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# Essays on product and process management for new ventures over digital platforms

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BOSTON UNIVERSITY  
QUESTROM SCHOOL OF BUSINESS

Dissertation

**ESSAYS ON PRODUCT AND PROCESS MANAGEMENT FOR  
NEW VENTURES OVER DIGITAL PLATFORMS**

by

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## **DEDICATION**

I dedicate this work to my foundation and loving spouse Kristie, my incredibly supportive immediate family Nejat, Isil, Ozge, Erdem, and Defne, my wonderful in-laws (who are too numerous to all name but especially Linda & Jim Anderson, and Vera & Tom Colwell), and to the people dedicated (and crazy) enough to start their own businesses.

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**ABSTRACT**

New ventures face operational, financial, and marketplace challenges after introducing their first products but before fully transforming into established firms. Recent examples of new ventures pursuing rapid growth strategies that ultimately lead them to collapse under their own weight has raised two questions: (1) how are survival and growth for new ventures related, and (2) how can new ventures pursue data validated growth strategies associated with product and process development over digital platforms? We examine these questions by setting up three studies. In our first study, we conducted a cohort analysis of new ventures to examine the dynamics of survival and growth. Our results show at least two stages for new ventures, a learning stage where survival and growth are independent outcomes, and a commercialization stage where survival and growth are intertwined. We observe that the transition between these two stages is not cleanly delineated and involves a prolonged period of product refinement and validation via market-based experimentation. In follow-on studies, we focus on product development over digital platforms in the tabletop gaming industry to look deeper at these transitions. Our second study examines the customer contexts new ventures must consider to process knowledge available on social media platforms using

the transactional memory system (TMS) theory. Our analysis shows that new ventures must extend conventional TMS by accounting for how knowledge structures are affected by customer identity on a social media platform and how the scope of knowledge flows enlarges over time as more customers provide input. Our third study further assesses product and process choices by examining how self-expression can be used to leverage backers over a crowdfunding platform. Results show that incorporating self-expression as an input mechanism can not only increase backer participation which can contribute to product validation, but crowd driven selection mechanisms can also ease process coordination burdens.



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## **Prologue**

The focus of this dissertation is understanding operational decisions (and their effects) pertaining to the distinct challenges that new ventures firms (called new ventures going forward) face. One of the reasons this topic is so rich for exploration is that the vast majority of operations literature was either developed or is currently examined through the lens of established firms. This dissertation helps to bridge the gap between the rich and robust operations literature we have for established firms and the challenges that new ventures face. Two of those challenges are related to survival and growth.

Survival for new ventures is the notion of a newly formed organization continually maintaining operations, which is no guarantee, as most firms will fail within their first 5 years (Robinson, 2014; Josefy et al., 2017). In contrast, established firms are assumed not to be at risk of permanently halting operations or being liquidated in the foreseeable future (Josefy et al., 2017). For example, most people would rarely consider whether an established firm such as IBM would go out of business within a 5-year horizon unless something truly drastic occurred. Even if a new venture is capable of achieving a state of continued survival, substantial growth can also prove to be a challenge (Isenberg, 2014).

Growth for new ventures represents the opportunity to acquire new sources of revenues necessary to achieve sustainability (or profitability) and is therefore considered an essential key to survival. However, recently, the exact nature of the relationship between survival and growth has been questioned. Factors such as premature scaling (i.e., too much growth too soon) have been identified by practitioners as a critical survival risk



(Patel, 2015) and examples of new ventures like *Zynga* also highlight the perils of pursuing fast (and ultimately unsustainable) growth (DeMers, 2018). *Zynga* suffered from investing most of its free cash in massive amounts of infrastructure that ultimately did not lead to more growth, resulting in a lack of cash and unused capacity. Many of these articles highlight the missteps (and specifically operational decisions) that new ventures took to pursue growth and the consequences of making ultimately poor choices.

To examine how operational choices related to survival and growth unfold for new ventures, we turn to The Kauffman Firm Survey, which is a longitudinal survey of new ventures in the U.S. that were all formed in 2004. The survey provides an excellent opportunity to examine these relationships as they evolve over time due to the comprehensive information regarding operational decisions (e.g., expand capacity or reduce inventory) and financial outcomes contained in the survey. Specifically, we can follow a cohort of new ventures on a yearly basis to examine whether survival and growth are independent or joint outcomes, and how the relationship evolves over time.

Regardless of the exact relationship of survival and growth however, from an operations perspective, funding and customer information are necessary for maintaining survival and achieving growth. No venture can maintain operations without funding. Information is also vital because new ventures need to know what their customers want and need. Information from potential customers can lead to product innovations and identifying new markets to serve as well. Unfortunately, information about how new ventures is often difficult to obtain.

Rewards-based crowdfunding (referred to as crowdfunding going forward) is the

practice of offering a reward to a group of customers (called backers) who pledge the financial capital necessary to fund the development and production of the product. Digital crowdfunding platforms like Kickstarter and GoFundMe provide transparent and recorded instances of crowdfunding that allow us to examine how new ventures can secure funds and information. For example, Kickstarter offers the opportunity to track the amount of funds raised for a new product, and comments (i.e., feedback that backers provide to each other or the manager of the crowdfunding campaign) allow us to examine information flows. One industry that is known for customers providing extensive feedback is the tabletop games industry, comprised of firms that produce board games, card games, minis games, and roleplaying games. The industry has quickly become one of the predominate users of crowdfunding, which provides an open (and quickly evolving) window into studying questions about the process new ventures must go through to ensure survival and growth.

Information flows can also come from other sources and the opportunities for gathering information on digital platforms is quite expansive. Social media outlets like Twitter or Discord (a messaging app that allows game enthusiasts to communicate with each other) can also provide transparent information flow records for analysis. However, time is limited, so which information channels are best for gathering customer information and how can managers focus their efforts to gain the most information with the least operational burden? To study this question, we compare how knowledge flow structures differ between two key customer demographics, backers who use Kickstarter versus game enthusiasts who use Discord.

The final question we examine relates specifically to crowdfunding backers and their propensity to provide information. Since backers must provide funding before providing information, there is always the possibility that a backer will simply give money while providing minimal information. This represents a wasted opportunity for a crowdfunding manager because while funding is critical, information is also critical for guiding how those funds should be used. We explore how crowdfunding managers can motivate backers to provide more information than they typically would as well as the operational burden those motivations entail.

The remainder of this dissertation is structured as follows: Essay 1 examines the relationship between survival and growth for new ventures and how that relationship changes over time. Essay 2 examines knowledge flows as it relates to customers that reside on different digital platforms and the operational implications for from these different groups. Essay 3 examines how to motivate backers to provide more information (after providing funding) while analyzing the increasing operational burden of incorporating these forms of motivation. The final section presents a discussion of the further research opportunities raised by the findings of Essays 1, 2, and 3.

## **Essay 1 - From validated learning to commercialization: The joint determination of survival and growth for new ventures**

### **Introduction**

Many new ventures do not survive their shaky initial years (Robison 2014) and those that survive seldom achieve substantial growth (Isenberg 2014). Because of the complex and tough challenge that is creating a successful new venture; the literature on antecedents affecting new venture survival and growth continues to grow even after multiple decades of research. Studies have examined the effects of many antecedents of survival including industrial environment (Romanelli 1989), industry and location (Stearns, Carter, Reynolds, & Williams 1995), initial human and financial capital (Cooper, Gimeno-Gascon & Woo 1994), founder gender (Boden Jr. & Nucci 2000), environmental innovativeness (Sarkar, Echambadi, Agarwal, & Sen 2006), time as a conditioning effect (Agarwal, Sarkar, & Echambadi 2002), organizational adolescence (Bruderl & Schussler 1990), collaboration (Mitchell & Singh 1996), and even political ties (Zheng, Singh, & Mitchell 2015). Many studies also examine the effects of antecedents on growth (and sometimes survival in the same paper as well) including studies on hybrid (i.e., franchised) organizations (Shane 1996), early internationalization (Sapienza, Autio, George, & Zahra 2006), general and specific human capital (Rauch & Rijdsdijk 2011), founding team (Beckman 2006), developmental pathways (Delmar, Davidsson, & Gartner 2003), exploration versus exploitation (He & Wong 2004), ambidexterity (Lubatkin, Simsek, Ling, & Veiga 2006), and guided preparation (Rotger,

Gørtz, & Storey 2012). Because at some point, new venture survival and growth are related, further specificity regarding the nature of this relationship is worth pursuing as it can affect the policies entrepreneurs employ to run their new ventures. Therefore we ask the following research questions:

- Are survival and growth independent outcomes that should be separately managed within new ventures or are they jointly determined outcomes that influence each other?
- What underlying decisions are associated with survival and growth being independent outcomes or jointly determined outcomes?

We present a framework that builds on the dynamic capabilities literature (Arend 2014; Teece 2014; Teece 2007; Teece, Pisano, and Shuen 1997) as it relates to different stages of new ventures. We hypothesize that when a new venture is in the validated learning stage (i.e., the early or concept validation stage of their business plan) and focused on developing a product or service, survival and growth are independent outcomes. However, when a new venture moves to commercialize after developing the product or service, survival and growth become jointly determined. To test our hypotheses regarding the independent or jointly determined nature of survival and growth, we apply logistic regression and a Hausman Specification test to a dataset of new ventures collected by the Kauffman Foundation Survey. In particular, we examine whether survival and growth are jointly determined year over year for a five-year span.

In order to evaluate the independently or jointly determined nature of survival and growth, we identify two key antecedents that serve as microfoundations for dynamic capabilities. We label the identification of a competitive advantage as a microfoundation

of the sensing dynamic capability, and we label the addition of new employees as a microfoundation of the seizing dynamic capability. We hypothesize that in the validated learning stage of a new venture, the identification of a competitive advantage will be directly correlated with survival, but not be correlated with growth. We also hypothesize that during the validated learning stage, the addition of new employees will be directly correlated with growth, but not be correlated with survival. The reason we hypothesize that each antecedent will only be correlated with a single dependent variable (rather than both dependent variables) is that the business plan of a new venture may take a long time to refine, develop, and validate through the process of experimentation. Thus, a business plan that has yet to be validated will have less chance of being effective at leveraging a competitive advantage to achieve growth and less chance of being effective at leveraging new employees to improve the odds of survival. Only once the business plan has been validated and refined can the new venture begin to leverage a competitive advantage and its new employees to the fullest (i.e., having a competitive advantage being directly correlated with survival and growth as well as new employees being directly correlated with survival and growth.) Our results support our hypotheses that in the validated learning stage, a competitive advantage is only directly correlated with survival, new employees are only directly correlated with growth, and that survival and growth are independently determined outcomes. We also find support that in the commercialization stage, a competitive advantage becomes directly correlated with survival and growth, new employees become directly correlated with survival and growth, and that survival and growth are jointly determined outcomes. One additional aspect to these results is that

the transition from the validated learning stage to commercialization stage for the new ventures in our sample is not sharply delineated, which raises questions about the nature of this transition for new ventures.

We advance dynamic capabilities theory as it applies to new venture survival and growth by examining how the relationship between specific outcomes and microfoundations (competitive advantage identification and new employees) changes in relation to the stage of a new venture. We raise theory questions regarding the nature of stage transition for new ventures (quick and clean versus long and muddled), the difficulty in creating a business plan that is capable of leveraging all assets available to a new venture, and offer managerial implications regarding the most effective usage of resources in the early stage, and whether growth is something that can always be pursued as a means of increasing the probability of survival.

## **Theory and hypotheses**

### *Literature review*

Early research on new ventures survival, from the mid-1960s to the mid-1990s, focused on how antecedents such as location choice or capitalization levels affected survival while assuming that survival and growth were simply different measures of organizational success. However, as the literature progressed into the mid-1990s, it became more difficult for researchers to assume that survival and growth were interchangeable measures because empirical studies showed that the same antecedent could affect survival and growth differently. From Cooper et al. 1994, "Much of the new

venture literature implicitly assumes that survival and success both reflect the same underlying processes. Although that justification may be appealing, there is some evidence that different factors may play a role in survival than those influencing other measures of success (Kalleberg & Leicht 1991; Carroll & Huo 1986).” In light of these empirical findings, researchers began treating survival and growth as separate constructs. For example, Cooper et al. 1994, classify new ventures into different mutually exclusive groups (e.g., new ventures that did not survive, new ventures that achieved marginal growth, and new ventures that achieved high growth). Rauch & Rijdsdijk 2011, and Zheng et al. 2015 considered growth as an antecedent that influences survival. Shane 1996, Sapienza et al. 2006, Rotger et al. 2012, and Wennberg, Delmar, & McKelvie 2016 treat survival and growth as separate organizational outcomes to be evaluated.

More recent studies of survival and growth have begun to question how survival and growth may be independently or jointly determined when viewed as separate organizational outcomes. For example, Wennberg et al. 2016 states, “...The debate regarding the relationship between survival-threatening low performance and risk taking may be informed by considering two separate decisions: (1) the decision to continue or exit and (2) the decision to grow or not,” while Greve 2008 states that an organization may have a sequence of goals to accomplish, which could mean that survival and growth are either independent, jointly determined, or that one causes the other. We believe a theoretical contribution can be made by discovering how the relationship between survival and growth may change during different stages of a new venture’s life.

When looking at the literature, especially Rotger et al. 2012, dynamic capabilities



(Arend 2014; Teece 2014; Teece 2007; Teece et al. 1997) stood out as the theory that could provide insight into our research question. Dynamic capabilities theory has become more integrated into the study of new ventures and provides a foundation to build a conceptual framework. To build our framework, we translate a component of “lean startup practices” into a microfoundation of dynamic capabilities. Microfoundations are “the distinct skills, processes, procedures, organizational structures, decision rules, and disciplines” that enable an organization to have dynamic capabilities (Teece 2007). In other words, a microfoundation is the distinct and concrete action occurring within an organization that enables higher level functions associated with dynamic capabilities.

#### *Dynamic capabilities and lean startup practices*

Our theoretical framework to evaluate whether survival and growth are independent or jointly determined at different stages of the lifecycle is built using dynamic capabilities theory. Dynamic capabilities theory takes the Resource based theory<sup>1</sup> of the organization and advances the theory by stating that it is not only the accumulation or absence of resources that determine which organizations will do better but also how an organization leverages its resources. In particular, organizations can generate long-term superior performance by constantly “re-deploying” assets in unique ways to better fit an ever-changing environment (Arend 2014; Teece 2014; Teece 2007; Teece et al. 1997). We use two dynamic capabilities to build our framework, sensing and seizing. Sensing is characterized by “analytical systems (and individual capacities) to

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<sup>1</sup> RBT states that an organization is built from a collection of resources (tangible or intangible) that enable the key functions necessary to generate value (Wernerfelt 1984).

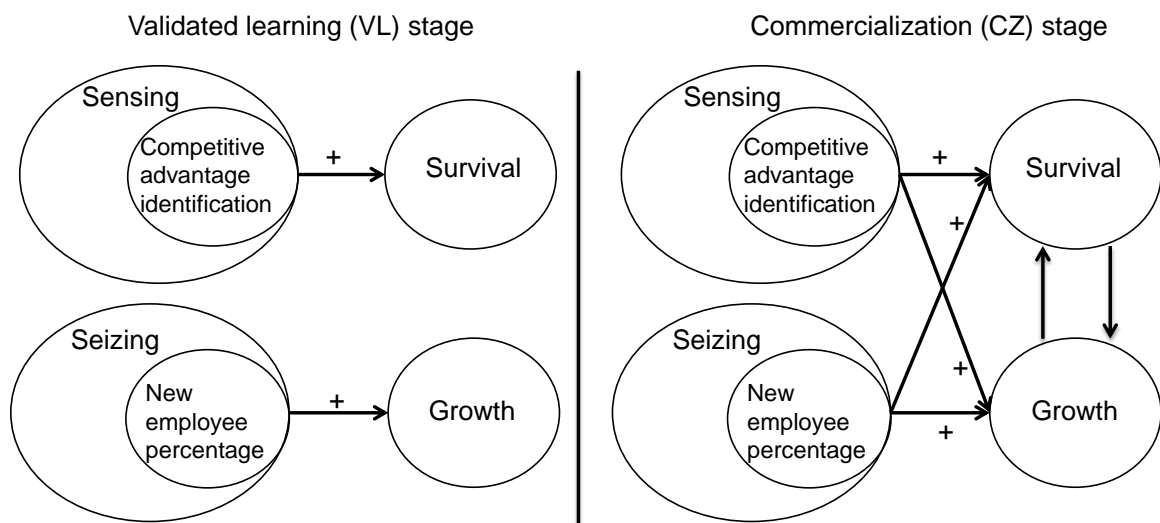
learn, ... sense, filter, shape, and calibrate opportunities” (Teece 2007). In other words, it is the ability of an organization to evaluate and identify potential business opportunities or information. Seizing is characterized by the development of organizational “structures, procedures, designs and incentives for seizing opportunities” (Teece 2007). In other words, it is the ability of an organization to convert an identified opportunity into revenues. We next examine how sensing and seizing fit into the new venture context by first looking at the lean startup practice of validated learning and then at commercialization.

The lean startup is a set of practices that focuses on cost-effective hypothesis-driven experimentation and iterative product releases to shortening development cycles (Ries 2011). At its core, the lean startup emphasizes testing assumptions in the marketplace before heavily investing in commercialization. By validating (or refuting) assumptions (e.g., a specific price point will generate a certain level of sales, etc.), a new venture can remove uncertainty to increase a plan’s chance of success (or avoid investing heavily in a poor venture). We call this action of validating (or refuting) assumptions “validated learning” because until there is sufficient evidence to make a claim in a specific direction, any proposition is simply an assumption. The idea of validated learning does have grounding in the academic literature, particularly in the organizational learning context. For example, a study analyzing quality improvement projects at a steel wire factory with the aim of reducing waste found that non-validated projects (meaning projects that were not rigorously evaluated before implementation) on average increased waste while validated projects on average decreased waste (Lapr e, Mukherjee & Van

Wassenhove 2000). Another study that looked at different product lines within the same organization found that without management buy-in or diversity of knowledge, experimental learning yielded poor gains in productivity (Lapr e & Van Wassenhove 2001). In the new venture context, validated learning can be viewed as a stage where a new venture is learning the necessary information to develop a viable business plan. In particular, by validating and refuting assumptions, the new venture can make a collection of decisions based on learned information that eventually forms a viable business plan. It is also possible that over the course of the validated learning stage, the managers of a new venture learn that a viable business plan cannot be crafted and that the venture should be terminated. If the process of validated learning leads to a viable business plan, the new venture can then move from the validated learning stage to commercialize the product or service with greater confidence. Commercialization is the process of taking a new business idea, product, or service and scaling it to make a full single business unit. (Josefy, Harrison, Sirmon, & Carnes 2017). We now move to identify how these two different stages of a new venture will affect the relationships between sensing, seizing, survival, and growth.

During the validated learning stage, sensing activities will affect survival because learning will give the managers of a new venture the necessary information to refine a product or service and develop a viable business plan. Seizing activities will affect growth during this stage because growth can be achieved regardless of whether there is sufficient evidence demonstrating the viability of a business plan. However, we expect that sensing activities will not affect growth and seizing will not affect survival during the

validated learning stage because the knowledge and experience gained from validated learning can take years to verify and convert into a viable business plan. Attempts to commercialize a new venture during the validated learning stage may result in incurred costs that commit precious resources to a nonviable business plan. Therefore, during the validated learning stage we expect survival and growth to be independently determined. If a new venture moves to commercialize after generating a validated business model, we expect that growth will have an effect on survival. The critical factor causing survival and growth to become more jointly determined over time is the new venture's ability to convert validated learning into a viable business plan, which leads to an organization that can grow successfully.



**Figure 2.1: Summary of conceptual framework and hypotheses**

Figure 2.1 summarizes our conceptual framework highlighting the differences between the validated learning stage and the commercialization stage in relation to survival and growth. Therefore:

Hypothesis 1A: Survival and growth are not jointly determined during the validated learning stage of a new venture.

Hypothesis 2A: Survival and growth are jointly determined during the commercialization stage of a new venture.

A key facet of dynamic capabilities theory, however, is that sensing and seizing are “higher level dynamic capabilities” and that these capabilities are built upon microfoundations (Teece 2018). Sensing is built on the microfoundation of identifying a competitive advantage; seizing is built upon the microfoundation of hiring of new employees.

