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A Distance Framework to Understand the Academia-Practicioner Gap

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Abstract

This paper lays out a framework for understanding the academia-practitioner gap. In this framework, there are three dimensions of distance between academia and practice: (1) Product, (2) Mindset, and (3) Process. Within each category, there are multiple elements that can be used as a comprehensive way to identify all the challenges in transferring academic research to practice. This approach is both firmly grounded in and distinct from existing frameworks like Rogers' Diffusion of Innovation, Roberts' Marketing Science Value Chain, Wierenga's Success of Marketing Management Support Systems and Lilien's analysis of Bridging the Academic-Practitioner divide. After describing the framework, the paper looks at how researchers can better understand the role of intermediaries in bridging the gap between academia and practice by identifying which types of distance they help close.

Keywords

academia-practitioner gap, decision support systems, intermediaries, diffusion of innovation

Disciplines

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A DISTANCE FRAMEWORK TO UNDERSTAND THE ACADEMIA-PRACTITIONER GAP

By

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ABSTRACT

This paper lays out a framework for understanding the academia-practitioner gap. In this framework, there are three dimensions of distance between academia and practice: (1) Product, (2) Mindset, and (3) Process. Within each category, there are multiple elements that can be used as a comprehensive way to identify all the challenges in transferring academic research to practice. This approach is both firmly grounded in and distinct from existing frameworks like Rogers' Diffusion of Innovation, Roberts' Marketing Science Value Chain, Wierenga's Success of Marketing Management Support Systems and Lilien's analysis of Bridging the Academic-Practitioner divide. After describing the framework, the paper looks at how researchers can better understand the role of intermediaries in bridging the gap between academia and practice by identifying which types of distance they help close.

Keywords: academia-practitioner gap, decision support systems, intermediaries, diffusion of innovation

1. INTRODUCTION

How do we create models that help people make better decisions? This paper began with the goal of understanding features of models that add value to people in practice. The goal is not to study how to educate people about how to use models more effectively – though there are many papers that do focus on that (Rousseau and McCarthy 2007). Instead, this paper aims to understand how to create and implement models that make them easier to use. Many other researchers or academics have also called for academic models and discussion to focus more on enabling use by managers rather than focusing on reducing statistical estimation error (e.g. Albers 2012 as cited in Lilien et al. 2013). Although the true question at hand may not be answerable in a simple statement, this paper lays out a framework for thinking about this problem. The most important work that can be done in understanding the gap between academic models and models in practice is trying to figure out how to "slice" and think about the problem space. In which situations will model implementation be more successful? What are the important dimensions of consideration?

The following is a framework for understanding the academia-practitioner gap. Not unlike the CAGE framework used to identify differences across countries (Ghemawat 2007), in this framework there are three dimensions of "distance" that lead to the academia-practitioner gap.

In this paper I want to show that this framework is (1) comprehensive (encompasses all the relevant factors), (2) grounded in but distinct from existing frameworks, and (3) a useful way of understanding how various intermediaries are uniquely positioned to address specific gaps between academia and practice. "Intermediaries" refers to any organization, person, or medium

that enables the diffusion of knowledge about current academic research to those in practice. Thus, I use the term "intermediary" to refer to everything from consulting firms to journalism or articles that may popularize academic research, and in particular analytical models. Finally, I will consider possible ways to reduce these gaps by leveraging existing intermediaries as well as suggest future directions for research that could use this framework as a starting point.

Table 1. Framework Overview

Product	Mindset/Culture	Process
● Relevance / Value ● *Complexity ● Robustness ● *Control ● Adaptability ● *Completeness ● Ease of Use (Interface, Speed)	● *Analytical Maturity ● Willingness to experiment (Risk Tolerance) ● *Existing mental models / decision infrastructure ● Patterns of communication	● Timelines ● Geographic ● Available resources to maintain connections ● Political Support

***These characteristics will be less important for automated decision models.**

2. DISTANCE FRAMEWORK

2.1 Product

We can think of knowledge or models as a product produced by academia. Thus, the first category identifies different features of the product (or in this case of the model) that either increase or decrease the gap between academia and practice.

2.1.1 Relevance

The first and foremost characteristic is relevance. When intermediaries or practitioners come into contact with new research, the relevance to their business will be the primary determinant of whether they have any interest in actually implementing the research. Essentially, good models should make clear what users have to gain from implementing the model (Kayande et al. 2009).

2.1.2 Little's Concept of a Decision Calculus

In addition to being relevant, models are more useful if they have certain characteristics that enable them to be better implemented in practice. Though there may be other papers that also address the concept of ideal model characteristics, one historically well-cited paper is John Little's 1970 paper "Models and Managers: The Concept of a Decision Calculus." Little defines a decision calculus as "a model-based set of procedures for processing data and judgments to assist a manager in his decision making" (Little 1970). In his paper, he lays out six main features of models that make them more useful for practitioners. The six features from Little's paper are included as components of the above framework: (1) Simple – only details that end users are able to understand should be included. (2) Robust—the model outputs should be reasonable. (3) Easy to Control—the model should represent the world as the user sees it. (4) Adaptive—the model can be updated as new information becomes available. (5) Complete on important issues—all important inputs, even subjective ones, should be included in the model. (6) Easy to communicate with—users should be able to change inputs and quickly see how that impacts the outputs of the model (Little 1970).

These features may seem relatively intuitive, but they are a useful framework through which to view model development.When understanding "model characteristics," this paper primarily focuses on what Lilien defines as traditional marketing decision models, or "systematic approach to harness data and knowledge to drive marketing decision making and implementation through a technology-enabled and model-supported interactive decision process" (Lilien 2011). Although this concept is defined with respect to marketing, the idea is largely applicable to any traditional decision models.

