently code and analyse the data, while the other takes a more general orientation, playing 'devil's advocate' by offering alternative explanations during several peer debriefing sessions to enhance the interpretative rigour of the findings (Eisenhardt & Graebner, 2007; Gioia, Corley, & Hamilton, 2012).

<<TABLE 2 ABOUT HERE>>

This method forms the basis for the identification of three key features of the impact of knowledge co-production processes. These key features describe how academic engagement as knowledge co-production generates non-academic impact in order to enhance the research findings' analytical generalizability to theory (Eisenhardt & Graebner, 2007) and strengthen their applicability to other contexts (Lincoln & Guba, 1985). This process helps to further triangulate the construction of the relevant higher-order categories, which enhances the internal qualitative reliability and validity of the researchers' interpretations, contributing to the development and understanding of the phenomena.

4. Findings

4.1. Characterising KTPs as knowledge co-production

Many of the interviewees agree that the process of academic engagement involves ongoing co-production of knowledge and seems to support several of the characteristics of knowledge co-production identified by the literature. Interviewees agree that knowledge is co-produced (i.e. formed, validated, and adapted) rather than simply transferred. They emphasise the possibility that '*the nature of that knowledge itself could be under negotiation*' particularly since '*the whole idea behind "knowledge transfer" is that knowledge is seen as something that is fixed and can be easily moved from one domain to another… in which case it is not*' (AA09).

Participants recognise the mainly tacit nature of the knowledge involved in the process of co-production, which rarely undergoes a process of codification. The co-produced conceptual knowledge provides '*a new lens on the way of looking at things*' and '*noticing things that haven't been noticed before*' (AA07), and it is '*a lot more philosophical, about changing the way people think and the way they work*' (AA03).

Therefore, knowledge co-production often produces intangible changes in the thoughts and attitudes governing individual and group behaviours, rather than tangible outputs: *'It might not have had like a really kind of tangible quantifiable impact at all… We may be opened their minds a little bit to a different way of working, different approaches. They certainly got to claim that they were working in a different way'* (AS08)

Interviewees express dissatisfaction with how the impact of the KTP is assessed. They suggest that the final report form, being strongly focused on

measurable benefits, does not capture the real impact of the KTPs. Some interviewees mention that, at the end of each KTP project, participants must produce a 'tangible *benefit log*' (AS05), which often feels like a '*box-ticking exercise*' (BA02), since they find it difficult '*to put a tangible benefit on something which is not*' (AS05). Some manage to identify outputs in terms of strategy documents, policies, and procedures, but they are aware that what really matters are the intangible changes that the KTP stimulates in people's attitudes: '*If you look at making a process lean, and re-skilling people, and making people more flexible, and changing the way that you do stuff…but it's not as tangible…and the way that the* [KTP] *was written…you have to quantify everything*' (AA04).

Furthermore, the final reports focus on immediate stakeholders and their potential benefits (e.g. company performance for the business partner, teaching and research for the academic partner), but the actual benefits are often broader and more indirect: *'My project is indirectly producing financial benefits; it's more around almost like the social return and investment rather than actually hard tangible profits that will come from* [it]. *It's developing a strategy that could be replicated in others areas of the* [industry] *and facilitate more effective working but it's not in a sense delivering profit'* (AS05)

Finally, the time scale considered is short, with impact measured at the end of the KTP along with the inclusion of forecasted impact over the next three years, whereas the actual impact of the KTP emerges slowly over time: '*You can't see numbers on a balance sheet you know, as easy as you can when you're actually making physical products. So the impact is something that's likely to be ... well it's less tangible, it's going to take more time*' (AS08).

4.2. The impact of KTPs as knowledge co-production

The study's data analysis identifies a set of three emergent, strongly interlinked impact features that describe how academic engagement as knowledge co-production generates impact. The key impact features are illustrated in Table 3.