#### *Competitive advantage identification and new employees*

Identifying a competitive advantage is a microfoundation of sensing and one key component of developing a viable business plan. A competitive advantage is an organization “specific advantage” that “influences the decision of what activities and technologies along the value-added chain an [organization] should concentrate its investments and managerial resources in, relative to other [organizations] in the industry” (Kogut 1985). When a new venture fully validates that it has discovered a competitive advantage to integrate into its business plan, the new venture can then move to commercialize (i.e., grow) with higher confidence that expectations will be met, instead of attempting to commercialize without an identified competitive advantage. Therefore, we expect the identification of a competitive advantage to be directly correlated with

survival. However, identifying a competitive advantage during the validated learning stage does not immediately translate into tangible growth as there are still many steps before a competitive advantage is fully integrated into a business plan. Once a business plan with a distinct competitive advantage is fully developed, we expect that the presence of a competitive advantage will be directly correlated with both survival and growth. Research on the survival of new ventures lends credence to this view as well. Pre-entry knowledge and management experience were beneficial in helping survival, but had less clear effects on growth (Dencker, Gruber, & Shah 2009). In addition, early stage business planning (which can be viewed as yet-to-be-validated assumptions) decreased survival, while product line changes increased survival (Dencker et al. 2009). General human capital was found to have a positive effect on survival and growth while specific human capital was found to have a negative effect on survival and no effect on growth (Rauch & Rijdsdijk 2011). Based on our theoretical framework combined with previous research findings, we propose the following hypotheses related to having a competitive advantage:

Hypothesis 1B: The identification of a competitive advantage is directly correlated with survival during the validated learning stage of a new venture.

Hypothesis 2B: The identification of a competitive advantage is directly correlated with survival and growth during the commercialization stage of a new venture.

New ventures also require labor but the benefits of a large employee base or

adding large numbers of new employees (i.e., having a large percentage of a new venture's employees be new employees) is not particularly clear. New employees bring new skills and resources to a new venture and an increased capacity to conduct validated learning. However, new employees also represent costs that can potentially strain assets, which is especially pertinent with undercapitalization being one of the most cited reasons for new ventures failing (Hall & Young 1991). In addition, it is not clear that a new venture would need to hire a lot of new employees to conduct validated learning. An example of a new venture testing its assumptions in the market place before moving to commercialization comes from Village Laundry Services ("VLS"), a new venture that provides laundry machines for middle class Indian people, similar to a laundromat (Innosight Ventures 2010). VLS tested its business plan by "mount[ing] a consumer-grade laundry machine on the back of a pickup truck [and parking it] on a street corner in Bangalore," to see if people would be interested in the service (Ries 2011). People reacted favorably to using the laundry machine, which validated VLS's assumptions and provided firsthand experience with potential customers to further refine their business plan and gave them confidence to invest further in the idea. However, an experiment like this requires few employees to provide worthwhile feedback. New employees also represent an opportunity to generate revenues which can in turn generate growth, but this can occur regardless of whether the business plan is viable or not. The key consideration is whether this growth will translate into greater survival. Our framework implies that new employees should only contribute to survival once a fully developed business plan is created to effectively and integrate them into the new venture. Therefore:

Hypothesis 1C: New employees are directly correlated with growth during the validated learning stage of a new venture.

Hypothesis 2C: New employees are directly correlated with survival and growth during the commercialization stage of a new venture.

There are, then, two sets of hypotheses. The first set of hypotheses (which includes Hypotheses 1A, 1B, and 1C) relates to a new venture in the validated learning stage while the second of hypotheses (which includes Hypotheses 2A, 2B, and 2C) relates to a new venture in the commercialization stage.

	Validated Learning Stage	Commercialization Stage
Survival & Growth	Independently determined (1A)	Jointly determined (2A)
Competitive Advantage	Directly correlated with survival (1B)	Directly correlated with survival and growth (2B)
New Employees	Directly correlated with growth (1C)	Directly correlated with survival and growth (2C)

**Table 2.1: Grouping of hypotheses with commensurate new venture stage**

## Methods

### *Design of study*

We evaluate the presence (or absence) of the joint determination of survival and growth by conducting a Hausman test between two regressions (Hausman 1983). One regression is the prediction of the survival of a new venture based on specific antecedents and the other regression is the prediction of growth based on the same antecedents. Our unit of analysis is the new venture. To evaluate the presence of joint determination, we



rely on an instrumental variable that allows us to separate out the individual error and joint error (potential error that can influence both the survival regression and the growth regression) in the survival regression. By separating out the two different error types, we conduct the regression on growth with the estimated joint error term from the survival regression and evaluate whether it is significant. If the joint error term is found to be significant, then there is evidence suggesting that both survival and growth influence each other and can be viewed as jointly determined. If the error term is found to not be significant, then there is evidence that survival and growth are independent. This design follows the method used in Novak & Eppinger 2001.

#### *Data set*

To test this framework, we use the private version of the Kauffman Firm Survey (KFS). The KFS is a longitudinal survey of 4,928 new ventures that were all started in 2004. The survey collected organization-level information encompassing basic characteristics, strategy, practices, finances, and demographics of owners. In addition, the collectors of the KFS computed a wide range of variables that related back to the data collected by the KFS. A more thorough description of the KFS can be found via Ballou, et al. 2008 and Robb, et al. 2009.

#### *Measures*

***Dependent variable – survival.*** New ventures voluntarily report on their operating status within the KFS. Participants could report one of the following statuses: continuing operations, merged with or sold to another organization, temporarily stopping operations,

permanently stopping operations, or other. If a participant reported being merged or sold, permanently stopping operations, or other, then the new venture was considered to have terminated operations and data collection by the KFS stopped. No other data was collected in the new venture's termination year by the KFS. Participants that reported to be continuing operations were asked to provide further information. A summary of responses from KFS participants over the entire survey is below.

	Year 1	Year 2	Year 3	Year 4	Year 5
Still Operating	3,998	3,390	2,915	2,606	2,408
Permanently Stopped Operations	326	622	890	1,067	1,214
Dropped From Sample	604	916	1,123	1,255	1,306
Total	4,928	4,928	4,928	4,928	4,928

**Table 2.2: Summary of survival states for each new venture by sample year**

If a participant stated that it was temporarily stopping operations in a given year, never restarted operations in subsequent years, and then permanently stopped operations afterwards, the new venture was categorized as having permanently stopped operations in the year it reported temporarily stopping operations. For any given year, a new venture was either continuing (1) or had stopped operations (0).

***Dependent variable – growth.*** We measure growth by measuring whether total revenues increase year over year. If a participant reported an exact value for revenues, then that value was recorded by the KFS. Participants that did not report a specific value were given the option to report within ranges of revenue values. If a participant reported a revenue range, the median value of the range was used in our analysis (e.g., if a

participant said that its revenues fell between the range of \$500 and \$1,000 dollars, we used a value of \$750). Any participant that did not report revenues in a given year while still in operation was dropped from our sample. Growth was coded as either growing (1) if year-over-year revenues increased or not growing (0) if revenues stayed neutral or decreased.

	Year 1	Year 2	Year 3	Year 4	Year 5
Growth	1,406	1,063	875	709	687
No Growth	1,312	1,343	1,247	1,157	1,009
Dropped From Sample	2,210	2,522	2,806	3,062	3,232
Total	4,928	4,928	4,928	4,928	4,928

**Table 2.3: Summary of growth states for each new venture by sample year**

*Independent variable - competitive advantage.* The KFS gathered information regarding a competitive advantage by asking the respondent whether the new venture had a competitive advantage (1) or not (0). Competitive advantage is a perceptual variable. While this may cause some concern regarding biases, we feel that it is still appropriate given the nature of the question we are asking. Entrepreneurs will make decisions based on their perceptions of whether a competitive advantage exists or not. Some participants changed their responses to this question over time, stating that they had a competitive advantage in one year, and then saying they did not have a competitive advantage in a following year or vice versa.

*Independent variable - new employee percentage.* New employees represent additional labor brought into a new venture that year. This factor is critical in developing the commercialization processes to sell a product or service and grow a new venture. We

operationalize this variable by looking at the difference in employee count from year to year. If the number of employees grew, then all new hires are treated as new employees. We then divide this number by the number of total employees in the current year to create a percentage measure to normalize the effect of the new venture's size. This percentage measures the size of the workforce in the current year that is new. If a new venture's workforce stayed the same size or decreased, we assume that only veteran employees remain and therefore the new employee percentage is 0%.

*Control variables.* We employ a few control variables to help mitigate the influence other antecedents may have on our analysis: total employees, total assets, whether the new venture is high tech or not, the gender of the first owner, and whether more than one person owns the new venture. Total employees are the number of workers, including any owners, contributing to the operations of a new venture. For a new venture, employees are not necessarily a good asset to have early on. If a new venture hires too many employees early, without an effective product to sell, employees can become cost with no benefit. However, some employees are necessary for a new venture to develop new products and are also a critical for sustaining a new venture. We define total assets as the sum of all assets on hand for operations and investments. One of the most reported reasons that new ventures fail is undercapitalization (Cooper et al. 1994; Hall & Young 1991). Assets are also critical to developing products and services and to find clients and grow. In general, total assets can rarely be too big. For established organizations, assets are usually more related to growth (production capacity) than to survival. We operationalize total assets by splitting the participants in the KFS into new ventures with

less than or equal to \$100,000 in total assets (0), and new ventures with greater than \$100,000 in total assets (1). Whether a new venture is high tech (1) or low tech (0) can have implications regarding survival and growth as high-tech new ventures encounter higher risk (Bayus & Agarwal 2007). However, this increased risk can lead to greater returns and growth if success is achieved. The participants the KFS identified as high tech are in the following categories: chemical & allied products, industrial machinery & equipment, electrical & electronic equipment, and instruments & related products. Female-owned new ventures have been shown to have lower survival rates than male-owned new ventures (Boden Jr. & Nucci 2000; Justo, DeTienne, & Sieger 2011; Kalleberg & Leicht 1991). We categorized new ventures either as having a lead female owner (1) or a lead male owner (0). The number of owners can have an effect on the survival and growth of new ventures. If ownership is concentrated in the hands of a single owner, then all risks and rewards are attributed to that single owner. This can make a new venture less resilient, but increase the potential rewards. With more owners, there is the possibility of risk pooling that can help a new venture through initial downturns but the rewards of the new venture will be split among the owners. In addition, more owners can bring more knowledge and resources into a new venture, which can directly affect survival and growth. We categorize new ventures as either having a single owner (0) or having two or more owners (1).

*Instrumental variable – State unemployment rate.* The state unemployment rate is the percentage of the labor force actively looking for work in a given state but incapable of finding work. It captures the difficulty of finding employment for labor in

the state, with a higher unemployment rate representing a higher difficulty of finding work (and a lower unemployment rate representing a lower difficulty in finding work). We use the state unemployment rate as an instrumental variable, based on the premise that it will affect the probability of survival for a new venture but can only affect growth after impacting survival.

Many studies regarding entrepreneurial motivation have cited the need for an immediate job, the feeling of being pushed out of an organization, and the desire for self-employment as three of the many key reasons for entrepreneurs to create new ventures (Cooper 1970; Krueger, Jr., Reilly, & Carsrud 2000; Mayer & Goldstein 1961; Shapero & Sokal 1982). These trends can still be seen today. For example, many older people who are being forced out of the workforce are turning to entrepreneurship to make up the lost income (Cook 2017). As such, it follows that participants in the KFS may have had some combination of the above factors influence their decision to create a new venture. However, entrepreneurs always retain the option to attempt to join an existing organization as time progresses. It is possible entrepreneurs may take stock of their current situation and deduce that becoming an employee of an established organization puts them in a net better position than running their own new venture. If an entrepreneur were to successfully join an existing organization, it would most likely mean closing down the new venture. The ease and feasibility of using this option by the entrepreneur to become employed by an existing organization can be captured by the state unemployment rate, as it captures the difficulty of the active labor force in finding work. Therefore, we assume that the state unemployment rate will have an effect on an entrepreneur's ability

to move to an existing organization, which will directly affect survival.

*Specification and testing*

We specify the new venture survival relationship as:

$$\begin{aligned}
 Survival_{n+1} = & \\
 & \beta_{0S} + \beta_{1S} * Competitive\ Advantage_n + \beta_{2S} * New\ Employee\ Percentage_n + \\
 & \beta_{3S} * Total\ Employees_n + \beta_{4S} * High\ Tech_n + \beta_{5S} * Female\ Owner_n + \\
 & \beta_{6S} * 2\ or\ More\ Owners_n + \beta_{7S} * Unemployment\ Rate\ (State)_n + \gamma_{1S} * \\
 & Growth_n + \varepsilon_S \text{ (Equation 1)}
 \end{aligned}$$

We use survival in Year n+1, as opposed to Year n because if a participant responded in Year n, it must have survived through Year n based on the KFS survey methodology. When a new venture reported closing down, the KFS did not collect any further data about the new venture in the year it closed down. Thus, the only information we know at Year n+1 if the new venture closed was that the new venture closed.

$$\begin{aligned}
 Growth_n = & \\
 & \beta_{0R} + \beta_{1R} * Competitive\ Advantage_n + \beta_{2R} * New\ Employee\ Percentage_n + \\
 & \beta_{3R} * Total\ Employees_n + \beta_{4R} * High\ Tech_n + \beta_{5R} * Female\ Owner_n + \\
 & \beta_{6R} * 2\ or\ More\ Owners_n + \gamma_{1R} * Survival_{n+1} + \varepsilon_R \text{ (Equation 2)}
 \end{aligned}$$

Because both survival and growth are binary variables, we use logistic regression. After conducting our logistic regression on survival in a given cross-section year, we use the newly estimated coefficients to predict values of survival ( $\widehat{Survival}_{n+1}$ ). The difference between the observed survival value and the predicted survival value

$(\widehat{Survival}_{n+1} - Survival_{n+1})$ , which we call  $\widehat{\varepsilon}_S$ , represents the predicted error for survival. We include  $\widehat{\varepsilon}_S$  and the observed value of survival into our regression of growth. If the error term,  $\widehat{\varepsilon}_S$ , is significant, then the error terms are not independent and both dependent variables are jointly determined. If the error term does not have significant explanatory power, then this provides evidence that the two are independently determined.

### Results

Tables A1 through A5 (In Appendix A) provide descriptive statistics for our data set from each year. We find little evidence of high co-variance between our independent variables and control variables, giving us confidence that any multi-collinearity issues in our regression are minimal. Our dependent variables, however, do show somewhat low correlation with our other variables, contributing to lower pseudo  $R^2$  values than desired.

We conduct the Hausman test on the KFS data from 2005 (referred to as Year 1) through 2009 (referred to as Year 5) to evaluate whether there is independent or joint determination for survival and growth over the first five years of the life of the participants in the survey. The results of these regressions are in Table A6 (In Appendix A). Standard errors are shown in parentheses below the estimated coefficients for each factor. The table is broken down by year, and then further separated between the survival regression in a given year that is used to calculate  $\widehat{\varepsilon}_S$ , which is then utilized in the growth regression of that year. Table 2.4 compares the results of our regressions against our proposed hypotheses.



		Year 1	Year 2	Year 3	Year 4	Year 5
Validated Learning Hypotheses Set	1A	Support	Support	No Support	Support	No Support
	1B	Support	No Support	No Support	Support	No Support
	1C	Support	Support	No Support	No Support	No Support
Commercialization Hypotheses Set	2A	No Support	No Support	Support	No Support	Support
	2B	No Support	No Support	No Support	No Support	Support
	2C	No Support	No Support	No Support	No Support	Support

**Table 2.4 Hypothesis testing results from year 1 (2005) to year 5 (2009)**

We examine the results of the regressions sequentially by year and evaluate our hypotheses as two sets. Support for Hypotheses 1A, 1B, and 1C indicates that new ventures are predominately in the validated learning stage. Support for Hypotheses 2A, 2B, and 2C indicates that new ventures are predominately in the commercialization stage. In Year 1 (i.e., the beginning of the sample), we find that Hypothesis set 1 is completely supported. There is no evidence of joint determination for survival and growth (Hypothesis 1A), identification of a competitive advantage is directly correlated with survival (Hypothesis 1B), and new employee percentage is directly correlated with growth (Hypothesis 1C). Therefore, we would conclude that in Year 1, these new ventures are in the validated learning stage. In Year 2, we find support for Hypothesis 1A

and 1C, but do not find support for Hypothesis 1B. Therefore, we conclude that in Year 2, the new ventures are beginning to leave the validated learning stage. In Year 3, we find support for only Hypothesis 2A (survival and growth are jointly determined outcomes), and no support for any other hypotheses. Therefore, we conclude that in Year 3, the new ventures are beginning to move towards the commercialization stage but are not strongly identified as being in either the validated learning stage or the commercialization stage. In Year 4, we find support for Hypotheses 1A and 1B, but no support for any other hypotheses. This result does not support our framework because it implies that the new ventures have either reversed their trend of moving from the validated learning stage to the commercialization stage or that the balance of new ventures in the validated learning stage and commercialization stage has shifted unexpectedly. We will expand on this finding below. In Year 5, we find support for Hypotheses 2A, 2B (competitive advantage is directly correlated with survival and growth), and 2C (new employee percentage is directly correlated with survival and growth). Therefore, we conclude that in Year 5, the new ventures are in the commercialization stage.

Year 4 (which overlaps with 2008) breaks the general trend of the new ventures moving from the validated learning stage to the commercialization stage. In particular, Hypotheses 1A and 1B are supported in Year 4, which we interpret as the new ventures showing signs of being in the validated learning stage but also transitioning out of the validated learning stage (similar to Year 2). This move away from the expected trend could occur through a combination of effects. New ventures that were further along the transition from validated learning to commercialization disproportionately (when

compared to previous years) exited the sample, new ventures managed to reverse course and move back towards the validated learning stage instead of continuing to move towards commercialization for a single year, or a shock occurred that altered the relationship between our dependent variables and the antecedents (independent variables and controls) for Year 4 that caused the relationship between variables to resemble the validated learning stage instead of the commercialization stage. One possible explanation for the aberration in Year 4 (2008) is the economic downturn beginning in late 2007 and resolving in June 2009, which could have been the shock necessary to change outcomes of the trend. This would also partially explain why the trend appears to correct itself in Year 5, with the effect of the economic downturn ending.

One additional finding is that having assets over \$100k (high assets), is directly correlated with survival in Years 1 and 2 (2005 and 2006), which are the earlier years of our sample. However, for Year 3 through Year 5 (2007 through 2009), having higher assets is no longer as significantly correlated with survival. This is in line with our framework that stipulates that high asset levels are more critical for survival early on as a new venture survives by covering costs through the use of funds from an initial endowment during this period. The effect of having high asset levels though becomes less relevant to new venture survival as the venture must eventually begin to survive from generated revenues. However, it was still expected that having high total assets would be somewhat associated with survival during the commercialization stage, which we do not see as much support for based on the results. This may be evidence that of the remaining new ventures, assets as means of enabling survival are becoming less pronounced and

becoming more associated with growth.

### **Discussion**

This paper examines a question that is gaining traction in the literature: whether new venture survival and growth are jointly determined and whether this possible joint determination varies over time (Greve 2008; Wennberg et al. 2016). We leverage dynamic capabilities theory and lean startup practices to empirically test for joint determination via a Hausman test applied to logistic regression. Our findings support the idea that survival and growth are not jointly determined for new ventures in the validated learning stage (or early portion of their lives) but are more likely to become jointly determined as time goes on and new ventures move to the commercialization stage. We developed this framework by mapping specific entrepreneurial actions and outcomes to specific dynamic capabilities and microfoundations. In particular, we examine the dynamic capability of sensing and propose that a key microfoundation within sensing is the identification of a competitive advantage that occurs during the process of validated learning. We also examine the dynamic capability of seizing and propose that a key microfoundation within seizing is bringing in new employees to implement a business plan during the process of commercialization. By drawing this mapping, we are capable of developing a framework that can help explain the temporal aspects of the relationship that survival and growth may have with each other.

#### *Contributions to theory*

Our study makes two contributions to theory. First, we shed light on a growing

question in the entrepreneurship literature regarding the linkage between survival and growth. Current research has begun to question the assumption that survival and growth are inextricably linked at all times. We use dynamic capabilities theory and associated microfoundations to develop a framework and generate hypotheses to empirically test this question. A related contribution is that we bridge the divide between the academic literature and practitioner literature in order to address this question. The academic entrepreneurship and operations literatures are rich, but may not be familiar to practitioners. The lean startup practice comes from industry, and we attempt to link it to the established literature. Our second contribution to theory is further identifying what antecedents may be better at fueling survival versus growth via microfoundations. Many studies have found that survival and growth can be affected differently by the same antecedents, such as total assets, human capital, or the presence of preplanning.