On the other hand, there is a large subset of models, automated decision modeling, where human decision making is not included in the decision-making process once the model has been implemented. In a comment on his original 1970 paper, Little articulates this dichotomy by writing, "I have come to the conclusion that models can be deployed in one of two ways – either fully automated/untouched by human hands, or as a decision support system under direction of a manager" (Little 2004).

Because automated decision models don't have to interact with human interpretation, the idea of "model characteristics" becomes less important. In these circumstances, even "black box" models that managers don't fully understand may still be effective. In these situations, certain model characteristics or aspects of this framework may be less important for successful model implementation. This paper will make sure to clarify which features of the framework may be less relevant for models where the decision making is fully automated.

2.1.3 Simplicity

Model simplicity reflects the value that additional information or details should not be included unless the end user has the capacity to understand them (Little 1970). The theme of simplicity emerges again and again in both the literature as well as in anecdotal evidence. Models are often not designed in a way that helps users understand and internalize the underlying factors driving the model results and related recommendations (Kayande et al. 2009 as cited in Lilien 2011).

For this reason, researchers have attempted to work on models that help managers better understand the underlying processes leading to model outcomes. One fun example looks at how to use agent-based modeling as a decision aid for a word-of-mouth marketing application (Chica

and Rand 2017). Because of the way agent-based modeling boils down complex interactions into a set of base rules it is one way of how model structures can be better suited to helping managers understand the underlying structure, assumptions and factors that drive the model results and recommendation.

Even simple models that are robust and improve output accuracy can be more helpful than academically sophisticated models (Lilien et al. 2013). Andrew Baill, who works in an internal consulting role at Wawa Inc., a regional convenience store chain, spoke about his experience implementing models at work. He said that models that were 80% accurate but that people could actually understand would often times more helpful than models that were 100% accurate that were too complicated (Baill). He even described a case where a new model created by corporate to help managers increase profits ended up relatively unused. The model recommended quantities of various products (coffee, hot foods, types of soup,etc.) that should be prepared based on the time of data using previous transaction data. However, because Wawa carries so many different product types, the sheer number of items made the models too unwieldy for managers to operationalize.

What “simplicity” means will depend on the context. In the case of Wawa, the complexity came from the large quantity of granular recommendations that managers struggled to take advantage of. In other cases, “simplicity” might refer to the number of variables in a model, or the ease or complexity of the model structure itself.

Since simplicity is important largely for the purpose of ensuring understanding, when people are taken out of the decision making process for automated models, simplicity becomes a less relevant feature. This may be one reason why some of the common successes in more

complex model implementation come from domains like advertisement or product recommendation where people are not necessary for decision making.

2.1.4 Robustness

Robustness ensure that model answers fall within a meaningful range of values (Little 1970). This feature is not mentioned as heavily in the literature, likely because of the consensus with respect to its importance. Ultimately, models must stay grounded within the constraints and boundaries of their real word contexts in order to be useful. One interesting aspect of robustness is that it may actually be more important for automated decision models because there is no additional layer of oversight before the final decision is made.

2.1.5 Easy to Control

The philosophy motivating this category is the idea that users should be able to make models behave the way they want it to (Little 1970). The model is only an aid to the ultimate decision maker. Thus, "the goal of parametrization is to represent the operation as the manager sees it" (Little 1970).

People will be more likely to use imperfect models (and no model is perfect) when they have the ability to make adjustments to the model outputs (Dietvorst et al. 2018). Interestingly, people will still be more likely to use models even if their ability to make adjustments to the model is heavily constrained (Dietvorst et al. 2018). This suggests that managers perception of the control they have over a decision is an important element in addition to the actual control managers have over the model.

2.1.6 Adaptable

If a model is adaptable then the model parameters and structure can be updated as new information becomes available. This reflects the ability of a model to change based on new situations and contexts. Academics may often not be incentivized to make their models or research as adaptable, which is why this is an important aspect of distance between academia and practice.

Steve Cohen is a co-founder and partner at In4mation Insights, a boutique consulting company focusing on applying state-of-the-art analytics and research to modern business problems. He spoke about the differences between the type of code an academic may write for a model versus what commercialization requires (Cohen). For example, an academic writing code for a model regarding product choice may code a structure with 3 products because the dataset they have access to has 3 product (Cohen). Part of the role of a company like In4mation Insights would be generalizing the code to apply to "n" products so that it would work in a more general setting and could be updated as the environment around the user changes (Cohen).

Models must be adaptable whether they are traditional decision models or automated decision models. Given the dynamic nature of any practical environment, the more adaptable models are, the more likely they will be to be successfully implemented by various types of practitioners. Later in the paper, there will be a section on the role of intermediaries like Cohen's company In4mation Insights in helping to create this adaptability to help bridge the distance between academia and practice.

2.1.7 Completeness & The Role of Human Judgment

Completeness represents that models include all factors that would impact the end decision. Completeness is important both for the purpose of increasing confidence in the model, as well as actually improving model accuracy. Previous research has shown that managers' confidence in their decisions when choosing an option among a set of risky alternatives has more to do with completeness than the specific model or decision rule they apply based on those factors (Hansen and Staelin 1999 as cited in Wierenga et al. 1999). Model confidence is important in order to increase model usage. Completeness is largely a human desire in the sense that it may be less relevant in a automated decision model context to have confidence in the model output.