The first key impact feature concerns the means by which impact occurs. The evidence suggests that sustained knowledge co-producing interactions involving many stakeholders within and beyond the KTP are crucial for impact creation. Two second-order themes emerge from the data. The first concerns the interactions between the KTP's immediate stakeholders – individually and as a group – and highlights the importance of cooperation and the quality of the interactions between these immediate stakeholders. The structure of the KTP plays a role in leveraging interactions within the project, and the associate acts as a boundary spanner between the academic and business advisors: '*You really need someone to knit these meetings together, to move them forward and a KTP associate would be a good way of investigating this, and so we decided to do it. We engaged with the university. We got a number of ideas going'* (BA03)

On the other hand, the associate as well as the business and academic advisors span the boundaries of their respective organisations, which helps to link ideas from both internal and external sources:

> *'The people who are responsible for developing strategies* [and] *the people on the ground; so there are two different management levels but they're both just as important, so I've had to make sure I have them on board'* (AS05)
>
> ……

> *'She's made an absolute network of people. She's contacted people and she's built a network and she's brought people together, without which it would have been very difficult to complete the project successfully'* (AA05).

Active participants support impact as they complement each other and collectively co-produce knowledge that they can use in practice:

> *'The type of change they were looking to make, they didn't have the expertise to do. They wanted to lean on the university to provide that particular type of expertise that comes from the academics*' (AS03).
>
> ……
>
> '[The KTP] *brings together people from practice, from a variety of industries, supposed to find commonality in similar problems…you know, nothing's discussed that can't be discussed, it's done in a safe environment*' (AS02)

The other second-order theme concerns knowledge co-producing interactions between KTP stakeholders and external stakeholders through distributed networks of relationships. The collaboration initiated through the KTP usually gives rise to numerous contacts, often thanks to access gained to the partner's pre-existing networks, which provides opportunities to apply and develop the knowledge emerging from the KTP: '*You talk about the company, you make some connections, you extend your network of people you have and then one day you do projects and new ideas can be brought in*' (AA01).

Hence, distributed networks of relationships, particularly across sectors, broadens the impact of the KTP. Many KTPs explicitly aim to achieve broader non-academic impact by addressing '*broader questions around society or individual well-being*' and understanding '*how society operates and how it includes and supports all*

its members' (AS06), objectives considered increasingly important for academic engagement (Trencher at al., 2014).

However, the evidence shows that simply gaining access to distributed networks of relationships that could be exploited to diffuse KTP outputs is not sufficient to guarantee the achievement of a broader impact. Rather, for the KTP to produce impact, the partners must seek to establish deep knowledge co-producing interactions with many stakeholders beyond those directly involved in the project, for two reasons. First, the lack of tangible outputs means that potential stakeholders will quickly lose interest, so pursuing the right people to interact with is important: '*It's about the people involved, I think, rather than the structure...maybe you need a* [stakeholder] *who…is willing to be patient, because you can't get quick results*' (AS08).

Second, the intangible changes the KTP achieves can be easily dispersed if, for example, the people initially involved in the project move on to other organisations. Therefore, impact generation depends strongly on people embracing the concept and sustaining it over time by engaging in a wide range of knowledge co-producing interactions. One interviewee emphasises that '*these rather softer* [management science] *KTPs actually can have far greater impact in terms of quality of life issues, safeguarding and the like, than many of the easier to measure KTPs that we saw'* (BA02), but this impact can happen only through the partners' willingness to engage in sustained knowledge co-producing interactions: '*Maybe KTPs* [in the management sciences], *because their outcomes are so intangible, need much better conditions to be successful; for example you need people who are committed and supportive of the concept behind the KTP*' (AA06).

The second key impact feature concerns the process through which impact occurs. The evidence suggests that who is impacted by the KTP and how that impact occurs depend on an often serendipitous 'rippling out' process that cannot be anticipated. In particular, the first second-order theme highlights that the impact is produced directly through the interactions occurring within the KTP, building on the expertise of the academic advisor, the business advisor, and the associate. Stakeholders are able to experience new ways of thinking by having access to each other's knowledge and skills, echoing the findings of previous studies (Brostrom, 2012; Guan & Zhao, 2013): '*Working with a kind of an almost like a multi-skilled and disciplined team has, you know, opened me up to loads of new experiences*' (BA04).