#### *Contribution to practice*

Our contribution to practice is two-fold. First, our findings empirically support a central tenet of the lean startup practice: that growth should not be hastily pursued. Since we find that survival and growth are not jointly determined in the validated learning stage of a new venture, entrepreneurs are not increasing the chances of their new venture surviving by aggressively growing through any means possible. We find evidence that if an entrepreneur wants to increase the odds of survival of their new venture through the early years, securing as many assets as possible and using those assets to rapidly develop a competitive advantage will most likely yield better results than anything else. Second, practitioners should be wary of maintaining a large workforce during the early years. We

did not find evidence that workforce size is related to survival in the early years of a new venture. If there are benefits generated by an increasing workforce size early in the life of the new venture, they are potentially being offset by labor costs.

#### *Limitations and future work*

There are limitations to our work that point to further avenues of study. First, we cannot cleanly identify when any particular new venture moves from the validated learning stage to the commercialization stage. We feel more work should be done to further understand the validated learning and commercialization stages of a new venture's life cycle. In particular, we feel that discovering clear methods to demarcate one stage from the other will help us — and future researchers — to further evaluate the nature of survival and growth. Second, we cannot observe exactly how new ventures generate or verify a competitive advantage. We feel much more firsthand data must be collected from entrepreneurs to understand how they conduct validated learning (successfully or unsuccessfully) to generate a competitive advantage or gain market information. In particular, this could help researchers identify key metrics that we can use for proxies of validated learning. Finally, we feel there is much more work to be done regarding analyzing the relationship between survival and growth of new ventures. One key aspect to explore is when does a new venture fully become “established” to the point where survival is simply assumed and no longer a goal — and how does this change behavior? In addition, are there other antecedents that can influence the relationship between the two?

## **Essay 2 - Who do we know virtually, and what do they know: Social media based transactive memory systems**

### **Introduction**

Transactive memory systems (TMS) were originally conceptualized by observing the “memory sharing” behaviors of intimate couples (Atkinson and Huston 1984, Wegner 1987) and were later refined by observing small project teams. Wegner observed that this memory sharing behavior mirrors the way database systems manage data by storing data in different memory locations and then accessing it as needed (Wegner 1995). A core tenet of organizational TMS studies is that, “group members divide the cognitive labor for their tasks, with members specializing in different domains. Members rely on one another to be responsible for specific expertise such that collectively they possess all of the information needed for their tasks” (Lewis 2003). TMS has now evolved into a theory for how groups are organized around the classification and sharing of knowledge. Three additional key constructs are used in this theory to assess organizational behavior: directory updating, information allocation and retrieval coordination (Wegner 1995, Ren and Argote 2011). While most TMS studies focus on small groups endowed with some combination of intimacy, formal group boundaries, & locational proximity, a growing segment examines TMS among virtual groups. Three dimensions define these virtual groups: geographically dispersed members, the predominance of electronic communication, and the presence of dynamic structural arrangements (Yoo and Kanawattanachai 2001, Gibson and Gibbs 2006). A group can be more virtual or less

virtual depending on how strongly it measures on these dimensions.

The evolution of communication collaboration technologies like social media and the growth of online groups enable new forms of virtual work because they give rise to tacit knowledge flows between participants (Faraj et al. 2016). Two growing forms of virtual groups in this context, which we collectively term as social media-driven work, are *backers* who engage in crowdfunding (Belleflamme et al. 2014) and *socializers* who engage in community discussion (Bartle 1996). Crowdfunding is the social media-based practice of “request[ing] funding from many individuals, often in return for future products” and currently occurs via online platforms (Mollick 2014). Platforms like Kickstarter and GoFundMe have become substantial sources of alternative financing for many initiatives. In 2015, approximately \$34 billion was raised through crowdfunding (Crowd Expert 2019). Of that \$34 billion, \$2.68 billion was associated with reward-based crowdfunding, which is when a backer contributes funding to a project in return for a reward (Crowd Expert 2019). A second source of interactions for group work comes from social media-based technologies such as Discord blogs and Slack. Discord is “Slack-meets-Skype,” type environment featuring voice, video, and text communications designed specifically for gamers. It currently has 87 million users in 231 countries, with over 14 million daily active users who post 9.5 billion messages a month (Rosenberg 2017, Crunchbase 2020). Social media participation expands the boundaries of group work by helping the way groups “run our organization, make new friends, and experience unforgettable moments” (Discord 2019).

In the next section, we review extant TMS theory to argue that there is a scarcity



of virtual group TMS research on social media platforms. The foundational research question that arises in this context, then, is whether organizations leverage TMS-based information coding and processing constructs to take advantage of specific expertise that might arise from social media participants. This question develops because social media participants are not full-time employees or contracted partners who must conform to established routines while engaging in knowledge generation and flows nor are they groups with more established boundaries and routines. This is especially relevant given that conversation channels can be a key factor in knowledge management (Von Krogh et al. 2000). This lack of established norms may lead social media discussion to be strictly transactive (i.e., conforming to conventional TMS practices) or to be transformative (i.e., providing commentary about product features and innovative opportunities) and leads us to our second set of research questions related to the division of cognitive labor and group member knowledge specialization. Specifically, does the scope of knowledge that flows through a TMS account for product alterations and critiques brought forth by social media participants?

We use the case methodology to explore these research questions by analyzing a tabletop game funded through Kickstarter (backers) and its parallel group on Discord (socializers) (Eisenhardt 1989, Eisenhardt & Graebner 2007). The tabletop gaming industry is rarely examined, yet provides a unique opportunity to gain a more complete understanding of the nature of virtual work (Bailey et al. 2012). Specifically, we analyze comment threads to find evidence of a TMS, and analyze comments to identify the proportions of TMS activity occurring on Kickstarter and Discord (an online community

of social media users). Social media blogs have become a de facto best practice for group-based development in this industry (Nelly 2018). Game virtual groups (GVG) frequently leverage social media as a technology platform for driving key aspects of innovation and engaging with players. A GVG is a group of people who rely primarily on electronic communication to interact with each other and whose interactions revolve around (but are not limited to) a single game. Although GVGs can have “in-person” aspects such as meetings at a physical location to play, a GVG’s primary form of communication and interaction is electronic; individuals who only play the game with others “in person” are not part of the GVG.

We observe that digital technologies empower a variety of actors (i.e., backers, socializers, innovators, those who provide feedback or changes, etc.) in the development and evolution of tabletop games. By using TMS to explore this aspect of innovation, we have taken a first step toward expanding TMS beyond its transactional information processing roots, connecting it with theories of collaboration and open innovation. Our results contribute to the organization science literature in two ways. First, we find support for the existence of TMS by evaluating whether knowledge specialization, directory updating, information allocation, and retrieval coordination occur in a group. We also find differences in knowledge flows between Kickstarter backers and Discord socializers. Second, we find that social media participants exhibit emergent TMS characteristics in terms of scope of knowledge. Specifically, as the work (and its outcome product) evolves, some of the participants gain stature within the organization and their roles become formalized in a manner consistent with TMS. These social media participants

also seek to expand the scope of the game beyond the transactive issues by transforming outcome features based on their own specialized knowledge and preferences. We conclude this paper by offering theory and practice implications of our findings.

## **Theory**

### *Transactive memory systems*

TMS theory was created by observing how roles emerged within groups (typically small groups or romantic couples) regarding remembering important information among members (Atkinson and Huston 1984, Stasser et al. 1989, Wegner et al. 1991). Two important findings were that intimacy is an important determinant of whether a TMS would develop (Wegner et al. 1991) and that common knowledge engenders discussion (Stasser et al. 1989). Eventually, a collection of studies germinated a formal theory of TMS, which likened the method of how groups allocate and share information to data management systems (Wegner 1995). The primary reason why a TMS improves a group's ability to leverage (and retain) information is that group members can specialize in specific domains of information while not needing to permanently retain and update all possibly relevant information (Wegner 1995). For example, lawyers can focus on legal issues instead of having to retain extra information (e.g., engineering knowledge) in addition to legal knowledge. The value of a TMS for the lawyer though is that engineering knowledge can be quickly accessed (from a group member with engineering knowledge) should the need arise (Lewis 2004). The presence of a TMS is established by three main constructs: directory updating, information allocation, and retrieval coordination (Wegner 1995).

Directory updating is the building of a group member registry that identifies the holder of a given piece of information (Wegner 1995). For example, if a group needs to track a specific piece of inventory, a specific group member may be assigned to that task. In TMS, the result would be each group member associating questions and information about that piece of inventory with the assigned person. Information allocation is the process, "...whereby individual memories are fashioned into a differentiated group memory that is useful to the group" (Wegner 1995). In other words, a key piece of TMS is that differentiated knowledge resides within and flows through group members who can be brought together to accomplish a task. For example, policy makers have specialized knowledge to craft policy and lawyers have specialized knowledge to codify policy, but both must work together to ultimately create legislation. Retrieval coordination is how information is accessed by group members (Wegner 1995). In particular, retrieval coordination occurs when a group member acknowledges that another group member has desired knowledge and acts to retrieve that knowledge. While these definitions form the foundation of traditional TMS theory, they have been adapted to a wide range of contexts including dynamic capabilities and new product development (Table 3.1).

Author	Year	Context	Directory Updating	Information Allocation	Retrieval Coordination
Lewis	2003	Field scale development	Specialization	Credibility	Coordination
Argote and Ren	2012	Microfoundations of dynamic capabilities	Building knowledge assets	Reconfiguring existing knowledge assets	Integrating existing knowledge assets
Manteli, van den Hooff & van Vliet	2014	Global software development	Expertise awareness	Accessibility / Credibility	Communication frequency
Argote and Guo	2016	Organizational behavior	Knowledge creation	Knowledge coordination & knowledge retention	Knowledge transfer

**Table 3.1: TMS's application to diverse contexts**

*TMS applied to the virtual group setting*

Technological advancement has made it possible for much of the work in today's organizations to be accomplished by virtual groups, prompting the need to better understand how traditional TMS changes when groups move into a virtual setting. Table B1 (Appendix B) summarizes the literature and key findings of studies that focus on virtual group TMS.

Early studies of virtual group TMS focus on identifying whether a TMS develops and whether a TMS has a direct (or indirect) effect on team performance. Yoo and Kanawattanachai (2001) found TMS activity directly correlates with performance in virtual groups, but the development of a collective mind relationship mediates the relationship. Lewis (2004) found knowledge specialization to be directly correlated with the probability of TMS developing in a virtual group, and the relationship to be positively moderated by team familiarity prior to group formation. Kanawattanachai and Yoo (2007) found that TMS reduced task-oriented communication within a virtual group,

which simultaneously reinforced knowledge coordination and team performance. Importantly, the study also found that a TMS can develop even if all communication is electronic, but found TMS development time to be longer. O'Leary and Mortensen (2010) found isolated team members to be the most open to developing a TMS while members of sub-groups were less inclined. Of note, these studies focused on students and as the literature progressed, studies moved outside the academic setting.

More recent studies look at virtual groups in a professional setting. Oshri, van Fenema, and Kotlarsky (2008) studied TATA Consultancy Services' management of its three distinct teams (that collectively formed a virtual project group for software development) located in different areas and found that specialized routines and protocols helped coordinate knowledge transfer between teams. However, frequent teleconferencing and occasional short visits were still part of the projects as the authors state, "The retrieval of knowledge was largely enabled by the shared meaning and context that these teams developed throughout the project, supported by virtual and face-to-face meetings, and short visits" (Oshri et al. 2008). Majchrzak, Wagner, and Yates (2013) found both knowledge depth and knowledge breadth directly correlate with the probability of contributing to corporate wikis. However the study also found TMS to positively moderate the relationship between knowledge breadth and contributions to corporate wikis while the TMS also negatively moderated the relationship between knowledge depth and contribution to corporate wikis. Tang, Mu, and Thomas (2014) found that communication among virtual teams increases the probability of TMS developing. Exploratory contexts only positively moderate the relation between informal

communication and TMS development while exploitative contexts only positively moderate the relation between formal communication and TMS development. Havakhor and Sabherwal (2018) found that when group members have public ratings of their specialized knowledge, group members will quickly be assigned to tasks associated with that specialized knowledge. In instances where ratings only reflect general knowledge (and do not distinguish specialized knowledge) members use interpersonal relationships to assign members to tasks.

We study TMS development in GVGs because they have characteristics that differ from prior virtual TMS study contexts in a few ways. First, unlike nearly all studies to date, with the exceptions of Havakhor and Sabherwal (2018) and Majchrzak, Wagner, and Yates (2013), GVGs have minimal face-to-face communication, which has been shown to reinforce TMS development outside of the virtual space. Second, GVGs are considerably larger than groups in earlier studies, which were rarely larger than 10 members. Third, our groups have crowdfunding (Kickstarter) or community-centric (Discord) characteristics, which have not been studied in prior virtual TMS research. Fourth, our subject groups are not assembled as a project team within organizational boundaries or as an experiment with a focused project task. The GVG setting allows the group to discuss topics more freely, allowing for us to observe whether they drift from strictly discussing the task at hand. Fifth, crowdfunding groups can reorganize when entering the second iteration of the product, allowing us to exam how the member contributions during the first iteration influence the group member's position in the second iteration.

*Kickstarter*

Kickstarter is an online platform where product managers can engage in large-scale crowdfunding by posting their projects to entice backers to commit funds. Backers that decide to fund a project in return for rewards (e.g., a piece of art) can provide comments that are visible to the product manager and all other backers. Communication during a Kickstarter project is predominately electronic, meaning that a Kickstarter group can be considered a virtual group (Gibson and Gibbs 2006). Kickstarter projects have a flat organizational structure with only two official titles, the product manager and backers. The product manager is the only person with authority over the project and is ultimately responsible for using funds to deliver rewards to the backers. No central authority organizes backers, but they are free to organize themselves. Backers can significantly influence the product manager by providing feedback (via comments or direct messages) and changing their financial commitment. Given the relationships between the product manager and backers, a Kickstarter group can have “dynamic structural arrangements” that would further define a Kickstarter group as being a virtual group (Gibson and Gibbs 2006). Taken together, we assert that a Kickstarter group measures highly on dimensions that define a virtual group, allowing us to build upon findings in previous virtual group TMS studies.

In a Kickstarter group, each backer can independently choose to commit or withdraw funds (i.e., leave the group), effectively making each backer an isolate, which should encourage the development of a TMS (O’Leary and Mortensen 2010). In addition, during a Kickstarter project, backers are free to simply share information because all



project tasks are performed by the product manager (Kanawattanachai and Yoo 2007).

Taken together, we form the following expectation regarding Kickstarter:

Expectation 1: A TMS will develop within the Kickstarter comments during the first iteration of the product

A new Kickstarter group can also be formed to create a second iteration of the product after the first iteration is complete. The second iteration group can consist of members from the first iteration group, as well as entirely new members who may not have participated previously. In the second group, members from the first group sometimes move from being strictly backers of a project to more of partner role with the product manager where they provide a point of contact for community members regarding questions. These individuals typically are either the most active in the comments section of the first generation or provide some specialized voluntary service that is deemed valuable by the group, such as attempting to help the product manager overcome a challenge that is stalling the campaign. Based on this information, we develop the following expectation:

Expectation 2: The most active contributors to the first iteration project will take on a partnership role in the second iteration project.

*Discord*

Discord provides free text and voice communication for gamers and is emerging as a premier virtual community tool, “whose mission is to bring people together around games” (Discord 2019). While Discord focuses on building socializer GVGs, anyone is free to use Discord as a social communication platform. Discord shares many characteristics with Kickstarter along the virtual continuum (geographic dispersion, electronic communication, and dynamic structure). For example, since Discord facilitates virtual communication, it measures highly on being “predominately focused on electronic communication” (Gibson and Gibbs 2006). Members of a Discord group are isolates (as they are free to enter and leave as they see fit), which should increase the probability of a TMS developing (O’Leary and Mortensen 2010). In addition, since community development is not fundamentally a project that has specific task coordination activities, we expect that this would encourage knowledge sharing (Kanawattanachai and Yoo 2007). Based on these characteristics, we assert that a Discord group measures highly on the dimensions that make a group “virtual” and develop the following expectation:

Expectation 3: A TMS will develop in the comments of the Discord group

Kickstarter and Discord do have significant differences that may result in different distributions of TMS activity. Kickstarter commenters are backers; Discord commenters are socializers. While both Kickstarter and Discord allow for “dynamic structural arrangements” as members can enter and exit at will, significant differences also exist.

Kickstarter groups have only two official roles while Discord allows server creators (i.e., community managers) to assign multiple different roles to members. For example, certain Discord socializers can be assigned a role as experts regarding specific facets of a game or even the primary contact for questions. While the structure of a Discord group tends to be flat, specific individuals within the group do have final authority regarding assigning roles to members. Differences such as these lead us to believe there should be some degree of difference between the TMS activity of the two groups and therefore, we develop the following expectation:

Expectation 4: There will be demonstrable TMS activity differences between Kickstarter and Discord.

#### *Knowledge scope*

Most conventional TMS studies seek to understand the effectiveness of teams and their virtual partners by focusing on transactional information processing. However, social media knowledge flows can hardly be bounded by the priorities of a team, raising theory questions about knowledge transition. Carlile and Reberich (2003) have drawn upon evidence from international joint ventures and product development to posit the existence of a knowledge transformation cycle where knowledge storage and retrieval (both key constructs in TMS) link into knowledge transformation, creating a dynamic process. The authors argue that, “Knowledge retrieval does not begin from a clean slate; it is based on a path-dependent history of activities within the organization. In many situations, such history is of significant value as individuals retrieve and reuse knowledge

and experiences to meet their needs. However, as task complexity increases, the scope of activities associated with the retrieval process needs to adapt to address not only the increase in the application of knowledge, but also the increased number of dependencies and sources of specialized knowledge” (Carlile and Rebentisch 2003). Such scope creep has been observed across generations of products as well (Anderson and Joglekar 2012).

This dynamism has also been posited in the open sourcing literature. Boudreau and Lakhani (2009) point to extrinsic motivations within open source communities that do not always align with the cognitive models of the firm attempting to draw from this open source knowledge. The authors also point out that the dynamics of open source communities are often driven by informal interactions, which may require a level of interaction with partners that is atypical when compared to more traditional projects. Felin, Lakhani, and Tushman (2017) discuss how various crowd-related phenomena and practices — for example, crowdsourcing, crowdfunding, user innovation, and peer production — relate to sociality. In this context, sociality can be a mechanism for sensing & signaling, or matching & identity. Customers (i.e., Discord socializers in our study) and broader stakeholders (i.e., Kickstarter backers in our study) increasingly demand transparency and exert their voice by, for example, not buying a company’s products if the product features do not align with their own identity. Therefore, we develop the following expectation:

Expectation 5: Input from social media participation will lead to a demonstrable increase in the scope of knowledge flowing through TMS prior to the launch of a second-generation product.

## **Methodology**

### *Case based research*

Virtual group TMS research is still relatively new and our context differs substantially from other TMS studies. For example, most studies do not have subjects with a direct financial stake in a project whereas Kickstarter groups by definition have a financial stake in the project. Another example is that Kickstarter and Discord groups can be magnitudes larger than traditional TMS settings, with Kickstarter projects sometimes exceeding 10,000 backers and Discord servers sometimes exceeding 1,000 members. One more difference is that most TMS studies define a group with a clear boundary of who is “within” the group and who is “outside” the group. Small groups like project teams or romantic couples have natural and sharp demarcations but a Kickstarter or Discord group may not. Therefore, we rely on guidelines established by Edmondson and McManus (2007) to develop our methodology. We assert that our study resides in the “Intermediate” setting (Edmondson and McManus 2007). In this setting, the goal is to “Propose relationships between new and established constructs” and the type of data collected is a “hybrid of both qualitative and quantitative [data]” (Edmondson and McManus 2007). To fulfill this goal, we select the case-based theory building approach (Eisenhardt 1989, Eisenhardt and Graebner 2007). “The case study is a research strategy which focuses on understanding the dynamics present within single settings... [to]

generate theory” (Eisenhardt 1989). We choose a large tabletop games Kickstarter project, Unstable Unicorns, with an active Discord community.

### *Unstable Unicorns*

Unstable Unicorns launched on August 16, 2017 by TeeTurtle Inc. (termed as firm, going forward) on Kickstarter under the tabletop game category with a target fundraising goal of \$10,000. The project ended with a total pledge amount of \$1,865,140 coming from 33,720 backers, raising ~18,651% of the original target. It was one of the most successful tabletop game Kickstarter projects at the time in terms of total backers (Marotta 2017). Of the 33,720 backers, 27,079 had backed at least one previous project. Slightly over half of all backers are located in the US while the other backers are spread throughout the rest of the world. The only city with more than two percent of total backers is Singapore, meaning the geographic dispersion dimension of a virtual group is high for this Kickstarter project. Unfortunately, we cannot measure geographic dispersion within the Discord group. However, Discord has global reach as an app and since the backer group is quite geographically dispersed, we believe that the Discord group should be geographically dispersed as well. While there are a number of job descriptions on the firm’s website for employees who interact with the social media participants, we deploy the term “product manager,” to refer to them because these interactions primarily address product management and allied innovation issues.