Completeness would only be relevant in those settings to the extent that it helps to improve model accuracy. When users have important information that the model does not have, then the ability for users to make large adjustments to the model's forecast based on their knowledge has the potential to increase accuracy (Fildes et al. 2009, Lawrence et al. 2006 as cited in Dietvorst et al. 2018).

Of the six, the idea of (5) Completeness is probably the most controversial because of the role of human judgment in the model. After all, the introduction of human judgment into the model makes the model susceptible to systematic biases (Bazerman 1998 as cited in Lilien 2011, Chakravarti et al. 1979). For example, if a manager only had limited experience in a domain with a nonlinear response function, then using a decision support system may not be accurate in predicting outcomes in unfamiliar situations which could lead to worse decisions. Even though people are excellent at pattern recognition, they tend to see patterns that are not there and

emphasize specific data points more than prior information about population means, etc. (Hoch 2001).

For decision-making contexts where human judgment plays an important role, it becomes interesting to investigate how to leverage the knowledge from human judgment while mitigating any systematic biases. Both the Hoch and Chakravarti papers advocate for models to be designed so that they complement the strengths and weaknesses of human decision makers (Hoch 2001, Chakravarti et al. 1979).

In addition to the direct role of human judgment, data analysis as a whole can be viewed as a "sense making" of quantitative data that is "primarily a procedure to build understanding and dovetails with cognitive processes of the human mind" (Grolemund and Wickham). Thus, human judgment can factor into model-based decision making both explicitly and implicitly. In other words, "managerial decision making is fundamentally a cognitive task and therefore subject to all the cognitive limitations and biases found in human problem solving" (Newell and Simon 1972 as cited in Chakravarti et al. 1979).

Little defines these situations as having "imbedded models" where implicit assumptions enter the data cleaning procedure (Little 2004). Human judgment plays a role in all model building, but when it also explicitly enters the decision-making process alongside the model itself, we should account for how people interact with models.

2.1.8 Easy to communicate with

When Little originally introduced this category, he meant to refer to the ability of the user to change model inputs and quickly observe how that impacted model outputs (Little 1970). Little also emphasized the importance of expressing inputs/outputs in the language of the user.

For example, describing inputs and outputs with respect to a relevant reference value often helps users better understand various inputs and outputs.

Using other terminology, this framework would include the computational speed of a model and the user interface as aspects of the "ease of communication" of a model. Both Cohen and Bryan Orme, the President of Sawtooth Software mentioned the importance of these features for the successful implementation of models (Orme, Cohen). Orme said that in the past when Sawtooth had planned to roll out new features of the software, if the interface didn't look to be high enough quality to be somewhat intuitive, Sawtooth would actually delay the release of the additional functionality until the user interface had improved (Orme). Cohen mentioned how one important facet of the role of In4mation Insights was decreasing the computation required for convergence on previous academic models (Cohen).

Though the interface aspect of "ease of communication" is not important for automated decision models, the speed of computation is still and important aspect of "ease" for implementation.

2.2 Mindset

Beyond the 'product' viewpoint -- thinking about the features and characteristics of the decision support system or model, we also need to think about the context of where and how the decision support system is being implemented.The extent to which a model is effective may depend on the decision environment (Hoch and Schkade 1996 as cited by Wierenga et al. 1999). The second category of 'mindset' attempts to capture organization level attributes that would influence the successful implementation of a decision support system. The following features are the main factors that differentiates different firms or companies abilities to implement decision

support systems. One important thing to note is that this category reflects the potential of a company to implement the next possible model or decision system. Thus, it takes into account the past behavior and history of the manager or company.

2.2.1 Analytical Maturity

Analytical maturity reflects the skill level or ability of practitioners to work with models and decision support systems. Past behavior and experience play an important role in this. Previous research has shown that prior involvement with decision support systems was positively correlated with the use of a marketing management support system (Zinkhan et al. 1987 as cited in Wierenga et al. 1999). The more experienced a manager or company is, the less distance that exists between that entity and academia. Though this may not be surprising, it's an important element of understanding the 'distance' in model usage between academia and practice.

In addition to experience with previous models, analytical thinking is an important skill that contributes to the ability of practitioners to work with models. Knowing this, it may be tempting to only target managers that are already high analytical thinkers when attempting model implementation. However, although analytic skills increase manager's abilities to use new models, low-analytical decision makers have the most to gain (Benbasat and Dexter 1982, 1985 as cited by Wierenga et al. 1999).

This reading of analytical maturity can be connected to existing frameworks concerning different types of customers. Previous researchers attempts to categorize firms can be connected to this notion of analytical maturity. For example, one of the dimensions of dividing firms into four quadrants in a paper is "analytical resources" which matches the idea of "analytical maturity," and the other axis is how much the company stands to gain from using analytics,

which would be related to the notion of "relevance" and "value" discussed earlier in the paper (Lilien et al. 2013).

One historically popular framework is Rogers' diffusion of innovation framework for the adoption of new products (Rogers 1962). We can think of the "innovators" in Rogers model as being those who have the highest analytical maturity and would be the most willing and able to adopt new models (perhaps when the academia to practice distance is greater on other dimensions). On the other hand the "laggards" or "late majority" type customers might map onto managers that currently have low analytical skills, but have the most to gain from implementing decision support systems. The next feature, risk tolerance, would also influence where on the spectrum from "innovators" to "laggards" that firms or managers can best identify with.

2.2.2. Risk Tolerance / Willingness to try new things

There is an inherent level of risk when attempting a new method that has not been used before. Risk aversion and age are two predictors of the usage of decision support systems as well as satisfaction with the models (Zinkhan et al. 1987 as cited in Lilien 2011). Thus, those that have higher risk aversion also have higher "distance" from academia. Additionally, because managers don't fully recognize the opportunity costs of the possibly suboptimal decisions they make so they are not usually motivated by clear upside or reward when thinking about a implementing a decision support system (Lilien and Rangaswamy 2004).