The other second-order theme concerns the indirect impact of knowledge co-producing interactions extending beyond the KTP. This impact emerges from further interactions that have an established connection to the initial project, although they occur after the end of the KTP or through stakeholders different from those directly involved in the KTP. What some interviewees define as 'rippling out' is important for achieving indirect impact. 'Rippling out' is a process whereby the impact of the KTP unfolds over time thanks to sustained knowledge co-producing interactions between academics, business partners, and other stakeholders beyond the organisational boundaries: '*It's kind of like a "ripple out" effect, the maximum value is within that core and then you will get other benefits that come out particularly over time*' (AA15). Nobody can anticipate when and how this rippling out process will occur because it largely depends on contingencies and serendipitous events. In fact, many KTPs generate benefits that the partners cannot predict. Some are one-off events (e.g. '*We have just secured the two biggest contracts in the UK as a direct result of the associate's work on the knowledge transfer partnership*' [BA06]), others are longer-

term relationships (e.g. '*We've continued to be involved in that companies' development projects. So you know it has grown into a continuing strand of our kind of relationship*' [AA12]), yet others consist of more permanent changes generated when the knowledge co-produced in the project leads to further developments in policy, practices, or research ('*But we're also now impacting...because we're working with the* [government] *Agency on helping them setting their own guidelines on how people should measure things that's having a much more national impact on how everybody's performing*' [AA11]).

The factors that favour the rippling out process, leading to the emergence of indirect benefits, are the potential for a replication or reuse of knowledge that could be applied later in different contexts: *'Well everything that I'm doing is almost being trialled and tested in* [X city] *and will be rolled out across* [Y county] *so in that sense the knowledge and the findings will be shared across the area and hopefully replicated in the other nine local authorities'* (AS05). Sometimes, indirect impacts are not attributable to a specific engagement activity conducted in isolation but to a combination of several projects: '*A lot of the ideas that we generated in the KTP went on to be used in other grants and other projects but they weren't necessarily an immediate outcome*' (AS02).

The third key impact feature concerns the timeframe during which the impact occurs. The evidence suggests that the impact of many KTPs unfolds and persists over a long period of time. The first second-order theme concerns the immediate impact of the KTP. The interviewees suggest that KTPs are often designed to produce quick results in an attempt to manage the perception of immediate impact. These results are built into the project to keep participants motivated:

> *'When you design the project so you try and build into quick wins as well as some long-term wins because that then tends to keep everybody happy'* (AA11)
>
> ……
>
> *'If you leave the benefits towards the end and then you – it's very difficult to get the buy in from the organisation, buy in from the people and hence we factor for several stage of mini loops of improvement as we go through the project'* (AA10)

The second second-order theme concerns the unfolding and persistence of the KTP's impact over time. Since knowledge continues to be co-produced between stakeholders, its most important benefits often materialise a long time after the project ends and persist a long time afterwards:

> *'Talking from our point of view, it's a way of diversifying into new sectors. Last month* [15 months after the end of KTP project], *we even launched another company and the reason for launching is because the products and services that the KTP has developed'* (AS12)
>
> ……
>
> *'I think that that kind-of continuing presence and obviously all of the knowledge and understanding that I built up about the project and what underpinned it, the fact that I'm still here, I think it's more likely to be further embedded and, therefore, the benefits are more likely to be realized'* (AS03)

The description of impact in Penfield et al. (2014) as a 'culmination of work' across communities through time is useful for explaining its intertemporal nature.

<<TABLE 3 ABOUT HERE>>

5. Discussion and conclusions: developing the impact research agenda

5.1. Theoretical contribution

This study responds to calls for a closer examination of specific cases of co-production (Osborne & Strokosch, 2013) and empirical evidence of the relevance of academic engagement (Knight & Pettigrew, 2007) by investigating how academic engagement as knowledge co-production generates broader impact. By integrating research on knowledge co-production and academic engagement with original empirical findings, the study argues that academic engagement is conceptualised more appropriately as a process of knowledge co-production than as a process of knowledge transfer. This study extends the literature on the impact of academic engagement as knowledge co-production by showing the following.