*Data collection*

We collected our data from two main sources: Kickstarter backers for Unstable Unicorns and Discord socializers for Unstable Unicorns. For the Kickstarter project, we scraped all backer comments from the comments tab of the project, resulting in over 14,000 comments. Kickstarter comments continued well after the funding period ended and even continued through fulfillment. For the Discord group, we scraped all comments since the group's inception on January 17, 2018. Within the Discord group, the only channel we found with discussions between socializers was the channel labeled "unbridled-canter," which is our focus of attention. We collected over 3,000 Discord comments.

*Comment comparability and screening*

We screen our comments to create a sample that only includes comments related to potential product characteristics and changes to ensure a consistent comparison between Kickstarter and Discord comments. Many Kickstarter comments pertain to issues unique to Kickstarter (e.g., stretch-goals management, payment tiers, etc.) that are naturally absent from a Discord group. Also, the Discord group was created months after the Kickstarter funding period ended, meaning items discussed during the Kickstarter project would potentially be absent from the Discord group as well. For example, a few backers wanted a card with a picture of a Rhino and discussed this very early on during the Kickstarter campaign. Over the course of development, it was clear that a card with a picture of Rhino was incorporated into the game. Since this Rhino art was incorporated, it would naturally follow that people on Discord would not discuss wanting a card with a

Rhino picture on it. Therefore, comments talking about changes that were implemented before the Discord server was created were also screened. Finally, we screened out any comments in either group that occurred after August 15, 2018 at 12:00 p.m. EDT, the launch time for the Kickstarter “Unstable Unicorns Chaos and Control,” project, a second-generation iteration of Unstable Unicorns. After applying our screening process, we had 1,284 Kickstarter comments and 437 Discord comments.

### *Method of analysis*

Our unit of analysis for the presence of a TMS is the comment thread while our unit of analysis for aggregate TMS activity is the comment. A thread is a natural grouping of comments that form a conversation (e.g., exchange of questions and answers, discussion about a topic, etc.) Using threads, we can track conversations that mimic TMS activity. Specifically, as a TMS is about storing and exchanging information, inquiries and answers from either players or the product manager also create knowledge flows that emulate the activity that occurs across a TMS.

Most TMS studies examine groups where all group members formally share responsibilities regarding the successful completion of a project and have knowledge that is applicable to the project. This means that within in a typical TMS group, each member can engage in directory updating, information allocation, and retrieval coordination activity. Similar to other studies, all group members in our context are capable of information allocation activity and unclassifiable activity (discussed below). However, a unique facet to Kickstarter and Discord groups is that only the product manager has any formal responsibility regarding the project but the other group members (backers and



socializers) house potentially relevant knowledge for the product manager. Therefore, only the product manager should technically engage in retrieval coordination to access information relevant to accomplishing a task related to the product. We account for this in our coding by restricting retrieval coordination activity solely to the product manager and restricting directory updating activity solely to members who are not product managers. After applying these restrictions, we code comments based on their respective TMS activity.

The product manager initiates retrieval coordination comments to gain knowledge from other group members relevant to making decisions about the product. An example from Kickstarter would be, “Hey, guys! We're looking at doing something to clarify rules here in the near future. Now that more of you are getting the game and able to play with it, what rules have you come across that are unclear that you'd like us to address for you? Let me know here in the comments and we'll compile a bunch of them and get some answers for you!” We see a desire by the product manager to retrieve information from players (backers in this case) regarding how they can make the rules clearer. An example from Discord is, “By the way, if anyone here has any suggestions specifically related to card effects, new mechanics, etc. that you'd want to see fixed or added in future versions or future expansions I'd love to hear feedback on those. I'm trying to collect a lot of that kind of stuff so that we can continue improving the game and making it more interesting as we go. Get as wild as you want with any ideas!” Once again, we see an effort from the product manager to garner knowledge from socializers to improve the game.

Directory updating comments are player inquiries about the product. An example of a directory updating comment from Kickstarter is, “Question about game play: Is it recommended to remove cards when adding the expansion packs or just cram them all together? If the first is true, How many cards do you recommend to have in total, for a well-balanced deck? Also, would that matter between a two-player game vs. a four-player game?” Here, the backer is seeking information regarding what cards should go into the main play deck to improve the player’s experience. Another example from the Discord group, ““... Btw. What's the point of the baby unicorns? Do they count towards the army count? I watched a game play video, but didn't really see anything about it...” Here, the socializer is trying to understand how a specific type of card in the game interacts with the rules.

Information allocation comments exchange information between two parties, which includes information flows between players, from players to the product manager, or from the product manager to players. An example from the Kickstarter group, ““Card idea ....Time Warp: Play and switch your entire hand with target player.” The backer here is proposing a new card for the game. Another example the Discord group, “Played two games without sleeves before sleeving; found a lot of the black edging on the backside was scratched off, noticed the damage straight away.” Here, the socializer is relaying that he/she noticed damage while playing and decided to disseminate the information to the members of the Discord group. Unclassifiable comments are comments that do not fit the other three categories (directory updating, information allocation, or retrieval coordination) of comments. These comments tend to be short comments that give no

indication of TMS activity. For an example from Kickstarter, “Well darn” is an unclassifiable comment because it has no discernible TMS activity. An example from the Discord group is, “Okay thanks.”

## **Results**

### *Kickstarter descriptive statistics*

While the Kickstarter project had over 32,000 total backers, after applying our screening criteria for comments, we count 444 backers who commented at least once, generating the 1,284 comments that meet our criteria. These 1,284 comments create 767 unique threads, averaging approximately 1.7 comments per thread with a standard deviation of 2.6 comments per thread. Ninety-five percent of threads, however, had four or fewer comments. Once we completed threading the comments, we classified each comment according to TMS activity, resulting in 203 directory updating comments, 1,046 information allocation comments, 1 retrieval coordination comment, and 34 unclassifiable comments.

### *Kickstarter TMS presence analysis*

To determine whether a TMS develops within the Kickstarter group, we analyze our threads by identifying those with a directory updating comment paired with at least one information allocation comment. Since TMS is about the storage and usage of information, questions that have answers should be representative of a TMS process. We identify 96 unique directory updating comments with at least one information allocation comment (forming a thread) and then group directory updating comments into 3 main

categories based on content related to product inventory characteristics (inventory), game design, and affect. Three sub-categories emerge for inventory: (1) box characteristics, (2) card characteristics, and (3) language. Four sub-categories emerge for game design: (1) 1-player mode, (2) 2-player mode, (3) card distribution, and (4) card interactions. This combination of main categories and sub-categories results in eight total categories. Table 3.2 provides examples of questions from our sample.

Major Category	Sub-Category	Question Example
Inventory	Box Characteristics	Does the box have enough for all extra cards and the expansions, even when sleeved?
Inventory	Card Characteristics	What is the size of the cards? wonder if i should get some card sleeves to protect them or not
Inventory	Language	Will this game get translated to Spanish?
Game Design	1-player mode	Anyone know about the 1 player version of the game? That is still happening, right?
Game Design	2-player mode	Could the game be played with only 2 players?
Game Design	Card distribution	Do we know if there are any repeat cards in any of the decks? Meaning identical cards not just same category, but complete identical copies.
Game Design	Card interactions	I have a question about the card blinding light. If blinding light is in my stable and I play a magical unicorn that has an effect that activates when it enters the stable, will it activate since blinding light is in my stable?
	Affect	Has there been a killer clown Unicorn yet?

**Table 3.2: Sample Kickstarter questions**

We then identified and tallied all responders to these 96 questions, resulting in 53 unique responders who responded at least once to the 96 questions. Response counts ranged from one to 17 while averaging three per responder. To identify evidence of a TMS, we observe how “specialized” a responder is regarding different categories of question, since responding more frequently to specific categories should reflect a degree

of knowledge specialization. Table 3.3 summarizes our findings by showing our results for the top five most frequent backer responders in the Kickstarter group.

Responder Name (Handle)	Responses	Inventory	Game Design	t-stat	p-value
Bobby D	17	0%	100%	N/A	<0.001
magisystem	15	0%	100%	N/A	<0.001
Nir Phili	14	7%	93%	2.74	0.017
Angela: Tentacles...	12	50%	33%	2.99	0.012
Josh Cole	7	29%	71%	0.15	0.885

**Table 3.3: Kickstarter inquiry response category proportions summary.**

The sample generated 24 inventory-related questions, 69 game design questions, and 3 affect questions. While there were subcategories within the inventory-related questions and game design questions, we elected to drop the subcategories, as well as the affect category, as counts were small. This left 93 questions for analysis: 26% inventory-related questions and 74% game design questions. Because sample sizes were relatively small, we conducted a one-proportion t-test due to check for knowledge specialization, comparing the proportion of game design responses for a backer against the total sample proportion (74%). If knowledge specialization is not occurring, then backers should be responding in proportions that mirror the overall proportions of categories. However, if knowledge specialization is occurring, we would expect that certain response categories would be over- or under-represented relative to the overall sample. For the four backers with the most responses, we see that all are significantly different at  $\alpha = 0.05$  level. The remaining backers analyzed were either not significantly different or had comment sample sizes too small to conduct a t-test. While the evidence is limited, we do see that the three top responders specialized in game design questions. In addition, they all

specialized in the same sub-category of card interactions. Based on the evidence, we find support that a TMS does develop among the backers.

*Kickstarter second iteration community partners*

The second iteration of Unstable Unicorns was funded via Kickstarter and the project was launched on August 15, 2018. For this project, specific group members were designated as “Game Experts.” While there is no description in the Kickstarter campaign about the function of game experts, the Discord server has the following the statement in their “ask-a-game-expert” channel<sup>1</sup>, “Please address all gameplay and rules related question @Unstable Unicorn Game Expert. For the correct answer. Answers will be given following the Control and Chaos rule-sheet and statements from Unstable Games Game Experts. Please use #rules-discussion channel if you prefer a conversation rather than a direct answer. @Unstable Unicorns Please do not give answers in this channel, thank you.” From this statement, we can assume that questions related to rules and gameplay are supposed to be answered by group members who are designated as game experts. The ten members designated as game experts for the second Kickstarter are *Demandred, OATS, Elessara, Ripper Zabel, Teresa, WyyvernWrath, Josh Cole, Zazer, Karalynn Meyers, and Bobby D.* Table 3.4 summarizes the comments generated by these ten group members.

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<sup>1</sup> This channel was created April 7th, 2019 in the Unstable Unicorns Discord server. However, communication in this channel is extremely limited and therefore is not part of the TMS analysis

<b>Responder Name (Handle)</b>	<b>Total Comments</b>	<b>Total Screened Comments</b>	<b>Screened Comments %</b>	<b>Information Allocation Comments</b>	<b>Information Allocation Comments %</b>
OATS	217	44	20.3%	41	93.2%
WyvernWrath	468	38	8.1%	31	81.6%
Bobby D	77	30	39.0%	30	100.0%
Josh Cole	112	16	14.3%	15	93.8%
Zazer	309	14	4.5%	14	100.0%
Karalynn Meyers	198	8	4.0%	7	87.5%
Teresa	184	7	3.8%	6	85.7%
Ripper Zabel	89	6	6.7%	5	83.3%
Demandred	120	2	1.7%	2	100.0%
Elessara	86	2	2.3%	2	100.0%
<b>Total</b>	<b>1860</b>	<b>167</b>		<b>153</b>	

**Table 3.4: Designated “Game Experts” for 2nd iteration of Unstable Unicorns Kickstarter**

The total comments column tallies how many comments the backer made throughout the entire first Kickstarter iteration. These are comments that were both screened out to keep comparability between the Kickstarter backers and the Discord socializers, and the comments that remained after screening. The total screened comments column tallies how many comments remained after screening to make comments comparable across digital platforms and the screen comments percentage column measures what percentage of comments remain after screening. The Information allocation comments column tallies how many of the comments after screening are information allocation comments, and the percentage column measures what percentage of the total comments that remain after screening are information allocation statements.

Some observations do stand out about these group members. First, these members provide far more comments on average than most group members before considering the screening done for TMS analysis. For reference, when using all comments in the

Kickstarter, the 98% percentile for comments per backer is 41 comments. This means that all these backers are in the top 2% of most comments in the first iteration Kickstarter. Second, once we apply the screening a criteria for comparability between Discord and Kickstarter, these ten backers are still in the 95% percentile or greater for comments. This suggests that in terms of group activity, these backers were extremely active in the comments section when compared to their other backer group members. Third, the vast majority of the comments made by these backers are information allocation comments, aiding in the flow of knowledge as opposed to frequently asking for information. This potentially makes them prime candidates to act as central knowledge transfer points in a TMS for the second iteration Kickstarter.

#### *Discord descriptive statistics*

In the Discord group, 163 unique socializer members made 3,217 comments between the group's inception and our cutoff of August 15, 2018 at 12:00 p.m. EDT. Once we applied our comment filter, 437 comments remained that were left by 37 unique socializers. We create 51 unique threads from this sample, averaging 10.07 comments per thread with a standard deviation of 11.6 per thread. After threading our comments, we code each comment pertaining to TMS activity, resulting in 46 directory updating comments, 321 information allocation comments, 13 retrieval coordination comments, and 57 unclassifiable comments.



*Discord TMS presence analysis*

We parallel the analysis of the Kickstarter backer group for the Discord socializer group by identifying 37 unique directing updating comments with at least one associated information allocation comment, which results in 15 total unique socializers who responded at least once to the 37 questions. Response counts ranged from one to 19 while averaging four per socializer. The resulting sample had 28 game design inquiries (76%) and 9 inventory inquires (24%). Table 3.5 provides examples of questions from the Discord group.

<b>Major Category</b>	<b>Sub-Category</b>	<b>Question Example</b>
Inventory	Box Characteristics	Hey guys. A little disappointed on how all the cards don't fit in the box. How are you guys dealing with the extra cards that don't fit? Any idea if they plan to sell a bigger box in the future?
Inventory	Card Characteristics	What gsm is the cards please?
Inventory	Language	Is there any translation of the rules book or cheat card in the pipe? Would be happy to make a french version of the cheat card at least, but would prefer to have Tee Turtle.
Game Design	1-player mode	So we are tuesday, any news for the 1 player rules??? :D
Game Design	2-player mode	No examples
Game Design	Card distribution	No examples
Game Design	Card interactions	What to do if they are both present? e.g.: if Rainbow Mane is in my stable (so I can place Basic unicorns from my hand) and at the same time another player has Queen Bee in it's stable and it's already in use (so I can't place Basic unicorns), which effect is stronger at the beginning of my turn:the prohibition of placing unicorns or the Rainbow Mane?
	Affect	No examples

**Table 3.5 Sample Discord questions**

Table 3.6 summarizes the results of t-stat proportion analysis for the top five socializer responders in the Discord group.

Responder Name (Handle)	Responses	Inventory	Game Design	t-stat	p-value
WyvernWrath	19	21%	79%	0.35	0.731
no one important	13	15%	85%	0.89	0.389
Mallory	19	33%	67%	0.57	0.582
Usami	4	25%	75%	0.03	0.977
erucsbo	4	25%	75%	0.03	0.977

**Table 3.6: Discord inquiry response category proportions summary**

Contrary to expectations, we do not find evidence of a TMS developing within the Discord socializer group as the five most frequent responders all fall within the overall sample proportion of responses to game design inquiries. *WyvernWrath*, the Discord server owner, is not surprisingly the most frequent responder. In addition, *WyvernWrath* specifically states that, “I get involved in all conversations...,” which naturally relates to a high response rate. However, *WyvernWrath* shows no evidence of specializing in any particular type of knowledge. The user *no one important* predominately responded to card interaction questions and showed a proclivity for the subject with statements like, “this game has a lot of intersting combos / if you have the horniest unicorn along with the unicorn lasso you can take horny flying and seductive from people and get 2 more which makes it 4 unicorns in the same turn.” Here, *no one important*, is describing a sequence of plays resulting in a very powerful game effect, but overall, *no one important*, still falls within the overall sample proportion of inquiries. *Mallory* is a TeeTurtle product manager and predominately responded to questions about the 1-Player mode (sub-category of game design), which released after Kickstarter fulfillment, but yet again, still followed the overall sample proportion. Taken together, we do not find evidence that a TMS develops within the Discord socializer group.

*Comparison of Kickstarter and Discord TMS activity*

Table 3.7 summarizes the differences between Kickstarter comments and Discord comments in our sample and shows the results of testing whether TMS comment proportions are significantly different between Kickstarter backers and Discord socializers. We employ the comparison test of proportions outlined in Ryan (1960) to evaluate our data. This analysis is done understanding that while there was a lack of evidence suggesting a TMS developed in the Discord group, the overall proportion of comment types may still be similar (or different) at an aggregate level for the Kickstarter backer and Discord socializer groups.

	Total Sample		Kickstarter		Discord		Comparison	
	Total Number	% of Total	Total Number	% of Total	Total Number	% of Total	z-stat	p-value
Total TMS Comments	1721	100.0%	1284	100.0%	437	100.0%	-	-
Directory Updating	249	14.5%	203	15.8%	46	10.5%	2.71	0.007
Information Allocation	1367	79.4%	1046	81.5%	321	73.5%	3.58	<0.001
Retrieval Coordination	14	0.8%	1	0.1%	13	3.0%	5.82	<0.001
Unclassifiable	91	5.3%	34	2.6%	57	13.0%	8.39	<0.001

**Table 3.7: Kickstarter versus Discord TMS comments proportions tests**

All categories of TMS activity are significantly different, with directory updating and information allocation comments being proportionally greater among backers while retrieval coordination and unclassifiable comments were proportionally greater among socializers. These differences potentially align with the orientation of the groups themselves. The Kickstarter group is oriented around backers choosing whether to commit funding to a project and providing input to the product manager that may fuel an environment of direct answers and questions. The average thread length of 1.7 implies

many threads could potentially be question and answer couples, or short pairs of comments. The Discord group is oriented around providing a space for a community to develop, which is different than the Kickstarter group. Unclassifiable comments make up a greater percentage of comments, which highlights the conversational tone of the Discord group. We see retrieval coordination comments are both greater in number and percentage in the Discord group than in the Kickstarter group. This is potentially driven by the Kickstarter group being project oriented and comments focus on what backers want to see added or adjusted to the product. For example, many threads in the Kickstarter group are a single information allocation comment during pre-fulfillment describing what backers wanted in the game:

- *David*: “I would love to see a card that you spin something like a bottle or a spinner at the start of each turn, who ever it lands on has one of there unicorns destroyed, even if it lands on the person who put the card in play, just love the idea of a last resort card.”
- *Aesha*: “Backed so I can add my voice to the chorus hoping for a two player (or solo!) variant. I only have one person to lay with regularly so I have to put some thought into fully backing for a game I may not get to play... but it's super tempting!”

This may have suppressed the need for retrieval coordination comments as the product manager was already receiving substantial feedback. The Discord group, by contrast, is more insulated from the product manager since its orientation is on the player community. This may influence comments to be more about exploring the product with

fellow players unless prodded by the product manager:

- *WyvernWrath*: “my opinion is that GLITTER BOMB is the most overpowered card, its solid by itself and amazing with any of the 7 combo unicorns. Being an upgrade its harder to remove than a unicorn. Its the ultimate stable control.”
- *Shicala*: “I got my set a few days ago... some feedback for anyone wanting to play 2 player... me and my friend recommend people remove the yay cards.... there are at least 2 and if ya both [have em,] neigh cards are about useless lol / At one point she wound up with 4 neigh cards in her hand and couldnt [use them] against me.”

These comments are quite different than retrieval coordination comment threads initiated by *Mallory*, a TeeTurtle product manager. Information allocation comments in threads that start with a retrieval coordination comment were more focused on the future of the product and ways to improve it (which more closely resemble information allocation comments from the Kickstarter group):

- *no one important*: “@Mallory my friend suggested other types of instant cards or equipment for unicorns”
- *GuruGuruMawaru*: “New instant card? How about reflect? / reflects a downgrade card(self protection) / reflects an upgrade card(prevents others from upgrading) / reflects a magic card(like poison, destroy/sacrifice) / alternative sacrifice, you can sacrifice others unicorn for your own card ability”

An area of concern for us relates to a natural shift that occurs when a Kickstarter project moves from development to fulfillment (i.e., when backers are receiving physical

product) since backers would naturally move from talking about what they want in a product to talking about the contents of the product. This shift prompted us to conduct a robustness check where we only use the comments generated when it becomes clear that backers are starting to receive product. The previous results hold with the exception of information allocation activity, as the difference between the Kickstarter backer and Discord socializer groups now is only suggestive ( $p = 8\%$ ).