In practice, there appears to be tension between manager's risk aversion and their desire to maintain appearance. In the management literature, there is the concept of a "management fashion" which captures the idea of the popular buzzwords or popularized management theories of a time. Abrahamson writes about the tension between the spread of new management

knowledge and the user's desire to differentiate themselves (Abrahamson 1996 as cited in Scarbrough 2002). There seems to be a seemingly contradictory desire for managers to want to use a new model both before and at the same time as others (Sturdy 2002 as cited in Scarbrough 2002).

Fear of being outdated may be another important motivator. Managers don't want to be seen as using outdated systems of analysis (Staw and Epstein 2000 as cited in Scarbrough 2002). Thus, the idea of "visibility" or what managers are seen to be doing in addition to the action itself may play into their willingness to take on risk. In fields where manager actions are more visible, and there is a greater understanding of the processes at other firms, then it may be that they would be more likely to adopt new models and techniques. For now, the literature discussing new theory/frameworks of decision making as a 'fashion' seems more centered around the field of management than with respect to marketing. In future research, it would be interesting to further consider the role of "visibility" in model implementation in various domains.

2.2.3 Existing mental models and decision infrastructure

This category of 'mindset' is particularly related to the belief explained earlier in the paper that models are decision aids to the end user who makes the decision. Using this line of thinking, decision aids for managers should match their existing mental models for how to make the decision (Wierenga and Van Bruggen 1997, 2000 as cited in Lilien 2011).

In general, people tend to have more simplified models of situations (Simon 1957 as cited in Chakravarty et al. 1979), which helps explain why 'simplicity' in models reduces the distance between academia and practice. One reason for lack of adoption of new models is that mental

models often can be good enough for managers, especially in predictable environments (Lilien and Rangaswamy 2004). In other words, the better that managers mental models or the existing decision making process is, the less likely they would be to switch to a new model. Existing solutions may be considered "good enough" if they are not a pain point for the manager or the company.

At the same time, because existing mental models are so closely connected to people's understanding of decision support systems, using certain new models can change individuals existing mental models. The "unexpected benefits" of implemented decision support systems may include possible culture shifts, like a stronger customer oriented culture after implementing customer lifetime value models (Lilien et al. 2013).

In the long term, when new models are truly successful they may become "institutionalized." This paper uses the definition of "institutionalization seen as requiring the embedding of new practices, such that they endure over time as taken for granted natural arrangements" (Suchman 1995 as cited in Scarbrough 2002). Both models and mental models are changing over time and influencing the perception of the other. Once models are fully institutionalized, people will again resist pressures for changing to new models (Zeitz 1999 as cited in Scarbrough 2002). One can think of the implementation of new models and the bridging of the gap between academia and practice to be a continuous or cyclic challenge rather than a linear one.

2.2.4 Patterns of communication

The different patterns of communication and language used by academics and practitioners also contribute to the distance between academia and practice. One large group of

collaborators which included both academics and practitioners wrote a case study of their experience working together. One challenge they encountered was that academics are accustomed to presenting information, but many business practitioners are more accustomed to open discussion of information (Amabile et al. 2001). Thus, the different patterns of communication was a pain point during the collaboration process.

Additionally, part of implementing new models is communicating why and how to change(Kayande et al. 2009). The ability of both academics and practitioners to communicate with one other plays into the academia to practitioner gap. For example, the type of language used in academic papers may take for granted certain language or terminology that managers at a company would not know. Thus, the language of mathematical level used by academics in their writing might make their work inaccessible to certain populations. Prof. Gary Lilien spoke about one of his earlier books, which due to the math involved would only have been suitable for other academics or PhD students (Lilien).

2.3 Process

The final category of "distance" between academia and practice is the 'process' distance. This category is distinct from the 'mindset' distance because two companies that have similar 'mindset' could still have different outcomes in terms of their implementation of decision support systems based on the actual procedure of implementation. Process fit is more case-specific and covers how the collaboration is managed.

2.3.1 Geographic

One barrier for academics attempting to work directly with practitioners to implement new models is the need for on-site involvement (Lilien et al. 2013). Depending on the industry,

information security risks might prevent remote work on models. Otherwise, some additional challenges may come from the need for data collection, integration and management (Lilien et al. 2013). This is fairly straightforward, but it will later be a way of understanding where intermediaries can help literally span the distance between academia and practice.

2.3.2 Timelines and Reward Structures

Because of the different incentives for practitioners and academics, they also have very different timelines. Practitioners will often push for early demonstration of value on new projects, or a high return on investment in order to get the needed "proof-of-concept" (Lilien et al. 2013, Amabile et al. 2001). Unlike practitioners, academics would be more likely to focus on the rigor of their methods rather than their speed to implementation.

This tension is not always a bad thing as it can encourage academics to think more deeply about how they can add value to those they collaborate with more quickly. For example, practitioner involvement in one research study encouraged researchers to provide more in-depth, individualized feedback to organizations who had agreed to participate in a research study (Amabile et al. 2001).

2.3.3 Available resources to maintain connections

Time is one of the more important resources relevant to process fit. A lack of executive time has been one barrier in collaborations between practitioners and academics (Lilien et al. 2013). On the other hand, regular, facilitated communication between parties helps improve the collaboration process (Amabile et al. 2001).

Even before the collaboration actually begins, some form of connection between academics and practitioners must first be established. Because academics and practitioners may

not be actively seeking connections with each other (and when they do it seems to be the exception not the rule) they may never have the chance to work together.

