Communications of the Association for Information Systems

Volume 51 Article 29

9-28-2022

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Recommended Citation
Lindberg, A., Lyytinen, K., & Grover, V. (2022). The Scholarly Impact of Exploitative and Explorative Knowledge in Top IS Journals. Communications of the Association for Information Systems, 51, pp-pp. https://doi.org/10.17705/1CAIS.05110

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Communications of the Association for Information Systems

Research Article DOI: 10.17705/1CAIS.05110 ISSN: 1529-3181

The Scholarly Impact of Exploitative and Explorative Knowledge in Top IS Journals

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Abstract:

Recently, several scholars have argued that the information system (IS) field needs to reduce its reliance on reference theories and focus on developing "indigenous" theoretical knowledge, suggesting that such a shift may help to increase the independence of the IS discipline. While original IS theory is likely to have larger impacts, the uptake of such ideas may also be more uncertain. To investigate such effects, we conduct a scientometric study on 211 research articles published in the two top IS journals, MISQ and ISR. We investigate the uptake of studies that draw on exploitative (i.e., exploiting existing theories from other disciplines) and explorative (i.e., exploration of new theoretical frameworks within the discipline) knowledge, respectively. We find that explorative knowledge receives, on average, a higher quantity of citations. Over time explorative knowledge manifests a higher variance in citations received. Further, we find that explorative knowledge is more likely to assume more sophisticated conceptions of the IT artifact compared to exploitative knowledge. Last, exploitative knowledge, due to its platform nature, interacts with reputation effects to a greater degree than explorative knowledge. We conclude by providing guidance to both individual researchers as well as to the IS discipline as a whole.

Keywords: Exploitation, Exploration, Borrowed Theory, Indigenous Theory, Knowledge Impact, Theory Development, Reputation Effects.

This manuscript underwent peer review. It was received 4/10/2020 and was with the authors for 16 months for one revision. Dirk Hovorka served as Associate Editor.

1 Introduction

For many years, the information systems (IS) field has been engaged in debates regarding the need and benefits of liberating the field from reference theory to focus on indigenous theory (Benbasat & Weber, 1996; Lyytinen & King, 2004; Straub, 2019). Grover, Varun, and Lyytinen (2015) suggest that the use of reference theory has become institutionalized, because the field endorses an epistemic "script" that makes it legitimate, useful, cheap, and appropriate, to borrow middle-range theories from established fields. This status of reference theory is not, however, unique to IS. Other management fields have long struggled with similar identity questions around theory use. Consider, for example, the state of theorizing in organizational behavior (Heath & Sitkin, 2001), a field that has criticized itself for borrowing psychological theories and simply re-contextualizing them within organizational settings. This has prompted heated debates with regard to the unique value that organizational behavior produces (or does not produce). Using such reference theories in combination with standardized scripts for their application may, however, have drawbacks—it may stop fields from developing valuable indigenous theories with strong contextual effects. At a time where we observe manifold emerging digital phenomena, it is pertinent to ask whether the novelty of these phenomena warrants more original knowledge development *within* the field rather than relying on extant knowledge frames already available in other fields.

At this junction, one way the problem can be framed is to ask which, indigenous or borrowed, theory will constitute a more proactive path with higher impact. There are arguments for both sides. On one side we can argue that by creating original research the field will establish a higher degree of legitimacy regarding the unique challenges related to IS issues in organizations and society (Hassan, et al., 2019) than it would relying on "reference theories" (Benbasat & Weber 1996). The reasoning behind this assertion is that the theoretical tenets of reference theories are imported and not necessarily salient or designed to explain IT phenomena. At the same time, because digitalization now influences most aspects of business, the proponents of indigenous theory advocate for the increased export of more original digitally-infused ideas to other fields (Baskerville & Myers, 2002). As the impact of digital technologies is increasingly felt across all walks of life, such an "export enterprise" is likely to grow in value and will contribute to establishing IS as a reference discipline for other fields (Baskerville & Myers, 2002; Grover, Gokhale, Lim, & Ayyagari, 2006; Grover, Gokhale et al., 2006; Kjærgaard & Vendelø, 2015; Yoo, 2012). This may shift the landscape of social science research, especially within business schools, where the competition between disciplines is ruthless. Furthermore, the indigenous theory position asserts that by developing theory concerning salient IS phenomena, rather than borrowing theories and re-contextualizing them, we can provide more value to practitioners who face novel challenges in developing, using, or managing IS solutions and platforms. This will by necessity lead to a deeper and more sophisticated engagement with the role of IT and digital artifacts in theorizing (Benbasat & Zmud, 2003; Orlikowski & Iacono, 2001; Weber, 2003) and aid in explicating the unique features of such artifacts, as well as the unique roles that they play in often novel social and organizational arrangements. These considerations have remained, at best, peripheral to other fields, such as marketing (see, e.g., Germann et al. (2014)), which now increasingly engage with technology issues. As such, indigenous research focused on artifacts and their roles can promote breakthrough ideas and enable the conceptualization of entirely new classes of digital phenomena. This differs from scripted efforts that mainly "re-dress" advice already dispensed within other domains by retrofitting it to an information technology (IT) context (Grover & Lyytinen, 2015).