### **Discussion**

Our first five propositions relate strictly to our analysis of the first iteration of the product, while our last proposition extends to the second iteration of the product. The first proposition relates to evidence supporting the expectation that the Kickstarter backer group would develop a TMS while our analysis provides a lack of evidence supporting the expectation that the Discord socializer group would develop a TMS:

Proposition 1: Backers are more likely to develop a TMS than socializers

We highlight two potential reasons that may help explain the outcomes we observe in our analysis. First, TMS development in a group is traditionally associated with a task or workflow. For example, nearly all the studies in Table 2 provide a well-defined task that subject groups must accomplish. A Kickstarter group is fundamentally about backers providing funds and input which the product manager converts into a reward, which has some similarities to a group accomplishing a task at work (e.g., a software development team creating a new program). However, there are context

differences: (1) backers are both the financiers and customers of a reward whereas most TMS studies have group members acting as agents to accomplish a task with no financial investment (as opposed to being paid a wage), and (2) the product manager is solely responsible for the product management that eventually results in a reward, whereas most TMS studies have group members who contribute to the accomplishment of a task. A Discord group by comparison is not oriented around completing a task, but building a community around a game. While community building may be considered a task, it is not a traditional project or workflow that we observe most TMSs developing around. This may imply that without a specified task that needs to be completed and therefore less need for organizing information, the probability of a TMS developing may decrease. Therefore, we can infer that the task orientation of a group will have an effect on whether a TMS develops or not. Second, the Kickstarter backer group is substantially larger than the Discord socializer group, which may encourage some degree of organization simply to manage knowledge flows. Since the comments section is a public space, all information flows are visible. However, this also means that all communication resides in a single channel, which means that if too many people try to communicate at once regarding every inquiry, it can quickly become intractable. Therefore, by having specific Kickstarter backer group members take on specific knowledge specializations, knowledge flows can be more controlled both for those with inquires and for those who respond to specific categories of inquiries. The Discord socializer group is smaller, which means communication (on an absolute scale) should be less, allowing for more individuals to respond to inquirers as they see fit. Discord is a social platform specifically

designed to allow easy and instant communication between group members whereas the Kickstarter backer comment page may not have been designed with instant communication in mind. This may also contribute to a TMS developing within the Kickstarter backer comments as opposed to the Discord socializer comments.

The following three propositions (2 through 4) are based on the differences in TMS activity we analyze between the two groups. To begin, we develop our second proposition pertaining to directory updating activity:

**Proposition 2: Backers generate a greater proportion of directory updating activity than socializers.**

The primary driver for this proposition relates to the task-oriented nature of a Kickstarter group. Specifically, many directory updating comments relate to answering question about product properties. During a Kickstarter campaign, a reward is malleable to a certain extent and the product manager will change the reward based on backer input. As such, with every change of the reward, there is a chance that certain backers will no longer have accurate information. Thus, backers may rely on other backers through directory updating comments to update their own information about the reward. The Discord socializer group, which is formed during fulfillment and after the reward is less subject to change, would naturally be different as less directory updating activity is required to keep up with a reward that is fixed. One special note relates to knowledge specialization. During fulfillment, there was a shift where the majority of questions



pertained to card interactions. In general, reading the rules for a card game and understanding how cards should interact with the rules (or other cards) is not typically considered generalized knowledge. Evidence of this includes Magic: The Gathering™ having a judge certification exam that must be passed to judge events, card games having dedicated rules teams tasked with being the keepers and interpreters of the rules, and even the Unstable Unicorns Discord eventually creating a special channel after our analysis period dedicated to “ask[ing]-a-game-expert” if a rules question did arise (Peck 2016). Therefore, if specialized knowledge is necessary to answer questions of this type and it becomes housed with those individuals constantly answering questions, it would emulate a TMS. Since the Kickstarter group is composed of backers, it is possible that a wide range of skill levels and experience levels with card games are represented in the group. If the majority of the group does not have the skill set necessary to make these interpretations, it would naturally increase the probability of a TMS developing per Proposition 1. The Discord socializer group by comparison has members who are very invested in Unstable Unicorns and the surrounding community, and thus may be a more homogeneous group that has more experience with card interaction questions. Therefore, a higher percentage of group members may be more capable of answering specialized inquiries of this nature, which would suppress the presence of a TMS and directory updating activity.

Our next proposition relates to retrieval coordination activity and the differences we observe:

Proposition 3: Product managers will generate less retrieval coordination activity with backers than socializers.

This proposition was unexpected; the authors anticipated the product manager frequently asking for input from backers during the Kickstarter campaign through the comments section. However, the nature of a Kickstarter campaign combined with the responsibility differences between backers and the product manager potentially help explain this outcome. Since a Kickstarter campaign is directly focused on the creation and delivery of a reward, backer comments (pre-fulfillment) focus predominately on potential reward features. Also, since the product manager is the sole group member responsible for evaluating and incorporating suggestions, backers can freely (and without cost) provide feedback via information allocation comments resembling backer input directed toward the product manager without any prompting (i.e., suppressing the need for retrieval coordination activity). In addition, the product manager confirms reading and taking suggestions from the comments section without prompting, with statements such as, “I read through every comment again this morning to see all of the backers who have suggested cards, and we are up to 96 already... I am taking note of all of your suggestions and comments so that I can make Unstable Unicorns grow and expand even more next year,” which may generate an expectation that backers can simply comment knowing the product manager will receive the input, thus suppressing the need for retrieval coordination activity. This contrasts with Discord for a couple of reasons. First, the Discord socializer group is an unofficial channel of communication as stated by the

new member greeting tagline, “This is an UNOFFICIAL discussion place for the card game UNSTABLE UNICORNS. The information discussed is for general information purposes only. This group is no way affiliated to the creator(s), or publishers of Unstable Unicorns. All Art Copyright TeeTurtle, used without permission.” The Discord group clearly sets the expectation that socializers should not assume a product manager is avidly scanning comments, which may help the community think of the Discord group as “their” group instead of a group under the influence of a product manager. Second, the Discord group appears to have started during Kickstarter fulfillment, which may discourage socializers from volunteering ideas since the rewards were already finalized. Under these conditions, it becomes more necessary for the product manager to elicit feedback from socializers, as opposed to the backers, since socializers may not have an obvious reason to volunteer suggestions. Thus, in order for the product manager to get information from the Discord group, retrieval coordination activity was necessary whereas with the Kickstarter group, backer input flowed much more freely towards the product manager without any prompting.

Our next proposition relates to information allocation activity and the differences we observe:

**Proposition 4: Backers generate a greater proportion of information allocation activity than socializers.**

This proposition is most likely explained by the goal of the Kickstarter group versus the goal of the Discord group. Specifically, since the goal of a Kickstarter campaign is the generation of a reward, information flows can be critical to the proper development on a reward in relation to backer desires. This contrasts sharply with the main goal of a Discord group, which is community building, which may not necessarily require critical information flows. This is evidenced somewhat by the comparison in unclassifiable comments (aka typical conversation artifacts) between the Kickstarter backer group and the Discord socializer group. Despite the Discord group having a smaller number of overall comments (437 to 1,284), the number of unclassifiable comments in the Discord group is substantially larger (57 to 34). It follows that since the Discord group is more oriented around community building, it would take a more conversational or interpersonal orientation, which would suppress information allocation activity. One caveat to this proposition however is that during the robustness check, we saw information allocation activity decrease (as a proportion) in the Kickstarter group, to the point where it was proportionally less than the Discord group. Therefore, this proposition is naturally weaker than the preceding propositions.

Our fifth proposition relates to the scope of discussion regarding TMS activity and how a TMS evolves over time.

Proposition 5: The scope of information flow across a TMS expands over time

Specifically, the nature of information that flows through a TMS may expand in scope from being purely factual (e.g., is the box big enough to hold all the cards?) to discussing quality and process characteristics (e.g., the box not being big enough is causing problems) that can provide deeper insight for the product manager. A clear example is captured by the discussions related to the size of the box for the product. Early in the Kickstarter campaign there was confusion regarding whether the box the game came in would be large enough to store all the various expansions. The confusion was due in part to the product manager not knowing if it was possible to actually deliver a bigger box without delaying the product due to supply chain lead times. During this period, there was some expression of the reasons why the box should be big enough to house everything:

**Early Thread:**

- *Angela: Tentacles of Frosted Wisdom:* “Does the box have enough room for all extra cards and the expansions, even when sleeved? / Otherwise both boxes need an upgrade too. Maybe a magnetic seal, hinged lid or whatever looks great.”
- *Marie - The catless wonder:* “@Angela It was for a day or two, but now the FAQ that stated that has been deleted, since @Ramy didn't know what he was saying yes to”

Eventually, threads began moving from strictly transactional yes/no comments and suggestions to also including expressions of frustration that a potential product feature would not be included, reasons as to why it was an oversight, and even displays of

tolerance about the feature. In addition, it became somewhat clear that despite the product manager clarifying what the box could hold, the information was not being accessed as more members joined the group:

**Mid Thread:**

- *Angela: Tentacles of Frosted Wisdom:* “I rather have a box which fits everything incl sleeves. Still don't know why this wasn't thought of, it was asked from the beginning :( / \*dissapointed\* / I would have a useless but pretty box collecting dust :/”
- *Amy Victoria Shackles:* “@Angela - It seems like the number of cards changed a lot over time and it would be hard to predict who would buy expansions and how many expansions if so. In addition, not everyone sleeves every game they own and a box that would have enough room that all cards would fit with sleeves would leave too much space for movement. Not to mention, there'd be no way for them to predict what size sleeves people would be using. / I think it's pretty impressive that this game has evolved so much in the short time it's been on Kickstarter and am personally thankful to Ramy for the amount of time and energy he's put into making the game what it is so far.”

Once fulfillment begins however, an understanding develops around why the box not being able to store all of the cards when they are sleeved is an issue. This also caused certain group members to respond to comments that were not necessarily designed to be a discussion. We can clearly see that many people were unaware of the dimensions of the

box and had some expectation that all the cards that were coming in the package would fit in the box even when sleeved.

**Late Thread:**

- *\_\_mahju*: “Received mine in Stockholm yesterday. The black box looks absolutely amazing and the cards look great but I'm very disappointed that the cards don't fit in the box when sleeved... / Just making the box a bit higher (same height as the cards are wide) would have let all the cards, including the expansion fit in the box. I'm not sure how to bring it to game night now :<”
- *Karalynn Meyers*: “@\_\_mahju This is something that it happens was gone over a bunch of times back in the point right before the campaign ended. Basically Ramy already had so much going on that he couldn't possibly get a big enough bigger box made soon enough to STILL get the game out in November, and it wouldn't be fair to cut out the earliest backers from having this box. / However this was a highly requested enough thing, that he /might/ look into re-doing the boxes at some point later, after all the stuff for the campaign's been fulfilled. There was just honestly no fair and good way to solve it within the constraints of the campaign due to the sheer volume of things that had to be taken care of within the time-span. Just letting you know the situation for the cause of your disappointment.”

There are some interesting pieces of information to unpack throughout the lifespan of all these comments. First, early on, most comments are strictly transactional in

the sense that they are similar to yes/no comments. Part of this may be driven by backers always having the option to leave the backer group if they decide they do not want to continue providing funds for the product. This may encourage TMS activity that is strictly grounded in information transfer. However, once the project is funded and closed, backers can no longer simply choose to opt out without giving up the money they already pledged. We now see people either taking more serious stock of the product (e.g., late comers to asking if the box would hold sleeved cards.) or expressing their frustrations. This means the TMS must both expand its coverage to meet the needs of newer members and must be capable of handling more and more flows. Once the product is fulfilled, comments contain more explanation regarding how the product is consumed. This provides some evidence that the scope of the content being covered has now exceeded what could be considered simple transaction level discussion. In addition, it becomes clear that the TMS was not capable of keeping all backer group members informed. Therefore, it would appear that some degree of TMS management may be necessary to make sure information is reaching all members. This may be evidenced by the second iteration Kickstarter having game experts who are the contact points for information of this nature.

Our sixth and final proposition relates to the governance of a TMS in a virtual group setting.

Proposition 6: The structure of the TMS evolves by converting social media users into information allocation specialists.

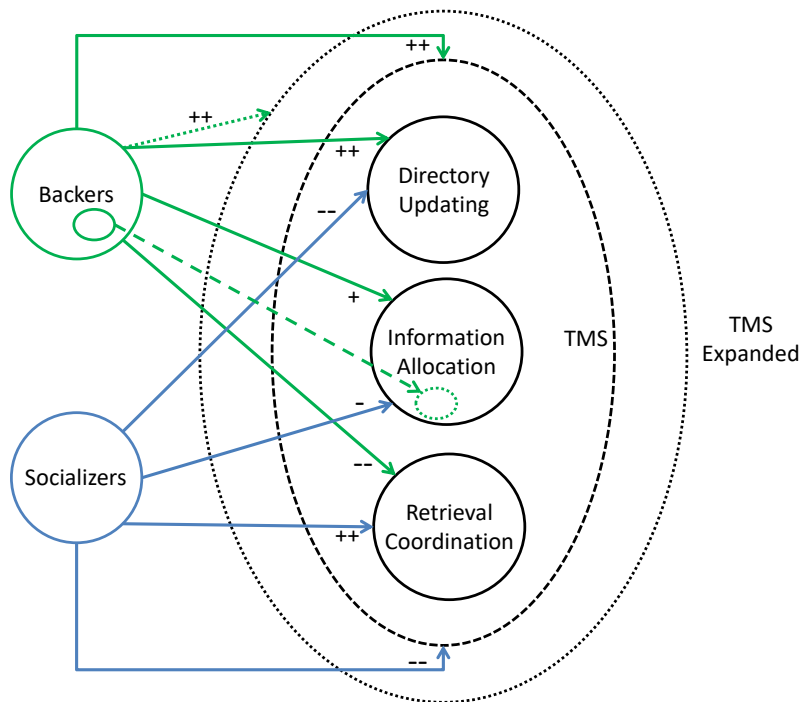


The TMS in our case evolves when moving from the first iteration of the product to the second iteration of the product. During the first iteration, there are only two distinct roles with regard to the product: the product manager (Ramy) and the community that is commenting. However, when the product moves into the second iteration, there are three roles: the product manager, the community, and game experts (i.e., backer members who have a more defined role regarding helping with the Kickstarter). Two factors stand out: (1) this is an instance of backer members demonstrating a willingness to help other backers (and thus freeing capacity for the product manager), and (2) the product manager is enforcing a more defined structure of TMS governance. By highlighting certain group members, the product manager is in essence attempting to create a TMS where backers focus their directory updating activities toward a small number of group members who specialize in information allocation.

These members were chosen for two main reasons, based on the communication patterns in the first iteration. First, they were extremely active in the comments section relative to the other backers, signifying that they were motivated to interact with other group members. Second, the majority of their activity was information allocation activity, which signifies that they are either happy to provide information to other backers who are requesting information or to the product manager. This means that backers may demonstrate through their comments that they would be good TMS partners. This also means that the product manager is actively attempting to give the TMS a governance structure, which is a departure from the first iteration Kickstarter. This may imply that in a more open virtual group where neither an organization nor a project acts as an

organization force, the product manager may need to actively manage the backer group to help the TMS function.

Figure 3.1 below summarizes our propositions. The relations of backers to information allocation and socializers to information are represented by only a single “+” and “-” respectively due to the robustness check diminishing the strength of these relations. Proposition 5 is demonstrated by expanding the boundary of the TMS and Proposition 6 shows a subset of backers moving into specialized information allocation roles.



**Figure 3.1: Summary of propositions**

## **Implications**

### *Theory implications*

Our propositions have three theoretical implications. First, absent a TMS generating enforcement mechanism, TMS development may hinge on the task orientation of a group. A core tenet of TMS is the efficiency and effectiveness gains achieved by group members specializing in specific types of knowledge as opposed to all group members trying to retain all relevant knowledge all the time. However, absent a defined task that must be accomplished, a group may have no need to generate a TMS. This would imply that TMS activity may be tied to a specific task as much as it is tied to a specific group. In addition, knowledge specialization may be critical to encouraging the development of a TMS. Once expanded to the virtual setting, retrieval coordination activity not only includes group members, but all computer accessible knowledge, leading to the possibility that knowledge itself may need to be specialized enough to warrant having individuals specialize to create a TMS. This is one of the potential reasons we see the TMS develop in the Kickstarter backer group versus the Discord socializer group. Havakhor and Sabherwal (2018) also provides evidence of this possibility since their subjects were screened and sorted into groups based on skill sets that were exclusive. When groups could access the ratings of each member's knowledge specialization, groups quickly assigned roles based on these ratings. In our study, we potentially find that if knowledge is specialized enough (e.g., the ability to make rulings on card interactions), individuals will potentially self-select to create a TMS that allows the group to effectively leverage its specialized knowledge. However, our findings also

imply that if there is no specialized knowledge within the group, then a TMS may not develop, as evidence by the socializer group.

Second, the context of electronic communication can affect TMS activity.

Kickstarter represents a more traditional project that is associated with TMS. There is a defined task (i.e., the creation of a product) where a group provides input and individuals can contribute their specialized knowledge. This resembles other virtual TMS studies where a project is the context for the group. Discord however is different as there is no direct project associated with the group (since it is designed to be a community interaction tool), yet the product manager viewed it as valuable enough to assign an individual to be active in the channel. The Discord group, by virtue of its main goal of promoting community growth, may have members self-screen and not provide valuable feedback, requiring the product manager to conduct retrieval coordination activity to acquire feedback. This is exemplified by *Mallory* actively engaging the Discord socializer group to get feedback via retrieval coordination activity. If the perceived purpose of a group can influence TMS activity, then taking care to properly manage group members in a way that generates optimal TMS activity may be necessary as well.

Third, the scope of knowledge that can flow through a TMS may be broader than previously defined. Most studies bind the subject group tightly around a single organization or product, and typically keep groups small. This may artificially restrict the scope of knowledge flows through a TMS to tasks and information related strictly to the accomplishment of a project. However, we find evidence of a TMS developing in a massive social media group based on knowledge specialization that has the freedom to

discuss matters beyond the strict task-oriented confines of a typical TMS study. This also presents possible new challenges like keeping everyone informed of relevant information or making sure knowledge flows are relevant enough to the product at hand. One possible solution that the product manager uses to address this issue is to appoint certain community members as game experts, which may be the equivalent of making them central and visible knowledge points. Appointing certain group members based on their high levels of commenting and information allocation activity can be a better way to serve all the people who can rely on a TMS. This may imply that a TMS may need to be designed with a scope beyond simple knowledge specialization that is organized around tasks for a product.

#### *Practitioner implications*

Our findings offer specific insights for the management of customer groups, especially when a product manager is establishing or expecting a group to be a knowledge source. One insight is that product managers must clearly communicate and establish an expectation that people responsible for the product will see and evaluate comments. Evidence of this in our study comes from the product manager periodically asking questions in Discord regarding possible new features for the game despite it being clear that an employee from the firm was in the Discord socializer group. Only when a product manager initiated conversations (with retrieval coordination activity) did relevant product knowledge began to flow. Otherwise, the Discord socializers were content to communicate among themselves without regard to whether information being exchanged was relevant to the product manager. This potentially leads to a situation where product

managers expecting to simply passively scan a virtual group (even when their presence in the group is transparent), it may not obtain any relevant information unless they actively engage with the group. In addition, this highlights that a product manager may need to explicitly set a standard that all comments are being read and evaluated to encourage group members to share ideas freely. In contrast, in the Kickstarter backer group, comments were abundant and given without prompting. This is most likely due to a Kickstarter project having a focus on creating a product funded by backers and therefore there is a strong expectation set that the product manager is always actively reading and evaluating comments left by backers to address their concerns and desires.

Our findings also highlight the potential need for a product manager to consider methods of soft governance regarding a TMS that may develop within virtual groups. In particular, we find the product manager for the second iteration of the product engages certain group members (i.e., the game experts) based on their activity characteristics to act as knowledge center points for the group. This can help direct group members who ask a lot of questions towards those game experts to make sure those questions are answered, and protect the product manager from having to answer the same questions over again. This allows the product manager to focus on other responding to other concerns or questions that may arise, which may be a better use of the product manager's time, especially when group members may be equipped to serve each other.