2.3.4 Political Support

Getting the political and organizational support needed to implement specific models is also important. One barrier to model usage can be the need for involvement of multiple stakeholders or buy-in from key executives in other functional areas (Lilien et al. 2013). Additionally, having strong organizational support can enable individuals working on the project to be more successful because they may have an easier time reducing their other obligations and commitments to devote more energy to implementing the new model.

To understand "political support" we should also think about how managers may be impacted by model usage. One paper highlighted that models require precision while managers often prefer ambiguity and intuition (Lilien and Rangaswamy 2004). Managers that set ambiguous goals will have an easier time meeting them than the concrete goals that might be outputted by a model.

2.4 Interactions between different elements

The framework is composed of three distinct dimensions of distance -- product level, mindset level and process level. Although the three types of distance between academia and practice are distinct this does not mean they are independent. That is, there will be some interactions between them.

Imagine a three-dimensional Cartesian plane with each of the "dimensions" as separate axes. If I were to increase my process fit while decreasing my mindset fit, it's possible I could maintain the same level of absolute distance, in some sense. Though it probably doesn't make

sense to think about the idea of "distance" so literally, the image might provide a sense of the tradeoffs involved. For example, as the analytical maturity of a practitioner increases, (or the mindset 'distance' decreases), they may care less about the simplicity and ease of communication of the model. As one form of distance decreases, the practitioner is better able to cope with the other forms of distance.

There is no right answer to what kinds of models are best implemented because there are tradeoffs between the different aspects of distance between academia and practice. If this distance framework were accurate, it would predict that given the opportunity to reduce "distance" on one of these dimensions without impacting the other, it would improve the implementability of the model. If I could make a model more simple without reducing its value and relevance I would do so. The true challenge comes from understanding the distance trade-offs when prioritizing one thing over another, something which would be a valuable topic for further research.

3. CONNECTIONS TO OTHER FRAMEWORKS

Now that this paper has described the different pieces of the framework to think about the academic-practitioner gap, the next section will address how it both fits in and is different from existing frameworks looking at similar subjects. These existing models have very much informed the model presented in this paper, and bringing together various frameworks and ideas has been a large source of motivation for this project.

3.1 Marketing Science Value Chain (Roberts et al. 2014)

One previous paper lays out the parts of the marketing science value chain, which captures the diffusion of insights from academic articles in a direct or indirect way (Roberts et.

al. 2014) The paper breaks down the value chain into three steps: (1) Knowledge Development, (2) Knowledge Conversion, and (3) Knowledge application (Roberts et. al. 2014). Each of these three parts of the value chain can be considered as linked to some types of distance described in the model. First, Knowledge Development is like research and development by academics to create a better 'product' to reduce the distance between academia and practice with respect to model attributes, whether that is value provided or making tools simpler to use or easier to understand. The researchers who are studying how to make neural nets more "explainable" to those using the model (e.g. Vaughan et al. 2018) are doing "knowledge development" for the purpose of making models more simple to understand. Next, Knowledge conversion can be thought of as translating the product to reduce product and mindset distances. Finally, knowledge application can be thought of as related to process fit.

Though the Roberts model is very comprehensive, it focuses more on the journey from academia to practice for any one model to any one practitioner. The model suggested in this paper operates at a more aggregated level because it considers some of the effects of differences at the firm level like analytical maturity and risk tolerance. The presented framework tries to understand why different combinations of firms and researchers may have more or less distance between them based on the research or the organizational context.

3.2 Success of marketing management support systems (Wierenga et al. 1999).

In this paper, Wierenga lays out a framework for determining the success of marketing management support systems (MMSS) based on (1) the demand for decision support, or the decision processes to be supported; (2) the supply of decision support, or the functionality offered by the MMSS, (3) the match between demand and supply, (4) the design characteristics

of the MMSS, (5) the characteristics of the implementation process of the MMSS) and finally (6) how to measure success.

Wierenga's framwork maps directly onto the framework I have suggested. Section (1), (2) and (3) of the framework, the demand and supply of decision support, have to do with relevance/accuracy. Like the authors write, these three elements combine to reflect the "potential success" of the MMSS. Section (4) of Wiereng's framework, the design characteristics of the MMSS, maps onto Little's framework ((Little 1970), and thus onto the product fit category – accessibility and presentation and system integration relates to the ease of use of the model, and the paper directly mentions adaptability. Section (5), the characteristics of the implementation process of the MMSS maps directly onto the process fit.

Finally, the Wierenga paper describes in section (6), measuring success relates to technical validity, adoption and use, and impact. It would be interesting to try and demonstrate that a MMSS is also more likely to be successful by these standards of technical validity, adoption & use, and impact if there is lower "distance" on the three framework dimensions of product, mindset and process fit. Although this was a great framework that provided an important starting point for my research, the Wierenga framework did not delve into the mindset category --"risk tolerance," "analytical maturity," and "existing mental models," as explicitly.

3.3 Diffusion of Innovation (Rogers 1962)

In this model, the five main factors that influence the adoption of an innovation are relative advantage (how much better it is), Compatibility (connection with existing values and needs of potential customers), Complexity, Trialability (if it can be tested before adoption), and Observability of results after using it. These factors map nicely onto the "Product," "Mindset,"

and “Process” distances. For example the Relative Advantage actually brings together the ideas of “relevance” and the improvement of the model over existing mental models and decision structures. Compatibility relates to the “mindset” distance, and would match with categories like analytical maturity, patterns of communication, and existing mental models. Complexity connects with part of Little’s description of a decision calculus as “simple.” Finally, the idea of “trialability” is somewhat related to the risk tolerance of the end user.