An opposing argument can also be made for the benefit of borrowing theories and "re-domesticate" such theories to fit better within the IS context. This is useful whenever the theory offers guidance in explaining the basic psychological, sociological, or economic phenomena at play in the IS setting. At the same time, it may call for modifications to account for the unique role of IT artifacts or their use in the study context. This line of reasoning in our field dates back to Keen's (1980) argument in favor of reference theory[1]. The argument essentially posits that by borrowing theories that have been validated and established in other contexts, the field can more efficiently funnel theoretical value to IS scholars' contributions and their effects on practice. In terms of theory formulation and methodological choice, this is an incremental research strategy where IS scholars are expected to make small, but steady contributions to the internal and external validity of established theories.

The two strategies can be viewed as differentiating those scholars and schools of thought who seek to increase the theoretical and observational variance within a given field (i.e., development of indigenous

[1] For a debate on the benefits and costs of reference theory adoption in the IS field, see Niederman et al. (2009).

theory) from those who primarily seek to improve the efficiency of producing high-quality knowledge claims put forward within the field (i.e., relying on borrowed theory, see King and Lyytinen (2006)). A possible consequence of this divide in theorizing is that indigenous theory calls for original thinking rather than reliance on extant theoretical knowledge. If such thinking sprouts from novel emergent phenomena, it is likely to increase the richness, diversity, and novelty of conceptualizations and theoretical claims put forward in the field. However, since such knowledge generally is more difficult to benchmark with and justify considering existing frames, it increases theoretical ambiguity and task uncertainty in the field. Theory development advancing based on using "received" conceptual and theoretical frameworks borrowed mostly from other disciplines will not open a similar potential for theoretical richness, but, at the same time, by progressing from established conceptual and theoretical frameworks it will sharpen and deepen associated knowledge claims and make research more efficient by reducing theoretical ambiguity and task uncertainty.

As March (1991) noted, the dichotomy between achieving rare but outsized performance as opposed to using existing resources and knowledge to make incremental gains, can be captured in the ideas of knowledge-related exploration vs. exploitation. Originally these concepts were conceived as strategies for organizational learning where both were viewed as necessary at any point in time for a given organization, group, or individual engaged in a task with some performance dimension (Wilden et al., 2018). Likewise, disciplinary domains and fields learn and advance their knowledge in multiple ways. Research fields need to also evaluate their learning per some performance dimension, be it "truth" or "utility" (Bacharach, 1989). Therefore, research fields need to engage in both types of learning. Moreover, in line with March's (1991) argument they never learn through exclusively using a singular strategy as it results in "competency" or "speculation" traps. Rather, research fields need to "employ" scholars who will pursue these two strategies at different times in varying proportions depending on current knowledge needs, theory explanations, and instrumentation.[2] Therefore, disciplines and associated groups of scholars will at any point of time exhibit lower or greater amounts exploration or exploitation in making their knowledge claims. The level of diversity and growth in a research field's knowledge, in proportion to its overall size, will consequently vary dynamically depending on how the two learning orientations are valued at any point of time within the community. This naturally depends on what specific criteria and norms guide the evaluation and recognition of the field's knowledge contributions, how reputation effects are distributed and resources allocated within the field (Cuellar et al., 2016), and how these align with individual and group incentives. Generally, and with some simplification, we can say that these effects reflect the degree to which either learning strategy is valued in the scholarly community (King & Lyytinen, 2006).