First, the impact of knowledge co-production processes depends heavily on ongoing interactions among highly committed participants who purposefully engage in deep interactions to generate new knowledge collaboratively with many potential stakeholders, since the intangible benefits can be easily dispersed otherwise. This study extends the impact debate by reorienting it toward a consideration of interaction processes (e.g. Antonacopoulou, 2010b) and showing that assessing impact is not as straightforward as the view of academic engagement as knowledge transfer suggests. Second, the study shows that knowledge co-production processes affect many stakeholders in unforeseeable ways since they largely depend on contingencies and serendipitous events (i.e. rippling out). This insight complements the main findings of management scholars, who tend to emphasize immediate and instrumental (rather

than conceptual) relevance (Nicolai & Seidl, 2010), and also highlights the difficulty of identifying and quantifying impact, reflecting the complex problems addressed by management science (Anderson, Ellwood, & Coleman, 2017). Third, this study finds that impact emerges and persists beyond the duration of the initial engagement, with many of the immediate outcomes designed to be 'quick wins' but with the most significant impact emerging and persisting over a longer time as the cumulative outcome of many unanticipated knowledge co-producing interactions. The broad consensus is that impact requires a long time to occur (McCabe, Parker & Cox, 2016; Wells & Nieuwenhuis, 2017), but this study's conceptual framework more clearly characterises how the impact timeframe relates to the process through which impact unfolds.

5.2. Implications for impact assessment

This study's findings can be used to draw implications regarding the most appropriate approach for assessing the impact of knowledge co-production processes (as summarized in Table 4). The serendipitous and contingent process through which the benefits of academic engagement ripple out to unanticipated stakeholders in unexpected ways, as well as their heavy dependence on the ability to establish knowledge co-producing interactions, imply that the quantification of pre-determined types of outputs involving pre-defined types of stakeholders will always return a partial view of impact. Impact is better captured through the narrative reconstruction of the process through which an engagement activity benefits specific stakeholders over time. Such assessments will 'always be qualitative and based on qualified statements' (Molas-Gallart et al., 1999, cit. in Meagher, Lynn, & Nutley, 2008, p. 165).

Reconstructing impact requires a consideration of the perspectives of key stakeholders, whose identity may depend on the academic engagement being considered. The literature argues that one can capture impact by identifying the 'distinctive contribution' of the project (REF2014, 2011): since impact often involves ongoing and serendipitous engagement, capturing a project's distinctive contribution requires continuous monitoring on the part of the key stakeholders involved. In the case of the KTPs, the key stakeholders include the academic and business advisors and associates, depending on the project. The timing of impact assessment is also important. Impact is best captured quite a while after the end of the formal academic engagement process, to allow for benefits to ripple out to external stakeholders. Capturing impact at different points in time (Penfield et al., 2014) may provide an informative account of how the process is unfolding.

<<TABLE 4 ABOUT HERE>>

While using quantitative impact indicators provides only a partial picture, the collection of quantitative data and standardised information in impact assessment is still worthwhile. For example, researchers could ask key stakeholders to trace their productive interactions (Molas-Gallart & Tang, 2011; Spaapen & van Drooge, 2011), allowing a mapping of the actors involved in the process as well as their roles (Cherney, 2013; Meagher, Lyall, & Nutley, 2008; Wilkinson et al., 2012) and the changes their interactions produced, both directly and indirectly (McCabe, Parker & Cox, 2016). This actor mapping can provide a more standardised representation of the impact achieved, which can allow for cross-project comparability and assist in the

collection of relevant quantitative indicators. In fact, some of the quantitative indicators linked to the key actors involved in impact generation (identified via the abovementioned mapping) and the outcomes achieved by each (measured quantitatively and, possibly, longitudinally) could integrate the narrative description of impact and allow for limited inter-project comparisons.