This model is more general than the topic of this paper, and has been used for “innovation” in general. However, because of this, Rogers doesn’t focus on specific aspects of model adoption, like thinking about the entire implementation process instead of thinking of an innovation as only a product that can be purchased so long as there is cultural compatibility.

3.4 Bridging the academic-practitioner divide (Lilien 2011).

This paper was an important starting point during my research. Lilien lays out four layers for understanding the adoption and use of a marketing decision model: (1) characteristics of the model and its design, (2) characteristics and traits of the manager, (3) the reward measurement system, and the culture of the organization, and (4) the characteristics of the competitive environment in which the models are deployed (Lilien 2011).

The first section connects to product fit. The second section rolls into mindset fit, probably within the idea of analytical maturity and risk tolerance. The third section encompasses the mindset fit with the “culture of the organization” and the reward measurement system relates most closely with the idea of timelines in the process fit category. The last section has the most to do with the “relevance” of the model, as well as the “visibility” of the industry which might influence managers willingness to try new models.

This framework draws a more clear distinction between the manager level and the organization level with respect to model adoption. I did not choose to highlight this distinction in the presented model. Additionally, the Lilien paper provides an overview of the factors that contribute to model adoption. My goal was to provide something more granular, like a diagnostic tool for those to evaluate the potential challenges when implementing a new model and to understand the full scope of the types of "distance" that would need to be overcome.

4. INTERMEDIARIES & INCENTIVES

Now that the framework for understanding the distance between academia and practice has been established, the next section will focus on one possible application of the framework. How can one use this notion of "distance" between academia and practice to account for the role of different types of intermediaries? This line of inquiry came from questioning the need for intermediaries, and the desire to understand when certain types of intermediaries were best suited to addressing different aspects of the gap between academia and practice.

Previous researchers have already established the range of intermediaries that play a role in research diffusion (Benders and Van Bijsterveld 2000, Kieser 1997 as cited in Scarborough 2002). It makes sense to break up this analysis based on the type of intermediary, because different intermediary groups have distinct roles based on their different skills and their organization (Alvesson 1995 as cited in Scarbrough 2002). In each section, this paper will try to touch on how the different incentive structures might influence the motivation of different types of areas. Not only does this paper consider what aspects of the gap between academia and practice that intermediaries could address, it also considers what aspects of the gap these intermediaries are currently incentivized and motivated to address.

4.1 Consulting Organizations

Various researchers have highlighted the importance of consultants in the diffusion of research (Lilien 2011, Scarbrough 2002). Specifically, one claim is that "their primary role is the commodification of knowledge" (Scarbrough 2002). Consultants are motivated to profit by selling their knowledge product to clients. Most consulting projects occur in three stages (1) search and selection, (2) diagnosis and planning, (3) Implementation and evaluation and beyond (Lippitt and Lippitt 1986 as cited in Sturdy and Wright 2011). The first and third steps highlight how consulting companies actively seek to create connections with practitioners (their available resources to maintain these connections are much higher than the average academic), and how they are able to specifically focus on improving the process fit with organizations with implementing models.

Consultants can help bridge the gap between academia and practice is the "process of translation where the original knowledge product is disembedded from its original context and re-embedded into a somewhat different organizational context (Suddaby and Greenwood 2001 as cited in Scarbrough 2002). One interesting angle to this is that consultants may actually require distinct skills from others like academics in this generalization of the knowledge product, such as specific commercial coding skills (Cohen 2019).

If one thinks about the ability to implement or to collaborate with practitioners as stemming from experience (Simonin 1997 as cited in Amabile et al. 2001), then it becomes more clear why consultants, who are able to work on multiple similar implementation exercises, would be well suited to manage process fit and improve their pattern of communication to best match

practitioners. Consultants, unlike academics, benefit from scale. If they complete similar projects multiple times, they are able to be more efficient and add more value to their clients.

Because of the profit motive of most consulting organizations, they want to expand the size of the market they can serve. Thus, the involvement of consultants tends to lead to ambiguous language surrounding models (Weick 1990, Kieser 1997 as cited in Scarbrough 2002). It is important to also keep in mind that consulting is a competitive industry, where firms compete to sell "knowledge" to businesses, which "involves packaging knowledge as products and services and differentiating offerings from other consultancy firms" (Hansen et al. 1999 as cited in Scarbrough 2002).

4.1.1. Large vs Boutique Consulting Firms

Since consulting is such a large industry with a huge variety of players, it seems worthwhile to address the possible differences between different types of firms. Some of the strengths of consultants comes from their involvement in inter-organizational networks Newell et al. 1996), and their ability to legitimize new ideas (Greenwood et al. 2002) (both as cited in Scarbrough 2002). This ability would be greater for larger organizations that are more well-known. Even from a political support standpoint, an organization like IBM would likely to be more able to legitimize a new idea than a firm that was not as well-known.

At the same time, smaller boutique consulting firms may be more motivated to experiment and pushed to add more value to their clients by seeking out more novel research. Some firms, like In4mation Insights or Hall and Partners The Modellers read through the latest academic journals or even attend conferences to try and determine what new research may be valuable to their clients. (Cohen, Feit)

4.2 Internal Consultants and Boundary Spanners

Those in roles that function like internal consultants or who act as boundary spanners for their organization also play an important role in bridging the gap from academia to practice. Although they are technically within the practitioner company, these individuals would be able to use their position to bring in external knowledge and research into the company.