One dimension along with the value of each orientation is reflected in the community is how the scholarly impact of publications is valued within a given research field (i.e., how much uptake of given published research following a specific learning strategy takes place among scholars within the field). Such impact has traditionally been captured by measuring how much recognition each published piece receives in terms of citations (i.e., scientometrics (Hassan & Loebbecke, 2017)). Using such citation metrics as a starting point prompts the question: do the two learning strategies have differential effects in terms of the "impact" they have on a community? In other words, are there differences in the scholarly benefit within the field that accrues to a scholar if he or she embraces a research approach that promotes either of the two learning strategies as reflected in the subsequent uptake of the ideas by other scholars when measured in terms of citations (Hassan & Loebbecke, 2017)? In such inquiry, we need to also account for whether the relative reputational position of a scholar within the research community matters (i.e., whether his or her past contributions have been visible and to what extent this also predicts the reception of his or her future research contributions). Also, we can ask: do such reputation effects interact with the type of research the scholar pursues?

In this paper, we address these questions by conducting a scientometric study. Broadly, the study focuses on exploration and exploitation (March, 1991) as two potential modes of research in the IS research community. We probe the extent to which these two modes contribute differently to the field's knowledge capital as reflected in the publications in the field's top journals and what impact they have had on the community in terms of uptake when measured by citations (Hassan & Loebbecke, 2017; Leydesdorff & Lamsterdamska, 1990; Merton, 1973). Our focus is exclusively on the uptake of theoretical knowledge within the field. Therefore, we examine publications and their citations in the field's journals that value theory. We compare the scholarly impact of published indigenous (i.e., explorative) and borrowed (i.e.,

[2] Sharp-eyed readers may here notice a similarity with Kuhn's (1996) notion of paradigms/normal science (as exploitation) and scientific revolutions (as exploration).

exploitative) theory articles as expressed in the article's citations. In the study we use a dataset of 211 research articles published in ISR and MISQ between 1994 and 2012 and track the impact of the articles all the way up to 2018. While our focus on the field's top two journals is not representative of the field, the sample does represent journals that within the sampling frame have identified a strong theoretical contribution as the journal's key mission. In conjunction with the empirical investigation, we theorize the impacts each research mode is likely to have, and how such scholarly impact is likely to evolve over time. We posit that explorative knowledge tends to receive more citations, on average, while the variance of the scholarly impact of explorative knowledge is also higher, in line with March's original argument. Therefore, the overall effect of explorative knowledge, in the long term, is likely to be more substantial compared to exploitative knowledge, but, such a strategy comes with risk for individual authors. We also find (as expected) that reputation effects interact with exploitative knowledge. Finally, as expected, the two modes differ substantially with regard to how the IT artifact is treated; most exploitative research borrows theories from other fields which do not focus on the IT artifact, while explorative research is likely to place a greater emphasis on the characteristics of the IT artifact thereby yielding deeper domain-specific insights which have a higher long-term impact on the field's theoretical development. We do recognize that by choosing dichotomous modes, our study is deliberately simplified as most modes of theorizing are indeed mixed. However, the contrasts between the two modes facilitate the provision of evidence that reinforces our arguments.

2 Exploitative & Explorative Knowledge in the IS Field

Our study draws on the two central concepts in March's (1991) seminal study on variance in organizational learning and associated innovation strategies: exploration and exploitation. We find these concepts fruitful for examining how scientific fields learn and how they advance their knowledge pools in the sense that the research strategies that scholars (and fields) pursue to make research contributions can be viewed as analogous to the strategies that organizations deploy to learn and innovate. To produce "new" knowledge claims scholars need to introduce novelty in empirical claims, their explanations, or methods. The more such novelty deviates, especially in terms of empirical claims, ideas, or beliefs, from an established shared baseline of empirics and explanations, the more explorative (variance inducing) such research is. Similarly, the firmer the scholar stands on the established theoretical ground and seeks to expand its application to new empirics, the more exploitative (efficiency/validity inducing) such research is.