5.3. Implications for further research

The findings of this study can be helpful in guiding the development of the research agenda concerning the impact of academic engagement. Acknowledging the need for a more qualitative approach opens up a new set of research questions in terms of how to describe impact and how to assess it for evaluation purposes (Rosli & Rossi, 2016). This task is particularly relevant given that a qualitative, narrative-based approach to describing the impact of academic engagement has begun to find traction at the policy level, as demonstrated by the introduction in the 2014 UK Research Excellence Framework of the requirement for universities to submit qualitative case studies to illustrate how their scientific research impacts the economy and society (Manville et al., 2015). The three interlinked impact features this study identifies can assist in proposing a set of avenues for the development of research.

First, since impact depends heavily on sustained knowledge co-producing interactions, future research could seek to determine which factors support the development of such productive interactions. These factors could relate to the governance of the relationships among the stakeholders directly involved in academic engagement activity, their individual characteristics (such as motivation, attitudes, and resources), and the characteristics of their organisations (such as organisational

culture, strategies, and practices) as well as the broader environmental conditions (e.g. incentives and practices prevalent in the sector). The factors could also pertain to the conditions that favour the emergence of interactions with stakeholders beyond those directly involved in the initial academic engagement process.

Second, although academic engagement benefits many stakeholders in unforeseeable ways, it may be possible to identify the factors that support the rippling out process and increase the likelihood that further benefits will emerge. For example, certain types of co-produced knowledge may be more suitable for reuse in different contexts, or certain of the activities of stakeholders involved in the initial academic engagement may increase their ability to reach out to others and broaden its impact. Better awareness of these factors might allow academics and universities to formulate practices and systems that would foster greater impact (for example, by putting the quality of interactions at the core of design and delivery) and might also enhance the sustainability of academic engagement (Pestoff, 2014).

Further research could also compare various cases of knowledge co-production (involving organisations in multiple economic sectors and fields of science, as well as various types of academic engagement activities designed to achieve different objectives) to identify and contrast the processes through which impact broadens in multiple contexts. Such knowledge could then assist in the development of more structured approaches to describing the impact of knowledge co-production appropriate for particular types of academic engagement, which could then serve in assessment processes.

Finally, because impact extends beyond the duration of the initial engagement, future research could explore what makes impact more likely to persist or continue to unfold over a longer period of time. For example, research could explore the role of

boundary spanners operating in complex and heterogeneous situations (Nicholson & Orr, 2016) in supporting impact. Research should also conduct in-depth longitudinal case studies, as Wells and Nieuwenhuis (2017) suggest, which could allow for a deeper exploration of the complexity of impact unfolding over time through a number of stages, such as 'transmission, cognition, reference, effort, influence, and application', as Cherney et al. (2015) outline. Longitudinal analysis may uncover the elements underpinning more persistent and broader impact, and may also outline interesting features of impact in different contexts.

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Table 1. Features of knowledge transfer and knowledge co-production processes, and implications for impact according to the literature

Process of engagement	**Knowledge transfer**	**Knowledge co-production**
Knowledge governance process	Unilateral transmission (Rosli & Rossi, 2015)	Bilateral/multilateral construction, validation, adaptation (Brudney & England, 1983; Roux et al., 2006)
Nature of knowledge	Mainly codified, embedded in artefacts or documents, although some tacit knowledge may be needed for effective transfer (Arza, 2010; Bozeman, 2000; Broström, 2012; Nuñez-Sánchez et al., 2012)	Tacit knowledge is crucial for co-production, although the co-produced knowledge can become partly codified (Antonacopoulou, 2010b; Roux et al., 2006)
How and when impact occurs	Through diffusion of codified knowledge outputs. Benefits, and the stakeholders who receive them, are clearly identifiable in advance and can often be quantified (Crossick, 2009; Pickerill, 2014). Most benefits are accrued by the formal end of the transfer process.	Through interactions. Benefits depend on distributed networks of relationships and on collective action; difficult to identify or quantify in advance, and sometimes even retrospectively (Anderson et al., 2017; Antonacopoulou, 2010b; Cunliffe & Scaratti, 2017; Murray, 2009). Benefits can persist over time (McCabe et al., 2016; Wells & Nieuwenhuis, 2017)