In a previous role, Elea Feit worked within a research group at GM. In the old department, many members of the research team had PhD's, thus their "mindset" was much closer to that of an academic (Feit). There are many examples of various research groups at companies with members who are academically trained. These individuals can play a role in bridging the mindset distance between academia and practice.

Some papers specifically look at the role of the "active client" in success of consulting projects. One paper has studied how active clients help manage information flows into the organization and how they can serve as gatekeepers, brokers and partners (Wright and Sturdy 2011). In general, more active clients are able to have more customization of their project (Hislop 2002 as cited by Sturdy and Wright 2011). This suggests that the involvement of an "active client" helps bridge the gap between academia and practice because it helps increase the relevance of the model and help customize it to the needs of the organization.

Those in internal roles are motivated both by the success of the organization as well as their own personal and political motives (Wright and Sturdy 2011). They may be motivated to bring in models that are seen as bringing in value to the firm, and may help with championing new ideas within an organization. Thus, they can help generate political support for new ideas to be implemented. Working in an organization for a longer period of time allows internal

consultants to generate personal relationships with those from various departments in the company; these personal relationships help when managing differences of opinion and conflict with respect to introducing new ideas (Baill).

There is a concept of "absorptive capacity" or a firm's ability to use external knowledge (Cohen and Levinthal 1990 as cited in Scarbrough 2002). The presence of those within a firm who are explicitly designated as bringing in external information or coordinating collaboration would likely increase the firm's "absorptive capacity" by increasing the available resources to make connections, and have someone to actively reduce the process challenges when implementing new models.

4.3 Media (Books, Articles, etc.)

This section focuses on the role of books or articles that popularize academic theories. The purpose of these books is to increase access to ideas that might help businesses or managers implement the latest theory. Depending on the book or article, they can be intended to address very different audiences.

Often times, academics will explicitly write books to focus on a general audience. Prof. Lilien mentioned how in his later book Principles of Marketing Engineering and Analytics, he worked with Arvind Rangaswamy to write a book that was more accessible to students. The book has circulated widely, with a global audience. This example shows how explicit attempts to make research easier to understand to a broader audience can help bridge the gap between academia and practice. It is important to note that different types of writing will be helpful to different people. Lilien made sure to note that a book that is mathematically dense may be easier for someone who is a mathematician (Lilien).

Media is best suited to translate new ideas into a form of communication that the intended user is able to understand. Thus, part of using media to spread research is developing a wide range of books, articles, etc. that can help reach different types of people. It will be interesting to see how "media" evolves over time, especially amid the increasing technology centered knowledge base. Perhaps it will be more relevant to start analyzing the role of Ted Talks or podcasts in understanding research diffusion in the future, although a specific focus on media is outside of the scope of this paper.

4.4 Academics

Academics play both a role in the theorization and diffusion of research knowledge. When they choose to act in an intermediary capacity, they can reduce the product distance as well as actively reduce process distance.

Delaine Hampton, who at the time was the Director of Consumer and Market Knowledge at Proctor & Gamble presented a graphic at the marketing science conference in June 2004 about the various assets and needs of both academics and practitioners (provided by Lilien). Academics want problems to solve, data, credibility, resources and domain knowledge. In exchange, they can provide methodology, knowledge, extensive networks, pedagogical skills and students. On the other hand, practitioners need training, knowledge, networking and employees while they can provide relevant problems, data, resources, and domain knowledge. There can be large benefits from academics and practitioners working together, since each group has access to resources that the other can benefit from. However, in order for these connections to happen, academics or practitioners need to devote resources like time to forming these connections.

According to Roberts, even though marketing intermediaries play an important role in the process, there is still the possibility of "disintermediation" where researchers work directly with marketing managers (Roberts et. al. 2014) Using the framework in this paper, if there is less product, mindset and especially process distance between researchers and marketing managers, they may be more likely to successfully implement new research without the aid of a different intermediary.

One final way that academics reduce the distance between academia and practice is by teaching. Professors may even bring in research they are working on into their classroom to expose students to their ideas, whereas others might attend conferences to spread their research ideas (Feit). In the next section we explore the role of profession groups and conferences as intermediaries between academia and practice.

4.5 Professional Groups

Professional groups bring together individuals from different organizations working to solve similar challenges. Because of this, professional groups are an important network to share knowledge across organizations (Brown and Duguid 2001 as cited in Scarbrough 2002).

The various professional groups competing for membership may be incentivized to "colonize" new domains to reaffirm their social identity (Scarbrough 2002). Professional groups may be incentivized to keep the ideas presented in their conferences "relevant" if they want to continue to stay relevant themselves. Conferences can sometimes be a source of ideas and problems for academics, thus contributing to both the spread and theorization of research knowledge (Feit). They reduce the academia-practitioner gap by increasing both the "relevance" of models.

Additionally, the existence of professional groups helps to create social contagion effects by generating an awareness of other firms activities (Davenport and Prusak 1997 as cited by Scarbrough 2002). By making managers aware of the opportunity cost of not using models as well as highlighted success stories, they reduce the risk of trying new models and encourage experimentation.

Professional groups might also be a space to improve procedures for implementing new models. At INFORMS conferences, speakers are encouraged to spend about 15 minutes describing the implementation challenges of their projects (Feit). These types of groups focus on the "how" of new ideas as well as the "why", which helps reduce process gaps between academics and practitioners.

4.6 Companies centered around research models

Companies centered around research models are those that focus their value proposition on bringing new methodology to practitioners. To understand the role of these types of companies, we can look at the case of Sawtooth Software, which provides both a platform and support for the conducting of conjoint analysis.