A recent review of exploration and exploitation within management research (Wilden et al., 2018) shows that the two concepts have been applied across diverse levels of analysis, contexts, and outcomes including individuals, teams, organizations, inter-organizational alliances, and so on. This suggests that the concepts of exploration and exploitation have not been confined to the context of singular organizations operating under profit-seeking economic regimes. Expanding the use of these concepts to scientific communities and fields to understand how much they exhibit variance in their theories, empirics, and so on is not necessarily new. Indeed, these concepts are based on the core of Kuhn's (1996) well known ideas of scientific revolutions and normal science. We do, however, recognize the limitations of doing this. First, strict dichotomies are always problematic and come with the cost of oversimplification as reality is messy. In our setting this means that scientific articles often involve a mix of the exploitation of extant knowledge and some exploration of new knowledge. By dichotomizing this, we argue that in many research settings and fields one strategy dominates (new radical theory vs. validation). Second, moving from an organizational learning context to a scholarly field may not faithfully represent these concepts as originally conceived by March. In academic research the performance dimension is more ambiguous compared to, for example, corporate settings and many scholars may focus and advance both forms of learning across their careers. To alleviate this issue, we add qualifiers to our argument and advance a circumscribed analysis as it relates to forms of IS theory development expressed in published, academic work. Thereby we narrow the two concepts to serve as manifestations of *how existing theories from other disciplines are exploited* and *how novel theoretical frameworks are explored within the discipline*. By doing this, we focus on the locus of knowledge expressed in research papers, while still meeting the definitions of knowledge and learning as articulated by March (1991). Below we will situate each knowledge-based strategy within the context of scholarly IS research and its theory development.

Exploitation epitomizes calls for control and certainty (O'Reilly III & Tushman, 2013). It is associated with using existing resources, such as the knowledge of current markets and an installed base of production factors used to maximize outcomes through incrementally iterating upon existing product designs and

production processes. *Exploration*, in contrast, is associated with generating novel options, exploring unknown product and market spaces in the hope of finding a "blue ocean" where massive rewards can be reaped (Kim & Mauborgne, 2005). The two concepts represent two different forms of experience-based learning that both yield generalizable and actionable insights for the focal organization, or, more generally, any actor dependent on experiential learning and related outcomes. As noted, we adapt these concepts to capture alternative forms of experiential learning that account for how scientific communities such as the IS field operate, learn, and produce new knowledge. In short, each form of learning offers a distinct and alternative way of making sense of experiences associated with IS phenomena. By utilizing these concepts in such manner, we can also discuss the relative benefits and costs of each for the community's overall learning outcomes and related success in line with March's (1991) original argument. These concepts also help set a stage for a wider conversation with regards to the relative distribution of varying forms of research within the IS field, their differential impacts, and what forms of research may be instrumental for salient outcomes as the field tries to move forward and position itself in a continuously evolving and abrupt social, technological, and academic landscape (King & Lyytinen, 2006).

The two learning/knowledge strategies essentially capture and explain how disciplines "allocate" their community resources to alternative forms of knowledge production. These forms are manifested in distinct forms and cultures of theory development and empirical claims which can be treated as the main learning outcomes for a given community. Exploitation manifests as the expected effort to lean on and advance existing theories internal to the field, or to borrow proximal, established external theories from other fields, and instantiating them with minor variations within a new study context (Avison & Malaurent, 2014). In the IS context this, for example, includes theories such as those related to the study of individuals' IT adoption based on intentions of acceptance and use (e.g., Davis (1989)), or through the lens of knowledge diffusion via information channels to create favorable decisions concerning focal innovations (e.g., Moore and Benbasat (1991)). If a field is not rich in its "own" theory concerning the focal phenomenon it is likely that initial theory searches will be conducted by assimilating theories external to the field, often in an effort to increase the legitimacy of the field. In the context of IS such searches typically involve attaching the "IT"-label to a well-established set of concepts and theories in another field, such as "dynamic capabilities". Such refinement of borrowed concepts ensures a greater degree of fit with a chosen context as often reflected in renaming the concept (e.g., "dynamic IT capabilities"). Such theory refinement then allows the authors to draw on a rich nomological network and related logics (Grover & Lyytinen, 2015). In such a case, the authors exploit the borrowed theory by applying it essentially in its original form such that in addition some superficial and contextually variable "IT" properties have been added to the central concepts. Consequently, the variance in theoretical accounts of the IS phenomenon being inquired into is reduced as it is channeled by the strong framing provided by the borrowed theory.

The benefits of exploitation are increasingly standardized expectations and degrees of research quality, creation of a stable and often sizeable research community with a well-defined common ground of theories, constructs, and methods which permits effective communication of (highly technical) research results. Such research emphasizes efficiency and rigor in the production and deployment of knowledge claims. Use of rigorous standards will generally decrease the variance in the expected results (e.g., file-drawer problems). At the same time, these forms of research may produce a relatively steady accumulation of citations. Furthermore, this research will exhibit low degrees of variance in ideas and new kinds of empirics. Indeed, many IS researchers have successfully followed this strategy. They rely on, and build, research platforms based on a select number of concepts borrowed from specific, preferred theories. Their theoretical work seeks to augment and modify incrementally this body of theory and empirical knowledge by adding new independent variables, mediator, contextual or process-related moderators, or moving from cross-sectional to longitudinal designs, incorporating multiple forms of data, or using multi-level designs. All these steps essentially iterate on, and refine, the same basic theory and set of concepts and test new potential boundary conditions.