### **Limitations and future research**

Some limitations highlight potential areas of future research. First, communication in our groups was asynchronous, which may influence the activity that occurred in each group. The Kickstarter backer campaign was active before and after the product was in the hands of players while the Discord socializer group only became active once the product was in the hands of players. Therefore, the Kickstarter backers knew that there was a genuine possibility of product suggestions being incorporated. One possible path of future research would be to see if different virtual groups created during product design could be shaped in order to cultivate specific types of knowledge flows. Second, our analysis is isolated to a single product which may limit the generalizability of our findings. Further studies that analyze a cohort of tabletop games and even different products with multiple virtual groups would help expand the theory. Third, while we find some evidence that the scope of knowledge that flows through a TMS may be broader than previously considered (as threads related to a specific product characteristic evolved from being transactional to transformative), this is a setting where the vast majority of knowledge providers could provide input with little regard to cost of implementing product changes. Further research to expand on these findings may help us understand the boundaries of what TMS may entail and how product managers can manage a TMS to effectively enable communication across group members that is expansive in scope.

**Essay 3 – Insert your picture here: The value of self-expression to generate and coordinate backer participation in crowdfunding**

**Introduction**

Crowdfunding campaigns (referred to as campaigns going forward) have become a significant source of financing for new products. In 2015, \$2.7 billion was raised via rewards-based campaigns and the total amount raised by campaigns for all initiatives was \$34 billion (Crowd Expert, 2015). As the popularity of crowdfunding grows, academic research continues to explore how various characteristics of a campaign or its creator may affect either the probability of reaching a funding target or total funds pledged. Studies have examined a creator's race (Younkin and Kuppuswamy, 2018), a creator's gender (Johnson, Stevenson, and Letwin, 2018), a project's incremental versus radical innovation offerings (Chan and Parhankangas, 2017), and the linguistic style of a creator's pitch (Parhankangas and Renko, 2017) to name a few. Ultimately, the goal of any campaign is to get enough backers to pledge enough funds to meet the funding target of a project. A backer is someone who pledges funds to a campaign with the expectation of receiving a reward. While these rewards can end up being available to the general consumer, some rewards can be exclusive to becoming a backer. In addition, backers are typically given enhancements (tied to the overall funding level of the campaign) that are not made available to the general consumer. While most academic studies have focused on how creators can craft their campaigns to attract backers to pledge funds, backers can also provide suggestions and feedback in the form of comments to the creator about the campaign. Cornelius and Gokpinar (2019) found backer participation (operationalized as



total backer comments generated during a campaign) to be directly correlated with total funds generated, which raises the question of how creators can increase backer participation. To answer this question, we rely on Zhang and Chen's (2019) finding that appealing to the egocentric nature of potential backers increases their intention to pledge. Specifically, we rely on the notion of providing opportunities for self-expression that appeal to the egocentric nature of backers as a means of directly increasing backer participation with the ultimate goal of increasing funding for the campaign

Self-expression, as it relates to customer value, is defined as, "the extent to which customers attach or associate psychological meaning to a product...[allowing] consumers to reflect or express their personalities, tastes, and values" (Smith and Colgate, 2007). The notion of consumers tying self-expression to products or brands is well-established (Belk, 1988; Richins, 1994) and new product funding campaigns provide a distinct opportunity for backers to express themselves. As an example, Fenway Park, the home stadium of the Boston Red Sox (a Major League Baseball team), conducted a campaign to raise funds during their 100th anniversary. A backer could purchase a brick, personalized with his or her name, that would be built visibly into the structure of the park. However, unlike the Fenway Park example, wherein backers pledged funds for self-expression directly, the question we wish to explore is whether providing an opportunity for self-expression will increase backer participation, which ultimately may lead to increased funding per Cornelius and Gokpinar (2019).

Self-expression has emerged as a new (and academically under-examined) dimension of engaging customers in product development that spans many industries.

Examples can be seen from personalized books (e.g., Lovebooks.com) that allow users to create physical books with cartoon versions of themselves, to massively online social media platforms like “Second Life,” where users create avatars of themselves to interact with other users and the game environment. Self-expression has also become prominent in the tabletop gaming industry, where developers commission art pieces or create characters using either customer input or a photo of a player. For example, the winners of a Magic: The Gathering™ tournaments have had their likeness used for cards like “Snapcaster Mage” (Ashley, 2011), and “Dark Confidant” (Maher, 2013). Another example, displayed in Figure 4.1, is of Doomtowntournament player at GenCon 2018 being rewarded with a game card that resembles him.



**Figure 4.1: Winner of game tournament and likeness card**

A self-expression opportunity, however, could also increase the creator’s operational burden (e.g., design of art work, production and coordination costs, etc.). A creator is the lead manager of a campaign and is typically responsible for fulfilling the

duties of a campaign (within a stated time from), while balancing the costs associated with design, development, production, and delivery. Campaigns are very time- and energy-intensive, so these additional workload commitments – including the need to interact with backers – can be a major deterrent for creators (Gerber and Hui, 2013; Stanko and Henard, 2016). One factor that can increase this time commitment for creators is the backer expectation that creators will regularly communicate with them. However, as Cornelius and Gokpinar (2019) argue, backers may act, “[as] substitutes for the support usually received from institutional investors,” which means that backers can also help the creator successfully deliver the campaign. This raises a secondary question: are there ways to organize backers that encourage backer participation while minimizing the associated creator operational burden? Taken together, we settle on two research questions for our study: (1) does providing an opportunity for backer self-expression increase backer participation? and (2) is there a mechanism that encourages backer participation via self-expression that reduces the operational burden to the creator?

To answer these research questions, we use a case-method approach where we collect quantitative and qualitative data to examine a tabletop game funded through Kickstarter (a crowdfunding platform), where the creator gives backers an opportunity for self-expression tied to their participation level. Specifically, the most active backer will receive a self-expression reward in addition to the core reward package. To examine the effect of the inclusion of the opportunity for self-expression on backer participation, we conduct an ordinary least squares (OLS) regression with an autoregressive term and find evidence that the opportunity for self-expression increases backer participation. We also

find evidence for the existence of a mechanism to coordinate backers in a way that reduces the operational burden for the creator.

Our study provides two contributions to the literature regarding crowdfunding and operational burden. First, we provide evidence that despite crowdfunding being a Herculean undertaking for creators, there are ways to coordinate backers to reduce work for the creator. We also suggest a way to increase backer participation, backer self-expression, that has been under-examined. We expand on the works of Cornelius and Gokpinar (2019) and Zhang and Chen (2019) by showing how self-expression can be used to increase participation from backers, which raises a question regarding how much value creators can gain from backers beyond financial capital.

## **Theoretical framework**

### *Rewards-based campaigns*

Rewards-based campaigns at their core offer a specific reward to individuals who provide financial backing (backers) (Belleflamme, Lambert, and Schwienbacher, 2014). Two of the factors that differentiate rewards-based campaigns from more conventional financing options are: (1) small individual contributions that are pooled together over a large number of backers, and (2) the reward from the campaign is the primary incentive to pledge funds, rather than interest payments (as with securities or bonds) (Belleflamme, Lambert, and Schwienbacher, 2014). With the introduction of digital crowdfunding platforms such as Kickstarter and GoFundMe, campaign activity and academic interest in the phenomenon have increased substantially. Table C1 (Appendix C) summarizes recent

literature examining rewards-based campaigns. Most studies have focused on either how the characteristics of a campaign or how choices of a creator affect total pledges (either measured as the probability of meeting a funding target or maximizing funds raised). Fewer studies have focused on the reasons backers participate (i.e., provide suggestions and feedback to creators via comments) in a campaign beyond providing funding (Cornelius and Gokpinar, 2019).

Some studies have identified potential reasons for individuals to become campaign backers, including: (1) improving the quality of the project, (2) helping a project creator, (3) being part of a community, (4) supporting a cause, or (5) some combination of all of these (Gerber, Hui, and Kuo, 2012; Gerber and Hui, 2013; Cornelius and Gokpinar, 2019). At least one study, however, found altruistic motivations (Reasons 2 through 4 above) to not be correlated with backing a campaign (Cholakova and Clarysse, 2015), leading us to examine what may motivate backers to not only fund a campaign, but to engage with other backers and the creator about the campaign. Zhang and Chen (2019) found that egocentric motivations were correlated with intention to back a campaign, which leads us to examine whether providing an opportunity for self-expression encourages backers to participate beyond project funding.

### *Self-expression*

Consumers tying self-expression to products or brands is a well-established phenomenon (Belk, 1988; Richins, 1994) and studies have explored how incorporating opportunities for self-expression into a product, directly or as part of the value proposition, affects customers. Self-expression as it relates to customer value is defined

as, “the extent to which customers attach or associate psychological meaning to a product...[and] allow consumers to reflect or express their personalities, tastes, and values” (Smith and Colgate, 2007). This concept of self-expression has led to examining how providing opportunities for self-expression can be used strategically by organizations. Consumers may value self-expression either to validate their identities (Rogers, 1947; Aakar, 1997; Dunning, 2005; Escalas and Bettman, 2005; Berger and Heath, 2007) and/or to represent their values (Belk, 1988; Richins, 1994). However, most of the research exploring self-expression relates to products attempting to establish a link between the product brand and consumers’ desire to express themselves through the product. In other words, customers choose which brand image best match their own personalities. Of course, this assumes that the brand has an established image. Campaign brands are typically underdeveloped (as opposed to the brands of established firms) as the purpose of a campaign is to bring a new idea to fruition. Therefore, a creator attempting to use a brand as an opportunity for self-expression to appeal to backers could prove to be difficult.

However, campaigns can also be viewed as virtual communities (since most backers will only ever interact electronically with each other and the creator) and studies have shown the value of self-expression (with regard to presenting oneself) can be a major consideration for members in virtual communities (Ma and Agarwal, 2007). Kim, Chan, and Kankanhalli (2012) found that online platforms that offered opportunities for community members to personalize their online appearance (e.g., art pieces, graphics, avatars, etc.) could increase intention to purchase digital goods. In this scenario, instead

of the brand being a vehicle for self-expression for customers, customers can construct versions of their online selves to present to the community. Many types of products enable some degree of self-expression such as: (1) creating a cartoon version of oneself to be placed in a physical book through Lovebooks.com, (2) creating your own logo to be placed on a pair of sneakers through Brandyourshoes.com, (3) engraving or monogramming gifts (e.g., watches, keepsake boxes, etc.), and (4) creating an avatar on social media platforms like Second Life. In our study, the creator provides an opportunity for a backer to receive a piece of game-related, personalized art. Backers can describe thematically how they would like to be depicted and the creator would produce a vanity art piece informed by the backer's description. However, there are two considerations that should be highlighted in our setting. First, the backer, who has already provided funding for the campaign, does not pay directly for the art image. Second, the number of self-expression images that can be created are likely limited, creating a potential for backer competition. In order to select which backers will "win" a vanity art piece, the creator informs backers that participation will determine who gets drawn. Based on previous studies, we would expect that this reward for self-expression would be valuable enough to the backers to encourage more backer participation and therefore we propose the following expectation:

Expectation 1: Providing an opportunity for self-expression is directly correlated with greater backer participation.

*Operational burden of self-expression*

Campaigns are time and labor intensive, which can be a major deterrent for many potential creators (Gerber and Hui, 2013; Stanko and Henard, 2016). The challenges of running a campaign have even created demand for professional campaign managers who help manage the campaign while creators focus on the rewards to be delivered (Williams, 2016). As one former project creator stated, “There are a lot of difficult parts of running a crowdfunding campaign, but overall the most difficult part is having enough time to do it all” (Launchboom, 2016). This implies that while each new backer may represent more funding and potentially useful input for the creator (Cornelius and Gokpinar, 2019), each backer also represents a financial stakeholder that may require more time and energy to serve. By adding opportunities for self-expression into a campaign, a creator may increase backer participation but at the same time increase the operational burden.

Two examples of operational burden increases include information load increase (Hoyer, Chandy, Dorotic, Krafft, and Singh, 2010) and transparency increase (Hoyer et al., 2010; Gerber and Hui, 2013). Information load increase occurs when the creator has more information to process and evaluate (Hoyer, Chandy, Dorotic, Krafft, and Singh, 2010). An expected natural consequence of increased backer participation (i.e., backers commenting more about the campaign), would be that the creator will have more comments to read and potentially more questions to answer. Transparency increase requires the creator to spend more time and energy displaying campaign progress, which requires time and energy (Gerber and Hui, 2013). One way for creators to address these operational burdens (and that appear to be expected from backers) is for them to regularly



participate in the comments section and interact with backers. Examples of this expectation from our own sample (verbatim quotes below) help substantiate this view (the number in parentheses after the backer name is the total number of comments posted by the backer):

- *Lefty (2)*: “I feel that I need to echo the frustrations posted by other backers. Having backed a few projects myself, I have a few concerns with this one / First of all, the complete lack of communication with backers makes me nervous. If the creator is uncommunicative when things are going well, it doesn't bode well post-campaign when we need updates.”
- *Autumn Games (Mike) (7)*: “Reducing my pledge from \$175 (10 copies of Black) to \$1 to see how this plays out. / Maybe I'm being paranoid, but it all seems a little sketchy. No communication...I'm chalking this up to the creator having inexperience with KS, combined with GenCon, but... I'll just wait and see what happens.”
- *Angela: Tentacles of Frosted Wisdom (827)*: “This is a first that the creator doesn't even post a hello or whatever on the comments page / \*hopes I was wrong about GenCon, but what excuse do they have for lack of communication”

Reading and answering comments (along with addressing backer concerns) takes time for the creator and based on previous findings can be burdensome enough to deter previous creators from using crowdfunding entirely (Gerber and Hui, 2013). Based on the findings of previous studies about the challenges of managing a campaign and how we

anticipate the creator needing to further interact with backers as more communication and input from backers is requested, we develop the following expectation:

Expectation 2: Providing an avenue of self-expression is directly correlated with greater creator comments.

## **Methodology**

### *Case-based research – Unstable Unicorns*

We use a case methodology (Eisenhardt, 1989; Eisenhardt and Graebner, 2007) for our study as our context provides a straightforward natural experiment to evaluate the effect of providing an opportunity for self-expression within a campaign. Our case is the Kickstarter campaign for Unstable Unicorns, which is a tabletop game. The campaign was launched on August 16th, 2017 by Ramy Badie (the creator), who is the owner of TeeTurtle Inc. with a target fundraising goal of \$10,000. When the funding period ended, \$1,865,140 was raised from 33,720 backers.

Due to the overwhelming success of the campaign, the creator introduced the notion of drawing unicorns that were thematic representations of backers and called these drawings “Backercorns” (a combination of backer and unicorn) as means of celebrating the success of the campaign. Backercorns appear to have been introduced primarily because the creator was caught off guard by the success of the campaign and had exhausted all other possible options to enhance the campaign. As he verbatim states, “Many of you have been wondering what will happen with Stretch Goals for the rest of

the campaign. I definitely did not anticipate a scenario where I had to come up with SGs past \$1M, but I want this campaign to be the most fun possible for the next 5 days.” The creator also mentions that backers can describe how they would like to be drawn in the comments section, and if selected, the creator would provide a drawing based on that description. As the creator verbatim stated in his update on September 10, 2017, “for every \$10k we go over \$1M, we will draw one of our most active backers as a unicorn. So start figuring out what you'd look like, let me know in the main comments, and we will get to work drawing for you :D And who knows, maybe we will figure out something to do with all of the new unicorns in the future ;).” The Backercorn reward was the opportunity for self-expression introduced into the campaign.

However, it also clearly demonstrates that the most active backers will get priority, which means that backers who were not previously active may not bother to participate. Finally, the creator implies (and later verifies) that Backercorns will not be included in the primary rewards package for backers (either as stand-alone art or art pieces on cards). While an explicit reason is never stated why the Backercorns will not be included, the creator does imply being burden with pursuing other tasks by verbatim stating, “I will be working on a lot of stuff that has been requested (like sleeves, bigger boxes, etc.), but since I don't have timelines or prototypes, I don't want to "unlock" them. I promise that if any of those things become available, I'll send out an update,” which may mean that there was simply a lack of capacity or time to actually incorporate Backercorns into the final rewards package.

*Data collection and method of analysis*

Our data for the study comes from two sources: The Unstable Unicorns Kickstarter’s page and the Kicktraq page for Unstable Unicorns. Kicktraq is a data analytics website that provides daily statistics regarding backers, comments, and funding that a campaign generates while the funding period is open. At the time of our scraping the comments from the Kickstarter page, there were over 17,000 comments posted. Our unit of analysis is the number of daily comments generated during the campaign. Specifically, we measure overall comment generation for Expectation 1 and then specifically evaluate the creator’s comments for Expectation 2. We supplement the quantitative data we gather with qualitative evaluation of the comments generated during the campaign to verify and further examine our expectations.

*Model specification for expectation 1*

To quantitatively analyze the effect of adding the Backercorn incentive on backer participation, we use an ordinary least squares (OLS) regression with an autoregressive term using the following specification:

$$\begin{aligned} \text{Daily\_Comments}_n &= (\beta_1 * \text{Daily Comments}_{n-1}) + (\beta_2 * \text{Daily Backers}_n) \\ &+ (\beta_3 * \text{Daily Pledges}_n) + (\beta_4 * \text{Backercorn}_n) \end{aligned}$$

Daily comments<sub>n</sub> is a count of the new comments generated on a given day as the backer participation dependent variable. The independent variable (Backercorn<sub>n</sub>) is a dummy variable that relates to whether the Backercorn opportunity was active (1) or not (0) on that given day. Our control variables are the number of new backers (Daily

Backers<sub>n</sub>) on that given day, the amount of funding (Daily Pledges<sub>n</sub>) raised on that given day, and daily comments on the previous day (Daily Comments<sub>n-1</sub>), which is the autoregressive term. Our autoregressive term is zero on the first day given that no comments exist.

### *Model Specification for expectation 2*

To quantitatively analyze whether the operational burden for the creator increased after introducing Backercorns, we conduct a two-sample t-test to evaluate if the average number of daily comments from the creator increases after introducing Backercorns. This t-test is one-sided given that we anticipate the operational burden to increase for the creator. Our sample consists of the first 25 days of the campaign (when Backercorns have yet to be introduced) versus the final 6 days of the campaign (where Backercorns are active).

## **Results**

### *Descriptive statistics*

The Unstable Unicorns campaign generated 14,824 comments from launch through February 7, 2020. This includes comments that were generated from August 16, 2017 to September 15, 2017 (the funding period) and comments that were generated after the campaign ended (the post funding period). According to Kicktraq, 9,651 comments were generated during the funding period while the remaining comments (5,173 as of February 7, 2020) were generated post-funding period. We use the comments generated during the funding period for testing Expectations 1 and 2 as we can verify variable value

daily using Kicktraq.

*Backercorn implementation effect on backer participation*

Our sample pool includes 31 daily observations over the funding period) to test Expectation 1 (providing an opportunity for self-expression is directly correlated with greater backer participation). The number of observations not including the Backercorn opportunity is 25, while the number of observations including the Backercorn opportunity is 6. Descriptive statistics and correlations are provided below in Table 4.1:

	Comments	Backercorn	Pledges	Backers	Mean	Standard Deviation
Comments	1.00				311.32	66.21
Backercorn	0.70	1.00			0.19	0.07
Pledges	0.93	0.74	1.00		60,166.03	10,829.93
Backers	0.88	0.70	0.99	1.00	1,087.74	196.58

**Table 4.1: Correlations and summary statistics of variables**

We run three separate models summarized in Table 4.2 (\*=  $p < 0.1$ ; \*\*=  $p < 0.05$ ; \*\*\*=  $p < 0.01$ ) regarding expectation 1. The first model (left) simply uses the previous day's comments and shows the majority of the variation can be explained solely by this term. The second model (center) incorporates all of our controls highlighting how accurately daily comments can be predicted simply based on the number of new backers and funding raised that day. The third model (right) incorporates the Backercorn term (alongside our controls) to examine the effect of adding Backercorns to daily comments. While the overall sample size (31) is fairly limited and the number of days the Backercorns term is active is small (6), we still find evidence of significance for the Backercorn term, which supports the expectation that incorporating an opportunity for self-expression into a campaign is directly correlated with backer participation.