A huge part of the work at Sawtooth is ensuring a smooth interface for customers using the software platform, whether that is managing browser compatibility or ensuring that different aspects of the software are intuitive (Orme). Although functionality is important, one of the primary ways the reduce the gap between academia and practice is by making models easier to communicate with.

The better that the company can get at making their platform intuitive and easy to understand, they can target a larger base of customers who may not have the same level of

analytical maturity as their existing customers (Orme). Companies like Sawtooth are incentivized to improve product fit and reduce mindset distance because this enables them to reach more clients. Another way they attempt to reduce this gap is by hosting training conferences to teach new customers how to take advantage of their platform (Orme), and thus automatically also how to take advantage of the conjoint analysis model.

4. 7 Overlapping Involvement

Though the various intermediaries all help address the acamia to practice gap in different ways, there is a large amount of overlap between the various groups. For example, many authors of academic papers also co-founded professional services companies to commercialize their work (Roberts et al. 2014). Some researchers or practitioners may be involved in a primary role and contribute to the functioning of a professional group (Feit). The characterization of the various intermediaries is more on a functional level than a personal level as the same person may fall into multiple forms of intermediation between academia and practice. In fact, it seems as though those researchers focused on ensuring the practicality of their work gravitate towards multiple of these forms of spreading research knowledge.

4.8 The Dark Side of Intermediation - Wrong Incentives?

Although intermediaries are largely beneficial for the spread of research knowledge, it is important to keep in mind the ways in which reward systems may disincentivize intermediaries and reduce these potential benefits. For example, one feature of the consultant-client relationship is one of "managerial insecurity" (Gill and Whittle 1993 as cited by Scarbrough 2002). Although consultants may be able to take on some of the risk of trying new models, it may also leave management more reliant on them as an intermediary and less willing to tolerate risk without the

presence of the intermediary. This would be good for business as a consulting company that can generate further revenue off of repeat business.

There is also another angle to professional groups, which can both help and constrain the spread of new management knowledge (DiMaggio and Powell 1983 as cited in Scarbrough 2002). Sometimes, professional groups can become insular communities that are less willing to include new practices that are different from what they had traditionally been involved with (Feit).

Finally, the primary goal of all boundary spanners is generally not to promote the proliferation of research. If new models or methodology threatened the boundary spanner's own source of power, it is possible that this form of intermediary could actually increase the process distance between academia and practice.

Despite the "darker" side of intermediation, intermediaries still play a necessary role in getting academic research implemented in practice. One way to examine the necessity of intermediary groups for a particular situation might be trying to analyze the academia to practice distance involved. The lower the distance, the less value intermediary groups have to add to the practitioner or organization.

5. CONCLUSION: REDUCING GAPS, FUTURE RESEARCH

Reducing the gap between academia and practice is important because the benefits of decision support systems include (1) improving consistency of decisions, (2) exploration of more decision options, (3) assess the relative impact of decision variables, (4) facilitate group decision making, (5) update mental models of decision makers. (Russo and Shoemaker 1989 as cited by Lilien 2011, Lilien 2011). Not only to they help people consider problems in a logical and

consistent way, they also improve communication between parties by drawing attention to disagreements on assumptions (Lodish 1971).

5.1 Limitations

The framework of process, mindset and process distance between academia and practice seems to be both comprehensive while avoiding being unwieldy. Much of the research for this project was conducted in the course of one academic semester, and relied on a fairly limited set of interviews with intermediaries and academics to refine. Future work may determine the need to break up some of the categories in this framework or group certain pieces together.

5.2 For intermediaries and practitioners

Despite the limitations of the framework, it can also be a helpful way of quickly introducing people to the many aspects of a complicated issue. To benefit from the framework, intermediaries should think about which aspects of this gap between academia and practice that they are best suited to address and develop competencies in those areas.

Following this logic, professional groups may focus more on reducing the sense of risk for practitioners in trying new models while also helping them navigate process distance. Consulting groups may focus on devoting resources to establishing connections with academia as well as practitioners and pushing for relevant research. By using this framework to think about how to reduce the gap between academia and practice, consulting companies can promote the spread of research knowledge while also increasing the differentiated value that they provide to clients.These groups can help commercialize and generalize new research models. Others companies centered around particular research, like Sawtooth, may focus on reducing the product distance by improving user interfaces and the simplicity of models.

On the other side, this framework may help practitioners more critically examine when and why they need the presence of certain intermediaries. What types of gaps are the intermediaries helping to address that the company itself cannot manage? If intermediaries are not playing a significant role in addressing these gaps, it may be an indication that the practitioner can attempt to form relationships directly with academics.

5.3 Future Research

In the future, researchers can test this framework further. If this framework is relevant, practitioners that have lower product, mindset and process distance from their academic partners will have an easier time successfully implementing new models, or intermediaries that address these specific areas of distance will add the most value to academics and practitioners.

5.2.1 Measuring Success

It would be worthwhile to test how previous literature on the "success" of decision support systems connects with the listed dimensions of distance. Models are successful based on (1) their technical validity, or the extent to which the model is a good representation of the system and makes statistically accurate predictions, (2) the adoption and use of the model, (3) the impact on the user, and (4) the impact on the organization (Wierenga et al. 1999). At a broader level, "The criterion for a good, productive model is not whether it is theoretically or empirically perfect. It is whether the manager's decision, based on the model, improves productivity enough to justify the costs and resources devoted to developing and using the model" (Lodish 2001 as cited in Lilien 2011).

5.2.2. Understanding interactions and other senses of 'magnitude'

As was discussed earlier in this paper, there are interactions between the different types of distance presented in the paper. One further area of research may come from understanding the relative importance of these various features, and how to make decisions about tradeoffs between different elements of the model.

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