There are, however, costs to applying this strategy: it limits the novelty of theoretical research and the chance of generating outlier contributions. For example, borrowing from other fields or using established concepts from past IS research is unlikely to contribute to the crafting of novel conceptualizations of the IT artifact (Orlikowski & Iacono, 2001). This is a concern, which is increasingly important as such artifacts now exhibit surprising "intelligent" and "autonomous" characteristics (Seidel et al., 2019; Seidel et al., 2018; Zhang et al., 2021). Given this strategy, we would expect the distribution of citations of exploitative research to be more stable compared to that of explorative research. Moreover, citation counts are likely to show limited variation over the lifecycle of each study's uptake and use. Because specific research communities are mostly formed around exploitative knowledge created by a relatively stable group of

members, who invest in this knowledge and have an interest to advance it and push for its recognition, such communities tend to grow and become established.[3] Such investments forge path dependency (through a feedback-based system) around citations of publications created by this community. For example, if a scholar establishes a reputable position early on in a specific field, he or she is more likely to be cited in the future as he or she produces new publications germane to that field. However, the citations are received mostly from other members of the same community, who utilize the common "research platform".

Exploration refers to indigenous theory development—sometimes referred to as "radical" theorizing (Nadkarni et al., 2018) or "rupturing breaks" (Walsh, 2014). While conducting such research, concepts are either borrowed from distal domains by a broad theoretical search, by inductive abstraction from the focal phenomenon, or by constant theoretical shifting and reframing of the phenomenon calling for new types of theoretical integration. Such searches will substantially modify or extend the ways in which the focal phenomenon is framed and how related research questions are posed and answered. If such searches are successful, they are likely to serve research goals unique to IS research such as addressing novel, IT-related phenomena. Most such concepts are ultimately formulated inductively and abductively (Lindberg, 2020; Zachariadis et al., 2013) as a means to conceptualize novel technology and information related experiences of phenomena. These inference forms increase empirical and theoretical variance and reveal facets of the IS phenomena which hitherto have remained weakly recognized and conceptualized. An example of an exploration-related theory search would be the adoption of a variant of complexity theory to account for the growth or scaling of digital platforms (Huang et al., 2017). Likewise, careful phenomenological and inductive studies of digital phenomena around novel business logics or value creation (Tilson et al., 2010; Yoo et al., 2010) would qualify as explorative theory searches that inductively or abductively increase the variance of the field's empirics and concepts.

Explorative knowledge has orthogonal benefits when compared to exploitative knowledge. It tends to generate novel results, rather than incremental findings. Novelty results from building and formulating a set of indigenously formulated concepts and logics with new theoretical relationships. The concepts and their relationships are, due to their novelty, more difficult to absorb (Wang et al., 2017). Their empirical grounding and operationalization tend to be less mature in methodological rigor. Therefore, the effort and related incentives (due to the likelihood of receiving more citations for more effort) to engage in such theory development are lower. The citations are also likely to be received more randomly from across multiple fields and settings. Therefore, such indigenous theories can potentially be exported to other fields if they offer novelty in accounting for IS-centric phenomena. For example, novel conceptualizations of IT artifacts (Orlikowski & Iacono, 2001) may aid in further understanding the roles of artificial intelligence and other forms of autonomous tools (Zhang et al., 2021) in various settings. Such research needs to demonstrate potential value and legitimacy with regards to its theory development effort (and related empirics) across a wider range of academic communities. An exploration strategy may also be associated with a higher probability of stumbling upon "blue ocean" (Kim & Mauborgne, 2005) concepts which may have stronger and wider impacts on research practice by potentially establishing seeds for a new type of exploitative knowledge stream in the field. Research establishing new and original concepts along with relationships across concepts will have the potential of becoming widely cited in subsequent studies.

[3] Often these communities can even be institutionalized into work groups, special interest groups, working conferences, or dedicated "vertical" journals.