	Dependent Variable		
	Daily Comments	Daily Comments	Daily Comments
Previous Daily Comments	1.140 ***(0.051)	0.421 (0.275)	0.220 (0.136)
Daily Backers		-0.388 **(0.145)	-0.279 **(0.109)
Daily Pledges		0.107 ***(0.003)	0.008 ***(0.002)
Backercorn			312.892 ***(58.091)
Constant	10.867 (31.263)	-22.983 (42.324)	-6.351 (15.070)
F-stat prob	0.000	0.000	0.000
R-squared	0.872	0.931	0.974
Observations	31	31	31

**Table 4.2: Regression results summary.**

Further qualitative analysis was done to verify the effect of the inclusion of Backercorns on backer participation. Specifically, we examined comments generated after Backercorns were introduced to see if there was a degree of self-expression present (signaling to the creator the way the backer would like to be drawn) and reference to the Backercorn opportunity. Verbatim examples pulled from the backer comments are provided below (the number in parentheses after the user handle is the total number of times the backer commented during the campaign):

- *Toni Barth (1)*: “Hi. I'm supporting this game since its second day I guess, and I now have an iinteresting idea as a Unicorn ;). / Since i'm blind, it would probably be fun to have a blind Unicorn, using its white cane as horn, and the three dots somewhere on it, maybe giving it some more attributes to classify it as blind, giving it those sun glasses those cliché blind guys always wear in those hollywood films for example... I didn't even think that this project would get over a million bucks, but even

more impressive is the huge amount of people supporting the Unstable Unicorns. Over 15.000 people! Thats amazing.”

- *Shicala (22)*: “I’m doubting I’ll get picked as a unicorn but I love dragons :P so if I were chosen I would love to have a uni cosplaying as a dragon”
- *OATS (217)*: ““I would love to be a +10k Unicorn! / Comment Gamer Unicorn playing with a Giant D20!!””
- *Neo (680)*: “Hmm actually, I could be a unicorn dodging bullets hehe with the effect that magic cards don't affect me!”

#### *Backercorn implementation effect on the creator*

When we examined the 9,651 comments generated during the funding period of the campaign, we found that the creator commented 48 times before announcing Backercorns and only commented a single time after announcing Backercorns. The 48 comments generated before the Backercorn announcement was done over 25 days. This results in a pre-Backercorn average of 1.92 comments per day, and a standard deviation of 3.07. The single comment post-Backercorn came over the course of a single day. This results in a post-Backercorn average of 0.17 and a standard deviation of 0.41. The results of the t-test are provided below:

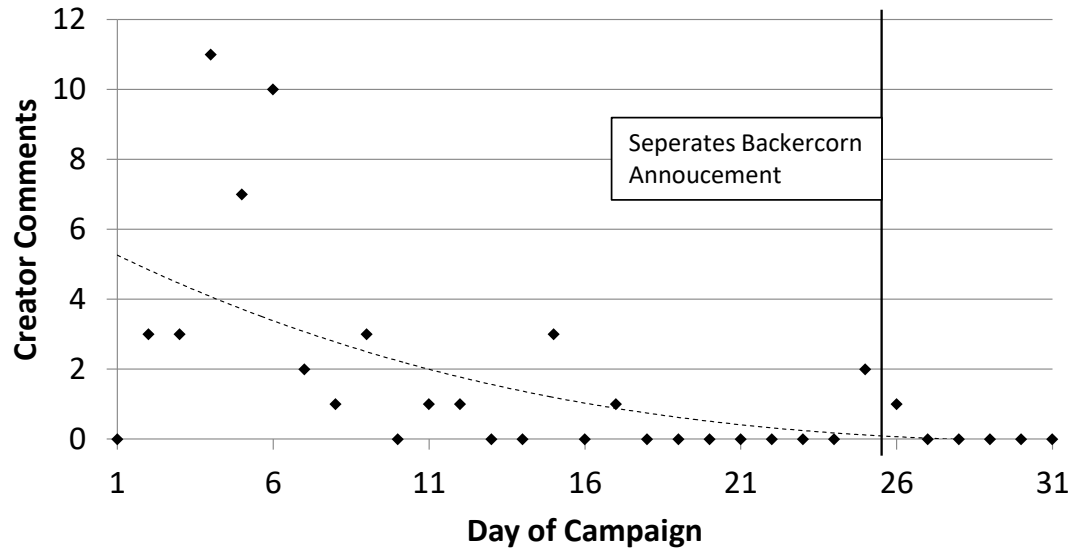


	Observations	Mean	Standard Error	Standard Deviation
Pre-Backercorn	25	1.92	0.61	3.07
Post- Backercorn	6	0.17	0.17	0.41
Combined	31	1.58	0.51	2.84
Difference		1.75	0.64	
Degrees of Freedom	27.000			
T-stat	2.758			
p-value (Pre $\neq$ Post)	0.010			
p-value (Post > Pre)	0.995			
p-value (Pre > Post)	0.005			

**Table 4.3: Two sample t-test of creator comments before and after Backercorn announcement**

Based on this information, we do not find any quantitative evidence supporting the Expectation 2 (including an avenue of self-expression increases the number of comments the creator posts). Instead, we find with the opposite: the creator engaging less with backers after announcing Backercorns. We therefore conducted further analysis to gain a better understanding of what occurred over the course of the campaign.

We first analyze creator comments on a daily basis from the first day of the campaign to the last day before the funding period closes, graphically depicted in Figure 4.1 (dotted line is a trend line).



**Figure 4.2: Daily creator comments on each day of the campaign**

The graph shows that there is a consistent downward trend regarding the creator and his posting of comments. In the first 10 days of the campaign, the creator is much more active regarding comment, but by day 20, the activity of the creator is quite minimal. We find a minor amount of activity around the Backercorn announcement, but this may have been prompted by the campaign raising over \$1 million. Therefore, it is difficult to determine whether the Backercorn announcement resulted in a lower operational burden for the creator, or had no effect. To gain further insight regarding why the commenting by the creator decreased over time and the Backercorn announcement did not result in a demonstrable increase of creator comments, we qualitatively analyze the content of comments.

We first qualitatively evaluated the 49 creator comments during the funding period. At the start of the campaign, the creator comments to introduce himself and to provide updates:

- “Hey everyone, I'm so excited to see how much support you've put behind this project! I promise I'm here and reading and will get to all the comments as quickly as I can! I've been trying to get to all the DMs, and will clarify everything I can by the end of the night :) THANK YOU!! <3”
- "Hello again everyone :D A huge thanks for helping us reach stretch goal #2 already!!... I've posted the second update and adjusted the FAQs, but I wanted to call out a few specific things: / 1. I thought more about the ""1 of each exclusive card"" situation, and in hindsight realized it made no sense at all. So now, all tiers that include the exclusive cards will get a set of them for EACH box (not just one).”

This quickly transitions to the creator using the comments section to respond to comments either directed at him, to answer questions that backers may have in general, or to resolve any discussions that backers may have on a topic that needs the creator's input:

- “@Scott C - I promise I'm not ignoring the issue, I just don't have the answer yet that I think is satisfactory. I hope you (and others with the same concern) can give me a few days to consider the situation and come up with a solution :)”
- "I just wanted to jump in to confirm that there will be no political cards in the game. / I will have responses to a lot of other questions/concerns (and the 2-player video) in my update tonight :)"

This trend continues for a while at a descending rate (as noted above) but eventually the creator stops answering questions and once the project achieves \$1M in funding, the creator effectively stops commenting entirely. We also examine if the creator's update activity during the funding period changed after introducing Backercorns and find no discernable change. An update is an official announcement that creators can send to backers on a crowdfunding platform. The only evidence we found regarding work related to the Backercorn announcement was the creator mentioning a live stream where he would draw Backercorns. Some of the updates released after the funding period also showcased the Backercorn drawings, but had no mention regarding extra work done. We discuss this result and the possible reasons for why this occurred in the discussion section.

## **Discussion**

### *Expectation 1*

While we find evidence that supports our expectation that self-expression opportunities will increase backer participation, a question regarding backer motivation arose while analyzing the qualitative statements. One backer, *Shicala*, expected not to be selected as a Backercorn, but still participated. We then further examined the backer comments related to being drawn as a Backercorn and found a fair number of comments (verbatim samples included below) that hint at an understanding that the probability of being selected is low. The number in parentheses is the total number of times the backer commented throughout the entire campaign:

- *Shicala (22)*: “I’m doubting I’ll get picked as a unicorn but I love dragons :P so if I were chosen I would love to have a uni cosplaying as a dragon.”
- *Daniel Cassidy (25)*: “I won’t get unicornification but if I did I would want to be a cosmonaut unicorn.”
- *Stephanie M. (57)*: “I know I’m not that active of a backer, but just in case, my unicorn self would wear glasses and shirts with flowers or animals on them, much to the dismay of her boyfriend who accuses her of wearing her grandmother’s clothes. / And congrats on the million dollar mark! Can’t wait for my order in November.”
- *Ripper Zabel (89)*: “Doubt that I would be chosen but my Unicorn would be on wearing a black trench coat and a fedora with red eyes and silver hair.”

This was unexpected given that we argue that the opportunity for self-expression drives backer participation because it appeals to an egocentric desire. We would expect that if the choice to participate is based partially on being rewarded, then backers who believe there is a low probability of being selected would not participate. One possible explanation for this behavior could be that the cost to provide a description of how a backer would like to be drawn is quite minimal, leading some backers to decide that the investment of providing a simple comment was worth the potential benefits. Another possible explanation could be the “lottery dream” effect where participation is not necessarily about actually getting drawn as a Backercorn, but imagining what it would be like to win (Clotfelter and Cook, 1989). Another alternative explanation for this could be that certain backers saw other backers either getting a Backercorn or participating despite

self-identifying as having a low probability of getting a Backercorn and decided to participate so as not to be left out akin to herding behavior (Devenow and Welch, 1996).

It is difficult to determine from this single case whether adding an opportunity for self-expression may directly lead to more backers and more funding. The final six days of the campaign (the period when Backercorns are active) accounts for nearly 46.5% of all eventual backers and 46.4% of total funding. However, successful Kickstarter campaigns commonly have a final boost at the end of the campaign. As one verbatim comment from the campaign highlights, “You guys are forgetting the last 48 hour push when the reminders go out. Kickstarters always get a get massive influx during the last 48 hours (usually rivaling Day 1 figures) because all of the people who hit the "remind me" button get their reminders, see how well the project is doing and all it's gained and will pledge themselves.” Clearly even backers themselves anticipate boosts in funding at the end. Based on this information, we offer the following proposition:

Proposition 1: An opportunity for self-expression will increase backer participation during a crowdfunding campaign even if all backers will not be ultimately rewarded

### *Expectation 2*

We do not find evidence supporting Expectation 2, which was unexpected given that the time and energy commitment of doing a campaign is a major deterrent to potential creators (Gerber and Hui, 2013; Stanko and Henard, 2016). It was surprising to see an effective decrease in creator comments to backers after including the self-

expression opportunity. However, further analysis showed that the creator rarely commented by the time Backercorns were announced. To evaluate why this may have occurred, we conducted a final analysis of the content of all comments generated after the inclusion of Backercorns.

The creator states that he would use the metric of “most active backer” to select who would be rewarded with a Backercorn once the \$1M funding mark was surpassed. Since we see no evidence regarding the creator actively commenting, we look to see how backer-to-backer communication may have played a part in reducing the creator’s activity. If the measure of “most active backer” was simply total comment count, backers could game it simply by posting frequently. We even see concern from one backer named *Zazer* that this is exactly what would happen, “I kinda hope Ramy will scroll down to see who's was active before update 22 because now people are just trying to get themselves drawn but before #22 people like me, Angela and Marie were commenting regularly to help people out ;-;,” and even another backer named *Michael den Heijer*, “Question is what is considered active :p spamming like crazy now with random nonsense or constructive answers to questions people have :p.” What these comments also highlight, however, is that many backers were generating comments by answering the questions of other backers. This raises the question of how the creator would encourage (and reward) not only frequent participation but helpful participation. Interestingly, the backers themselves would sometimes nominate other backers to be drawn, and these nominations tended to be for backers who helped answer questions. For example, we can see from the following verbatim comment from *OATS*, “Voting for @Angela and @Marie to be a duet

Unicorn pair! / Always helpful/positive/funny...” is an indication that backers value other backers who are always helpful. This seems especially pertinent given that backers who were helpful seemed to express some frustration at having to answer the same questions over and over again or repeat answers to questions that had already been answered by the creator, as captured by the following verbatim comment from *Zazer*, “Guys, check the fifth comment on update #20. Ramy replied to me about 1-player rules. If you can't be bothered to find it, or don't want to, I've got it pasted below :)”. In addition, our results did indicate that many comments made by the creator during the funding period were in response to answering questions from backers. Taking these observations into consideration, we offer the following proposition:

Proposition 2: An increase in operational burden caused by introducing an opportunity for self-expression can be mitigated by creators using the metric of “active helpful comments” to distribute the self-expression reward.

This proposition highlights an opportunity for creators to use a backer’s desire for self-expression as a way to encourage helpful activity while potentially freeing the creator to spend time elsewhere. Helpful activity is defined as, “customer behavior aimed at assisting other customers” (Yi and Gong, 2013). By linking the concept of helpful activity to the reward of self-expression, creators can simultaneously encourage greater participation from backers while also using the most active backers as a means of taking on responsibilities that free up the creator from answering questions. While this does



mean that a creator must consider the cost of ultimately rewarding backers with an opportunity for self-expression, it may be a tradeoff worth taking when time is a scarce resource during campaigns.

## **Implications**

### *Theory implications*

Our findings raise two implications for theory regarding: (1) the operational burden of crowdfunding and (2) the value of self-expression to firms. First, while crowdfunding has been found to be an intense undertaking for creators, our findings indicate that certain methods of managing a campaign can be implemented with a minimal increase in operational burden. This raises a critical pair of questions regarding crowdfunding: 1) what are the factors that make running a campaign so grueling for some creators? and 2) what can be done to minimize the creator's operational burden?" Could the excessive operational burden for some creators simply be explained by inexperience with the multitude of tasks necessary to deliver a successful campaign (task complexity) or could it be that simply trying to serve a distributed network of backers can push agency costs to an insurmountable high (task volume)? For now, this remains an open question. In our case, backers off-loaded some of the work from the creator, effectively resulting in the creator having more capacity to work on other parts of the campaign. This raises questions regarding the types of arrangements creators can use to leverage backers to their fullest (aside from capital), the types of backers best suited to helping with a campaign, and what infrastructure would minimize the operational burden on potential

creators.

Second, our results raise a question regarding the flexibility of self-expression and how it can be leveraged by firms. In our case, the self-expression reward was effectively paid for by off-loading work from the creator. Considering most studies regarding self-expression ultimately examine the monetary value of providing an opportunity for self-expression (in other words, encouraging self-expression increases funding from backers), a new question regarding the “work value” of self-expression does potentially emerge. If self-expression encourages backers to help each other, this may imply self-expression can offer a nonmonetary value. This is striking because backers had already paid to participate in the campaign and were under no obligation to help the creator.

#### *Practitioner implications*

We identify two implications for practitioners (primarily creators in our case): (1) providing an opportunity for self-expression can encourage backers to participate beyond simply pledging funds to a campaign, and (2) creators can use rewards grounded in self-expression to coordinate backers to help each other. If self-expression can provide a boost to backer participation, this may indirectly increase funding levels, which is always a primary concern for creators (Cornelius and Gokpinar, 2019). What makes this a potentially powerful method of encouraging backer participation, however, is that despite very few of the backers ultimately receiving a self-expression reward in this study, a Backercorn, many backers still choose to participate. These self-expression rewards were not even included in the core rewards package of the campaign, which means that they

can be provided without needing to alter a campaign. With these considerations in mind, it would appear that creators would benefit from considering how they can incorporate opportunities for self-expression that fit their campaigns.

While increased participation may yield benefits in general, creators may want to also consider how they can influence the participation activity of backers. In our case, while the creator technically makes “most active backers” the criterion for choosing who gets a Backercorn, it appears that the actual criterion ends up becoming “most helpful backers,” which has the positive side effect of freeing the creator from needing to respond as frequently in the comments section. Given that running a campaign is a time-intensive endeavor, a potential option to exchange a time commitment (i.e., being active in the comments section) with some other cost may be a valuable option for creators who need to maximize the value of their time. This also opens up the possibility that different self-expression rewards could be allocated based on different criteria (e.g., most creative ideas, best product improvement, most helpful backers, etc.) to encourage different types of participation. By being able to encourage specific types of participation, creators may be able to more effectively leverage backers as partners in a campaign in addition to being financial stakeholders.

### **Limitations and future research**

Our study comes with some limitations that warrant further exploration. First, as our methodology is case-based, there may be generalizability concerns regarding our findings. As the practice of crowdfunding continues to proliferate, there will be more

campaigns to study both the effects of adding an opportunity for self-expression to a campaign, and evaluating ways to encourage different types of backer participation. Second, the campaign we studied was one of the most successful campaigns of its time (Marotta, 2017), which means that the campaign did not face the challenges of reaching a funding goal that most campaigns must overcome. This does point to the potential for studying how providing opportunities for backer self-expression may increase the probability of meeting a funding target or increasing total funds generated.

## **Epilogue**

The three main research questions examined in this dissertation are: (1) what is the nature of survival and growth (i.e., are they independent or jointly determined) in new ventures as they related to the choices of developing a competitive strategy and hiring new employees, (2) how do knowledge flow structures differ between customer groups and what are the operational implications for new ventures regarding how to allocate limited time to gaining information from a limitless selection of information channels, and (3) how can new ventures motivate customers to provide more information even after they have they have given money? All three of these questions ultimately help inform the operational choices that new ventures must make to maintain survival and achieve growth.

The first study found evidence that at least two distinct stages exist - A validated learning stage where survival and growth are independently determined, and a commercialization stage where survival and growth are jointly determined - for new ventures as they relate to survival and growth. This study also identified that the transition between these two stages can be prolonged and is not cleanly delineated. These findings raise two main questions for further analysis. First, outstanding questions exist regarding the transition between the validated learning stage and the commercialization stage. It may be that only two stages exist and the transition between the two stages is long and fraught with difficulty, but a possible alternative explanation is that more stages may exist between the validated learning stage and commercialization stage that were inadequately captured by our analysis framework. Further study is required to examine

the veracity of the possibility of in-between stages. Second, our research effectively relied on reflective measures to understand when the new venture cohort on average was in the validated learning stage versus the commercialization stage (Diamantopoulos and Siguaw, 2006). Further study may also define formative measures that can be used to determine whether a new venture is in a given stage, which would enable researchers to identify which stage a given new venture is in and practitioners to tailor operational decisions to maximize the venture's success.

The second study found, using TMS theory, that different customer virtual groups evolve to have different knowledge structure and knowledge flows. We also found evidence that the scope of virtual group discussions may expand over time. This is critical to new ventures that must spend their limited time to learn as much as possible, and thus a key operational choice becomes selecting the best information channels to secure information. These findings raise two main questions for further analysis. First, TMS theory has been traditionally applied to teams that are either small or bounded by some unifying organization or project, which is not surprising given that the roots of TMS theory are intimate couples and small project groups. However, we find evidence that a TMS is capable of developing within a large virtual group that is magnitudes larger than those of typical TMS studies, suggesting that with proper organization, new ventures can potentially efficiently access large amounts of information. This finding raises questions regarding the boundaries of TMS development in terms of group size and how a can TMS develop to meet the needs of large groups. Second, TMS has traditionally been focused on how group members efficiently manage information with the ultimate

goal of, “collectively [possessing] all of the information needed for their tasks” (Lewis, 2003). However, our findings suggest that a TMS can evolve over time in scope beyond task-oriented knowledge and act as system to facilitate learning. This may suggest that further studies can examine how TMS theory can help with concepts such as open innovation or decentralized groups that may need to coordinate knowledge beyond the task-oriented.

The third study found that self-expression can be an effective incentive to increase backer participation, even amongst backers who do not anticipate being rewarded with the self-expression reward, without significantly increasing the operational burden of managing a crowdfunding campaign. In addition, we found that a creator can use selection mechanisms to off-load some work onto the backers. These results raise further questions regarding leveraging the crowd for new ventures. First, the self-expression opportunity provided in our case was neither included in the main reward package nor of significant monetary value, but was still capable of increasing backer input. This may mean that new ventures potentially do not need to expend large sums of capital (a critical component of survival) gathering critical information. In addition, rewards that new ventures provide to customers who provide information can be smaller (and potentially cheaper) so long as they can appeal to a customer’s desire for self-expression. Second, depending on the method of raising funding and securing information, new ventures can effectively organize customers to a certain extent to reduce operational burdens. Given that new ventures are almost always resource constraint, having the option to off-load work onto customers (for a small reward) may be a worthwhile trade.