Table 2. Interview participants

No	ID Code	Role	Industry focus of KTP project	Academic subject area (for academic advisors and associates) and business position (for business advisors and KTP administrators)
1	AA01	Academic	Digital	Digital Marketing
2	AA02	Academic	Non-profit	Strategic Management
3	AA03	Academic	City Council	Health Management
4	AA04	Academic	Operations	Operations Management
5	AA05	Academic	Telecom/City Council	Digital Technologies
6	AA06	Academic	Social Housing	Strategic Management
7	AA07	Academic	Healthcare	Sociology and Management
8	AA08	Academic	Operations	Operations Management
9	AA09	Academic	Change Management	Experiential Learning
10	AA10	Academic	Tyres	Operations Management
11	AA11	Academic	Consultancy	Strategic Management
12	AA12	Academic	Product Development	Product Innovation Management
13	AA13	Academic	Engineering	Business Strategy
14	AA14	Academic	Security	Relationship Marketing
15	AA15	Academic	Packaging	Product Marketing
16	AS01	Associate	Food Development	Management
17	AS02	Associate	Solutions	Revenue Management
18	AS03	Associate	Consultancy	Business Management
19	AS04	Associate	Health	Management
20	AS05	Associate	Housing	Management
21	AS06	Associate	Non-profit	Management
22	AS07	Associate	Recruitment	Human Resource Management
23	AS08	Associate	Social Work	Communications
24	AS09	Associate	Chemical	Health Management
25	AS10	Associate	Consultancy	Management
26	AS11	Associate	Engineering	Management
27	AS12	Associate	Architecture	Design Management
28	BA01	Business	Consultancy	Business Manager
29	BA02	Business	Non-profit	Strategic Development Manager
30	BA03	Business	Engineering	General Manager
31	BA04	Business	Housing	Business Manager
32	BA05	Business	Architecture	Business Manager
33	BA06	Business	Chemical	General Manager
34	KT01	KTP Admin	Non-profit	KTP Advisor
35	KT02	KTP Admin	University	KTP Manager
36	KT03	KTP Admin	University	Business Manager
37	KT04	KTP Admin	University	Partnership Officer
38	KT05	KTP Admin	University	KTP Manager

Table 3: Academic engagement as knowledge co-production: key impact features

1st Order Categories	2nd Order Themes	Thematic aggregate: Impact features
• Complementarity between actors • Cooperation between stakeholders • Interdependent stakeholders • Quality of interaction • KTP structure	Knowledge co-producing interactions within the KTP	Impact is achieved through sustained knowledge co-producing interactions between many stakeholders, within and beyond the organisations involved in the initial academic engagement
• Cross-sector working • Networking • Social engagement • Societal benefits	Knowledge co-producing interactions through distributed networks	
• New way of thinking • Educational value • Sharing of and access to knowledge • Building expertise	Impact emerging directly from interactions within the KTP	Who is impacted and how depends on a 'rippling out' process and cannot be anticipated
• Indirect impact • Replication/reuse • Broader work/expansion • Building relationships • Leading to other projects • Continuous monitoring	Impact emerging indirectly from interactions beyond the KTP ('rippling out')	
• Immediate assistance • Quick wins • Theory to practice	Immediate impact designed to occur during the KTP	Impact unfolds and persists over a long period of time
• Change in culture/behaviours • Strategic and business growth • Long term	Impact unfolding and persisting beyond the KTP	

Table 4. Academic engagement as knowledge co-production: Implications for impact assessment

Key impact features	**Implications for impact assessment**
Impact is achieved through sustained knowledge co-producing interactions between many stakeholders, within and beyond the organisations involved in the initial academic engagement	Ongoing monitoring of knowledge co-producing interactions is required in order to map the impacted stakeholders, who should then be asked for their views about what impact has been achieved
Who is impacted and how depends on a 'rippling out' process and cannot be anticipated	The impact achieved should be described through open-ended narratives collected from impacted stakeholders (which can be supported by quantitative information)
Impact unfolds and persists over a long period of time	Impact should be captured at different points in time, including some time after the end of the formal academic engagement process