Table 1. Types of Knowledge in Research Practice

Type	Description	Benefits	Costs
Exploitative (Exploiting existing theories from other disciplines)	Instantiation of established and borrowed theories from other domains to build platforms for research Limited theory searches across established theories or their variants Searches limited by evidence established by existing theoretical frames	Strict quality standards and therefore also low variance in quality Stability in research questions and tasks Predictable impact (factors) within a given community Strong path dependency and few incentives deviating for novelty	Incrementalism Limited (narrow) impact beyond the community Probability of creating "signature" contributions is limited May lead to lack of attention to important phenomena due to filters created by received theories Superficial conceptualizations of the IT artifact
Explorative (Exploration of new theoretical frameworks within the discipline)	Search for novel, ingenious theories Apply puzzles, novel evidence, as well as untried research methods to stimulate theoretical imagination Close inquiry into a focal phenomenon and its distinct features	High variance in outcomes due to commitment to novelty Significant breadth in topics and frames used to account for a focal phenomenon Fidelity towards emergent and local phenomena Sophisticated conceptualizations of the IT artifact Higher probability of creating "signature" contributions	Difficult to carry out and evaluate due to the lack of examples and common standards Uncertain scholarly impact as instrumentation and operationalization is lacking Novel findings tend to be ignored or less likely to be accepted within the community if they question dominant beliefs

Each mode of research, as summarized in Table 1, is present in any disciplinary field at any point of time—including the IS field. One reason for this is that each mode offers unique benefits and costs, and may therefore be complementary to each other. The learning modes fit differently with varying abstraction and the empirical research skills of scholars and how they are trained as well as with dominant normative expectations as to what counts as good research within a chosen community. For instance, the extent to which the community values novelty over the risk of possibly violating specific, rigorously established veracity requirements, is likely to have a substantial impact on which type of learning strategy is preferred and how resources are allocated.

3 Theorizing the Scholarly Impact of Two Research Modes

Based on the review of the benefits and costs associated with the two research modes we surmise that both strategies are valuable for the viability and flourishing of a research community. In a sense, each strategy can be compared to specific risk-return ratios in financial markets—more risk tends to lead to greater potential rewards, but it is also just that—riskier. As such, we would expect the scholarly impact to vary across the modes, in such a way that the greater risks associated with explorative knowledge also are accompanied by expected higher rewards, i.e., potentially higher scholarly impact. Therefore, we propose the following:

Hypothesis #1: Compared to exploitative knowledge, explorative knowledge will show higher average scholarly impact.

Hypothesis #2: Compared to exploitative knowledge, explorative knowledge will show greater growth over time in cumulative scholarly impact.

While exploitation tends to lead to steady, but slow, growth in scholarly impact in a research community, exploration, due to its inherent uncertainty, tends to pose larger risks. As such, it is less likely that a novel manuscript will find favorable review audiences and panels. Therefore, getting such manuscripts published is associated with a great amount of uncertainty. Even when such studies do get published, they lack established platforms or communities of researchers to ensure the uptake of concepts,

relationships amongst them, and their implications. Also, establishing common ground between scholars is more difficult because the use and assimilation of introduced concepts by a wider community are unlikely, on average, to offset the cost of adopting them. Hence, we expect explorative research to have a more skewed distribution of scholarly impact with a greater number of outliers, compared to exploitative knowledge. Similarly, we expect scholarly impact to show more variance in growth patterns over time. Accordingly, we posit:

Hypothesis #3: Compared to exploitative knowledge, explorative knowledge will show greater variation in the growth of scholarly impact over time.

A key component of engendering the "research platforms" that are crucial to exploitative knowledge is to build name (i.e., "brand") recognition. Such name recognition can be related to a specific, identified core theory (e.g., Venkatesh et al.'s (2003) UTAUT, i.e., Unified Theory of Acceptance and Use of Technology), but it can also be related to "celebrity researchers" whose name and reputation signal quality and legitimacy. Such reputable authors often establish their reputation in an area where they cultivate synergistic, incremental research programs that become widely endorsed and cited by the community at large, or at least by the subset of the community that forms around the platform constituted by the research (Cuellar et al., 2016). Such scholars establish "anchor positions," meaning that they, through their reputation and name recognition, draw scholars to a particular research domain and endow it with a sense of legitimacy. As they do so, they also foster and grow the research platform that undergirds their individual publications. Using an explorative strategy, however, the newness of concepts, and the lack of a clear community that can afford path dependency for publications and related citations, offers weaker platforms for research, therefore limiting the impact of name recognition on the uptake of theory and results. Therefore, we state:

Hypothesis #4: Compared to explorative knowledge, exploitative knowledge exhibits a scholarly impact that is influenced by an author's reputation to a greater degree.