## APPENDIX A

**Table A1: Descriptive statistics for year 1 (2005) sample**

	Year 1	Mean	SD	1	2	3	4	5	6	7	8	9	10
1	Survival	0.86	0.34	1.00									
2	Growth	0.63	0.48	0.15	1.00								
3	Competitive Advantage	0.70	0.46	0.10	0.02	1.00							
4	New Employee Percentage	0.25	0.29	0.04	0.11	-0.02	1.00						
5	Total Employment	6.00	9.18	0.08	-0.01	0.05	0.22	1.00					
6	Assets > \$100k	0.68	0.47	0.13	0.20	0.08	0.19	0.26	1.00				
7	High Tech	0.16	0.37	0.04	0.08	0.07	0.10	-0.01	0.00	1.00			
8	Female Owner	0.22	0.41	-0.03	0.06	-0.01	-0.02	-0.09	-0.11	-0.09	1.00		
9	2 Or More Owners	0.47	0.50	-0.01	0.12	0.00	0.06	0.19	0.24	0.03	-0.04	1.00	
10	State Unemployment	0.05	0.01	0.01	-0.05	0.00	0.00	-0.01	-0.03	0.00	0.04	-0.04	1.00

**Table A1: Descriptive statistics for year 1 (2005) sample**

**Table A2: Descriptive statistics for year 2 (2006) sample**

	Year 2	Mean	SD	1	2	3	4	5	6	7	8	9	10
1	Survival	0.86	0.35	1.00									
2	Growth	0.55	0.50	0.16	1.00								
3	Competitive Advantage	0.69	0.46	0.03	0.13	1.00							
4	New Employee Percentage	0.16	0.23	0.06	0.08	0.08	1.00						
5	Total Employment	7.14	12.28	0.03	0.10	0.06	0.15	1.00					
6	Assets > \$100k	0.71	0.45	0.14	0.14	0.13	0.05	0.23	1.00				
7	High Tech	0.14	0.35	0.09	0.04	0.07	0.05	0.01	0.03	1.00			
8	Female Owner	0.21	0.41	-0.05	-0.10	0.00	-0.01	-0.09	-0.05	-0.07	1.00		
9	2 Or More Owners	0.47	0.50	0.07	0.08	0.03	0.03	0.22	0.27	0.07	-0.01	1.00	
10	State Unemployment	0.05	0.01	0.00	-0.04	0.01	0.05	0.00	-0.02	0.01	0.00	-0.03	1.00

**Table A2: Descriptive statistics for year 2 (2006) sample**



**Table A3: Descriptive statistics for year 3 (2007) sample**

	Year 3	Mean	SD	1	2	3	4	5	6	7	8	9	10
1	Survival	0.92	0.28	1.00									
2	Growth	0.53	0.50	0.08	1.00								
3	Competitive Advantage	0.64	0.48	0.09	0.05	1.00							
4	New Employee Percentage	0.11	0.18	0.04	0.08	0.03	1.00						
5	Total Employment	7.50	14.15	0.06	0.07	0.09	0.13	1.00					
6	Assets > \$100k	0.74	0.44	0.03	0.15	0.14	0.07	0.20	1.00				
7	High Tech	0.15	0.36	0.06	0.11	0.04	0.01	-0.01	-0.02	1.00			
8	Female Owner	0.20	0.40	-0.06	-0.03	0.00	-0.02	-0.08	-0.11	-0.06	1.00		
9	2 Or More Owners	0.47	0.50	-0.01	0.10	0.07	0.04	0.20	0.27	0.07	-0.01	1.00	
10	State Unemployment	0.05	0.01	0.03	0.03	-0.05	0.01	-0.01	-0.05	0.00	-0.01	-0.04	1.00

**Table A3: Descriptive statistics for year 3 (2007) sample**

**Table A4: Descriptive statistics for year 4 (2008) sample**

	Year 4	Mean	SD	1	2	3	4	5	6	7	8	9	10
1	Survival	0.92	0.28	1.00									
2	Growth	0.43	0.50	0.11	1.00								
3	Competitive Advantage	0.63	0.48	0.08	0.04	1.00							
4	New Employee Percentage	0.10	0.19	0.01	0.05	0.06	1.00						
5	Total Employment	7.69	15.72	0.04	0.14	0.04	0.10	1.00					
6	Assets > \$100k	0.74	0.44	0.09	0.13	0.10	0.06	0.19	1.00				
7	High Tech	0.16	0.37	0.02	0.00	0.05	0.06	0.02	0.03	1.00			
8	Female Owner	0.20	0.40	-0.04	0.09	-0.03	0.01	-0.06	-0.06	-0.07	1.00		
9	2 Or More Owners	0.48	0.50	0.02	0.05	0.08	0.05	0.20	0.30	0.07	-0.01	1.00	
10	State Unemployment	0.06	0.01	0.01	-0.03	-0.06	-0.03	-0.02	-0.02	0.03	-0.01	0.01	1.00

**Table A4: Descriptive statistics for year 4 (2008) sample**

**Table A5: Descriptive statistics for year 5 (2009) sample**

	Year 5	Mean	SD	1	2	3	4	5	6	7	8	9	10
1	Survival	0.94	0.24	1.00									
2	Growth	0.43	0.50	0.09	1.00								
3	Competitive Advantage	0.55	0.50	0.10	0.09	1.00							
4	New Employee Percentage	0.10	0.18	0.09	0.16	-0.01	1.00						
5	Total Employment	8.01	17.87	0.06	0.09	0.06	0.07	1.00					
6	Assets > \$100k	0.72	0.45	0.08	0.10	0.15	0.03	0.20	1.00				
7	High Tech	0.16	0.37	0.01	0.08	0.05	0.02	0.02	0.02	1.00			
8	Female Owner	0.19	0.39	-0.04	0.01	-0.11	0.03	-0.06	-0.04	-0.08	1.00		
9	2 Or More Owners	0.49	0.50	0.01	0.03	0.12	0.03	0.20	0.31	0.11	-0.02	1.00	
10	State Unemployment	0.09	0.02	0.06	-0.04	-0.06	0.11	0.00	-0.03	0.02	-0.01	0.02	1.00

**Table A5: Descriptive statistics for year 5 (2009) sample**

**Table A6: Logistic regression (Hausman test) results from year 1 (2005) to year 5 (2009)**

Dependent Variable	Survival Year 1	Growth Year 1	Survival Year 2	Growth Year 2	Survival Year 3	Growth Year 3	Survival Year 4	Growth Year 4	Survival Year 5	Growth Year 5
Competitive Advantage	0.48 ***(0.19)	0.24 (0.33)	0.03 (0.21)	0.51 ***(0.16)	0.58 **(0.26)	-0.49 *(0.28)	0.55 **(0.28)	0.51 (0.47)	0.77 **(0.34)	0.61 **(0.24)
New Employee %	0.04 (0.35)	0.65 ***(0.25)	0.76 (0.50)	1.14 *(0.61)	0.67 (0.89)	0.05 (0.49)	-0.07 (0.76)	0.25 (0.45)	3.07 *(1.62)	2.41 ***(0.68)
Total Employees	0.03 (0.02)	-0.01 (0.01)	-0.01 (0.01)	0.01 (0.01)	0.04 (0.04)	-0.01 (0.01)	0.01 (0.01)	0.03 ***(0.01)	0.04 (0.04)	0.01 **(0.01)
Assets > \$100k	0.63 ***(0.19)	1.19 ***(0.43)	0.72 ***(0.22)	1.10 *(0.60)	0.01 (0.30)	0.54 ***(0.19)	0.61 *(0.33)	0.95 (0.59)	0.44 (0.40)	0.56 **(0.23)
High Tech	0.35 (0.28)	0.63 **(0.26)	0.81 **(0.36)	0.62 (0.49)	0.77 (0.48)	0.04 (0.31)	0.14 (0.40)	0.10 (0.24)	-0.02 (0.47)	0.43 *(0.23)
1 <sup>st</sup> Owner Female	-0.10 (0.22)	0.42 **(0.18)	-0.25 (0.22)	-0.70 ***(0.27)	-0.37 (0.30)	0.39 (0.25)	-0.27 (0.32)	0.37 (0.30)	-0.28 (0.38)	0.03 (0.23)
2 Or More Owners	-0.29 (0.19)	0.30 (0.20)	0.19 (0.22)	0.30 (0.20)	-0.24 (0.31)	0.43 **(0.18)	-0.18 (0.32)	-0.19 (0.21)	-0.31 (0.36)	-0.18 (0.18)
Unemployment Rate	3.96 (10.19)		1.01 (11.03)		11.63 (14.46)		4.48 (12.70)		14.89 *(9.119)	
$\hat{\varepsilon}_S$		4.34 (4.78)		7.50 (6.00)		-12.22 **(4.98)		9.19 (10.10)		6.52 *(3.63)
Survived		-3.52 (4.78)		-6.71 (6.00)		12.63 **(4.97)		-8.38 (10.09)		-5.85 (3.66)
Constant	0.89 (0.56)	2.22 (3.65)	1.07 (0.56)	4.50 (4.57)	1.37 (0.80)	-11.76 (4.37)	1.45 (0.74)	6.10 (8.60)	0.56 (0.84)	4.16 (3.24)
Chi Squared	26.11	88.69	28.48	57.97	13.52	40.60	14.52	31.16	19.66	32.12
Pseudo R <sup>2</sup>	0.04	0.07	0.04	0.05	0.04	0.04	0.03	0.04	0.07	0.04
Observations	1,052	1,052	899	899	765	765	696	696	632	632

\*p<0.10 Logistic regression with robust standard errors. Greyed out portion are our controls for the regressions. Unemployment rate (state level) is our instrumental variable to test whether there is joint determination in the growth regression.  $\hat{\varepsilon}_S$  is the key variable in checking if survival and growth are independent (no significance) or jointly determined (significance).

**Table A6: Logistic regression (Hausman test) results from year 1 (2005) to year 5 (2009)**

## APPENDIX B

**Table B1: Summary of virtual TMS literature**

Author	Year	Subjects & Context	Virtual Group Communication	Key Findings
Yoo and Kanawattanachai	2001	Graduate students / Inc. 2000 game	Web-based interface (Email)	<ul style="list-style-type: none"> <li>• The effect of early communication on team performance is negatively moderated by the development of TMS</li> </ul>
Lewis	2004	MBA students / Corporate consulting projects occurring during the semester	Email and telephone	<ul style="list-style-type: none"> <li>• Teams with initially distributed expertise and familiar members are more likely to develop a TMS</li> <li>• Face-to-face communication leads to TMS emergence, but other forms of communication had no effect</li> <li>• Teams with more established TMSs benefited most from face-to-face communication while other forms of communication helped less</li> </ul>
Kanawattanachai and Yoo	2007	MBA students / Inc. 2000 game	Web-based interface (Email)	<ul style="list-style-type: none"> <li>• TMS can develop in environments where interactions are solely electronic, but can take substantial time to develop</li> <li>• TMS is essential to performing tasks effectively in virtual teams</li> <li>• Task-knowledge coordination directly correlates with team performance</li> </ul>
Oshri, van Fenema, and Kotlarsky	2008	Professional consultants / Software development projects	Documents and Email	<ul style="list-style-type: none"> <li>• Codified and personalized directories were established to locate information</li> <li>• Teleconferencing and short visits were critical to facilitate knowledge sharing</li> </ul>
Choi, Le, and Yoo	2010	Two South Korean firms / Knowledge management	IT infrastructure management software	<ul style="list-style-type: none"> <li>• IT has a positive correlation with the creation of a TMS</li> <li>• Knowledge application, beyond knowledge sharing improves team performance</li> </ul>

O'Leary and Mortensen	2010	Undergraduate students / Complete a written assessment	All forms of electronic communication	<ul style="list-style-type: none"> <li>Geographically isolated group members have better measures regarding TMS adoption than minority or majority sub-groups</li> </ul>
Majchrzak, Wagner, and Yates	2013	Experienced corporate wiki users / Wiki Management	Corporate wikis	<ul style="list-style-type: none"> <li>Knowledge depth and knowledge breadth are directly correlated with knowledge shaping behavior</li> <li>Assessments of the community's TMS positively moderated shaping contributions but negatively moderated adding contributions</li> </ul>
Tang, Mu, and Thomas	2014	NPD Teams / High-tech firms in China	Computer mediated	<ul style="list-style-type: none"> <li>Information communication and face-to-face communication were directly correlated with TMS development, and both relationships are positively moderated by an exploration task context</li> <li>Formal communication and computer-mediated communication were directly correlated with TMS development, and both relationships are positively moderated by an exploitation task context.</li> </ul>
Havakhor and Sabherwal	2018	Amazon Mechanical Turk/ Web Page Design	Microsoft team foundation server	<ul style="list-style-type: none"> <li>Group members with specific dimensional measurements of knowledge expertise are rapidly allocated knowledge responsibilities according to expertise.</li> <li>When group members do not have specific signals about knowledge, groups use interpersonal connections to allocate knowledge responsibilities</li> </ul>

**Table B1: Summary of virtual TMS literature**

## APPENDIX C

**Table C1: Summary of most recent rewards-based crowdfunding literature**

Author(s)	Year	Creator Content Usage	Backer Content Usage	Key Findings
Mollick	2014	<ul style="list-style-type: none"> <li>• Creator updates</li> <li>• Speed of updates</li> </ul>	<ul style="list-style-type: none"> <li>• Average number of comments</li> </ul>	<ul style="list-style-type: none"> <li>• Personal networks and product quality are directly correlated with meeting funding goals</li> <li>• Over 75% of projects suffer from a delay</li> </ul>
Colombo et al.	2015	<ul style="list-style-type: none"> <li>• The number of visuals used by the creator</li> </ul>	<ul style="list-style-type: none"> <li>• N/A</li> </ul>	<ul style="list-style-type: none"> <li>• Internal social capital is directly correlated with funding success</li> <li>• This effect is mediated by early funding and backers</li> </ul>
Courtney et al.	2016	<ul style="list-style-type: none"> <li>• Project description</li> <li>• Speed of updates</li> </ul>	<ul style="list-style-type: none"> <li>• Sentiment analysis of comments</li> <li>• Total number of comments</li> </ul>	<ul style="list-style-type: none"> <li>• Media usage is directly correlated with meeting funding goals</li> <li>• Positive backer sentiment is directly correlated with meeting funding goals</li> </ul>
Allison et al.	2017	<ul style="list-style-type: none"> <li>• Creator comments &amp; tone</li> </ul>	<ul style="list-style-type: none"> <li>• N/A</li> </ul>	<ul style="list-style-type: none"> <li>• Information matters most for funders with greater ability and motivation regarding evaluations.</li> <li>• Adopting a group identity was most effective among first-time funders and when requested funding amounts are smaller.</li> </ul>
Chan and Parhankangas	2017	<ul style="list-style-type: none"> <li>• Video pitch length and word count</li> <li>• Number of updates</li> <li>• Creator preparedness</li> </ul>	<ul style="list-style-type: none"> <li>• Total number of comments</li> </ul>	<ul style="list-style-type: none"> <li>• Incremental innovation is directly correlated (and radical innovation is inversely correlated) with probability of reaching target funding.</li> <li>• Incremental innovation can mitigate the inverse correlation between radical innovation and reaching target funding</li> </ul>

Davis et al.	2017	<ul style="list-style-type: none"> <li>• Creator's positive affect</li> <li>• Pitch video length and word count</li> </ul>	N/A	<ul style="list-style-type: none"> <li>• Product creativity is directly correlated with crowdfunding performance</li> <li>• Creator passion can affect the link between product creativity and positive affects</li> </ul>
Greenberg Mollick	2017	<ul style="list-style-type: none"> <li>• Project pitch</li> </ul>	N/A	<ul style="list-style-type: none"> <li>• Female funders are more likely to backer female project creators</li> <li>• Female project creators are most successful in areas where they are least represented</li> </ul>
Kuppuswamy and Bayus	2017	<ul style="list-style-type: none"> <li>• Number of creator updates</li> </ul>	N/A	<ul style="list-style-type: none"> <li>• Funding accelerates as funds raised reaching the target funding amount</li> <li>• Contributions decrease after a funding target is met</li> </ul>
Roma et al.	2017	<ul style="list-style-type: none"> <li>• Number of visible creator-backer interactions</li> </ul>	<ul style="list-style-type: none"> <li>• See creator content</li> </ul>	<ul style="list-style-type: none"> <li>• Funding amounts are directly correlated with likelihood of gaining professional investor interest</li> <li>• Results are only effective if a patent or large social network is present</li> </ul>
Parhankangas and Renko	2017	<ul style="list-style-type: none"> <li>• Project description word count</li> <li>• Linguistic style</li> <li>• Pitch content</li> </ul>	N/A	<ul style="list-style-type: none"> <li>• Concrete language and interactive language is directly correlated with the likelihood of reaching a funding target</li> <li>• Linguistic style has a greater effect for social projects as opposed to commercial projects</li> </ul>
Stanko and Henard	2017	<ul style="list-style-type: none"> <li>• Number of creator updates</li> </ul>	<ul style="list-style-type: none"> <li>• Number of backer comments</li> </ul>	<ul style="list-style-type: none"> <li>• Amount of funding is not correlated with market performance whereas number of backers is directly correlated with market performance</li> <li>• Portion of completed product development during crowdfunding affects subsequent focus on radical innovation</li> </ul>
Anglin et al.	2018	<ul style="list-style-type: none"> <li>• Creator campaign</li> </ul>	N/A	<ul style="list-style-type: none"> <li>• Positive psychological capital is directly correlated with funds raised</li> </ul>

		<ul style="list-style-type: none"> <li>word count</li> <li>• Video inclusion</li> <li>• Positive word usage</li> </ul>		<ul style="list-style-type: none"> <li>• Human capital moderates the stated correlation</li> </ul>
Crosetto and Regner	2018	<ul style="list-style-type: none"> <li>• Project description word count</li> <li>Number of videos</li> <li>• Number of images</li> </ul>	N/A	<ul style="list-style-type: none"> <li>• Majority of successful projects are not on track at the 75% time elapsed period</li> <li>• Information cascades help these projects reach their target</li> <li>• No evidence of pledge herding from self-pledges</li> </ul>
Giudici et al.	2018	<ul style="list-style-type: none"> <li>• Video inclusion</li> </ul>	N/A	<ul style="list-style-type: none"> <li>• Local altruism is directly correlated on the likelihood of contributions by proponents who reside in a geographical area.</li> </ul>
Hong et al.	2018	<ul style="list-style-type: none"> <li>• Twitter activity</li> </ul>	N/A	<ul style="list-style-type: none"> <li>• Twitter activity increases in funds raised for prosocial oriented crowdfunding campaigns when networks exhibit greater embeddedness.</li> </ul>
Johnson et al.	2018	<ul style="list-style-type: none"> <li>• Creator fidelity and competence</li> </ul>	N/A	<ul style="list-style-type: none"> <li>• Women have a funding advantage over men for crowdfunding projects</li> <li>• Gender biases of women related to trust help explain the relation</li> </ul>
Scheaf et al.	2018	<ul style="list-style-type: none"> <li>• Video and text quality</li> </ul>	<ul style="list-style-type: none"> <li>• Total comments per funder</li> </ul>	<ul style="list-style-type: none"> <li>• A signal's effectiveness changes depending on funding audience</li> <li>• Media coverage is directly correlated with reaching funding target while references to patent ownership is not clearly correlated with reaching funding targets</li> </ul>
Viotto da Cruz	2018	<ul style="list-style-type: none"> <li>• Word count</li> <li>• Spelling errors</li> <li>• Project description sentiment</li> </ul>	N/A	<ul style="list-style-type: none"> <li>• Crowdfunding projects that fail to meet funding targets are more likely to be released into the market if the crowd gave the project a positive valuation.</li> </ul>



Younkin and Kuppuswamy	2018	<ul style="list-style-type: none"> <li>• Positive and negative emotions in pitches</li> <li>• Pitch word count</li> </ul>	N/A	<ul style="list-style-type: none"> <li>• African American males are less likely to receive funding for similar projects to while male counterparts</li> <li>• Effect is due to product being evaluated as lower quality</li> </ul>
Cornelius and Gokpinar	2019	<ul style="list-style-type: none"> <li>• Project description video count</li> </ul>	<ul style="list-style-type: none"> <li>• Total backer comments</li> <li>• Brief qualitative evaluation to ensure relevance</li> </ul>	<ul style="list-style-type: none"> <li>• Greater involvement from customer investors is directly correlated with reaching funding target</li> <li>• Effect is driven by influence on product development reduced agency costs for prospective funders</li> </ul>
Zhang and Chen	2019	<ul style="list-style-type: none"> <li>• Project description and personal appeals</li> </ul>	N/A	<ul style="list-style-type: none"> <li>• Self orientation has a stronger direct effect on funding intention</li> <li>• An other-orientation is more likely to cause a woman to back a project whereas a self-orientation is more likely to cause a man to back a project.</li> </ul>

**Table C1: Summary of most recent rewards-based crowdfunding literature**

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**CURRICULUM VITAE**