Research platforms relying on "borrowed" theories (Grover et al., 2015) often look sideways to reference theories developed in psychology, sociology, economics, or computer science. These theories and their associated concepts are "instantiated" by contextualizing them in an IS setting. The IT artifact tends to, however, be situated at the periphery of such theories, rather than being situated within their core. This reinforces relatively generic views of the IT artifact, where the IT artifact is either viewed as a context for, say, psychological or economic dynamics to unfold, or they are "black boxed" (Latour, 2005) in terms of how they achieve particular goals or serve specific functions within a larger social or economic setting.

Exploratory research and its penchant for indigenous theory often starts with the focal IT or digital phenomenon and its unique nature. Not accidentally, this is often viewed as the core "generative" phenomenon of the IS field (Benbasat & Zmud, 2003). Hence, scholars conducting explorative research often seek to generate value by conceptualizing the IT artifact in ways that foreground the unique features of IT artifacts and their impact on related phenomena (such as decision making, business process performance, innovation, or design, etc.). Therefore, we posit that exploratory research around IT phenomena is more likely to develop concepts that take the IT artifact seriously and seek higher fidelity to related phenomena. In contrast, exploitative knowledge that draws upon established reference theories is more likely to treat IT as exogenous to the focal phenomenon. This may, for example, manifest itself in asking how IT influences the relationships proposed by the theory. Accordingly, we expect that when following an exploratory approach, the treatment of the IT artifact will be richer and more nuanced. This is premised on the view of the IT artifact that Orlikowski & Iacono (2001) label the ensemble view. In contrast, exploitative knowledge tends to make theoretical claims and utilize concepts that are weakly and only in generic ways related to IT, i.e., what Orlikowski and Iacono (2001) refer to as nominal and proxy views. The former view theorizes the multiple features, practices, relationships, behaviors, and technological capacities that make up an IT artifact (i.e., the IT artifact is treated as an ensemble of social and technical phenomena and related relationships). The latter views consider IT or IS "in name" only, for example through using IT as a context for a study (i.e., the nominal view), or as a proxy, such as when investments in, or cost of, IT are used as proxies for the IT artifact in an econometric analysis. Therefore, we posit:

Hypothesis #5: The distributions of IT artifact treatments across explorative and exploitative knowledge differ in that exploitative knowledge favors the nominal and proxy views while explorative knowledge favors the ensemble view.

4 Method

To validate the hypotheses, we carried out a scientometric study (Hassan et al., 2017). Most such studies in the IS field used citation data to measure and rank an individual's productivity, the effect or role of social authorship networks, mentoring relationships, or the scholar's departmental location. Efforts have also been made to identify major research themes in IS or its subfields or to determine the effect of reference disciplines (Grover et al., 2006) in shaping ideas in the IS field (for a recent survey see Hassan et al., 2017). In our case, we wanted to examine the effects of novelty and increased theory variance as well as reputation (for other studies examining reputational effects, see Takeda et al., 2011; Truex et al., 2009) in shaping the field's internal citation patterns. To this end, we collected panel data on citation patterns of articles exhibiting either exploitative or explorative research. We sampled every 5th article (i.e. 20%) of the theory-based research articles published in the two major journals of the IS field, MISQ and ISR, between the years 1994 and 2012 (N=211).[4] As ISR and MISQ traditionally have been considered the top two IS journals and they particularly value theoretical contribution, the sample was deemed as an appropriate representation of leading research in the field. Articles that do not have theory such as editorials, research notes, certain design science papers and articles on research methods, education, or the IS field as a whole were excluded. Each of the articles was coded regarding whether they were examples of exploitative or explorative knowledge.

The coding was carried out in several steps. First, we coded several rounds of "training" articles, not included in the final sample. Each round of coding was conducted as follows; the co-authors each coded a set of 10 articles, after which the coding was compared and discussed. After this, the coding scheme was updated to ensure greater consistency. At each round, we assessed Fleiss' et al. (1969) Kappa. We stopped the revisions of the coding scheme once the Kappa reached 0.831, indicating an acceptable level of agreement. Further, we collected and counted the citations for each included article for each year between 1994 and 2018. We also collected the h-indices of the authors of each article for the publication year of each article as well as for the last year of our measurement period (i.e., 2018). This enabled us to trace the citation patterns of each article across time, as well as assess the cumulative number of citations for each article (and each form of research) for each year. We also tested whether the publication years for articles coded as drawing on explorative vs. exploitative knowledge were distributed differently. Using a Kolmogorov-Smirnov test of differences in distributions we found that the two distributions were not significantly different (p=0.7656). We provide visualizations of the distributions of publication years in Appendix A.

The concepts introduced in the prior section were operationalized in the following way: explorative and exploitative knowledge were captured using a coding scheme described in Appendix B. The coding scheme ensured that specific and explicit rules were systematically applied to identify whether the knowledge in the identified paper was exploitative or explorative. Citations were extracted from the Scopus database for each year of the study's duration. The IT artifact in each article was categorized and coded using Orlikowski and Iacono's (2001) taxonomy. The measures of the concepts occurred at different timescales. First, whether an article was coded as explorative or exploitative, as well as what treatment of the IT artifact is used, was determined without considering changes over time—the measure is the same across all years for a given article once it was deemed one or the other at the time of publication. Second, total citations were measured for the year 2018, which was established as the end point for the data collection. Third, citations were measured for every year between 1994 and 2018 allowing us to estimate changes using latent growth curve models. Fourth, and last, the authors' reputation was measured by the h-indices of the co-authors of a particular article (Cuellar et al., 2016; Takeda et al., 2011; Truex et al., 2009). H-index was measured for all co-authors at the year of publication, as well as for 2018. For the Poisson regressions, we used the average of the h-indices recorded at the year of publication and in 2018 for the co-author with the highest h-index. For the latent growth curve models, we used a linear extrapolation across each year of the h-index, starting from the h-index of the co-author with the highest h-index at the year of publication, ending with the h-index of the co-author with the highest h-index in 2018. The concept operationalizations are summarized in Table 2.

[4] This period is characterized by a movement towards internet-based business models and involved uses of IT in completely new business contexts. This period can be thus viewed as a stretch of time where one can expect higher incidence of theoretical work, given the novelty of the phenomena emerging at the time.

Table 2. Concept Operationalization

Concept	Definition	Operationalization
Explorative knowledge	Novel theory development	Captured by coding scheme described in Appendix B
Exploitative knowledge	Instantiate theories from other domains, build platforms for research	Captured by coding scheme described in Appendix B
Total citations	Total scholarly impact	The total number of citations over the lifetime of an article
Cumulative citations	Cumulative scholarly impact across time	Citations accumulating for each year since the article's publication
Authors' reputation	The authors' status within the research field	The h-index of the co-author with the highest h-index (see Truex et al., 2009)
IT artifact treatment	Conceptualization of IT artifacts within the study	Draws on Orlikowski & Iacono's (2001) typology to code for the treatment of IT

To make the data corpus amenable for statistical analysis we used several transformations. We also used multiple statistical analytical techniques as explained below. To illustrate salient characteristics of the dataset we will use two distributions: total and cumulative citation counts. The total distribution is the count of the total number of citations for each article across all the years when the citation count was measured. The cumulative distribution is the number of citations that each article has accumulated in all years preceding the current year. This measures the number of citations the article has garnered so far starting from the year when the article was published. For example, for articles published in 1994 and 2004, citations garnered in 1994 and 2004 respectively would fall under the variable "first year citations" for both articles.

The distributions were analyzed in several ways. First, we conducted regression modeling to see how exploitative vs. explorative knowledge predicted total citations. We used a generalized linear model with a Poisson distribution to account for the dependent variable being a count variable. In conjunction with this model we used McFadden's pseudo-R2 (Veall & Zimmermann, 1996) to evaluate the model fit. After this, we applied latent growth curve modeling to analyze the effects of the cumulative citations per relative age representation (Duncan & Duncan, 2004; Meredith & Tsiak, 1990; Preacher et al., 2008; Rosseel, 2012). Specifically, we tested for differences in the slope coefficients as well as the detected variance in citation growth trajectories. Last, we used a χ^2 test to identify whether the distributions of articles within each type of research differed with regard to their treatment of the IT artifact (Orlikowski & Iacono, 2001). We also report standard errors to give a sense of not only the statistical significance of estimates but also the range of variation around estimates (Mertens & Recker, 2020). Last, we conducted power analyses for each of the hypotheses where power was estimated at the .05 level of significance, to be 99% for H1 (Cohen, 1988), 99% for H2-H4 (MacCallum et al., 1996), and 39% for H5 (Ekstrom et al., 2020).

5 Findings

The inter-construct correlations are shown in Table 3.

Table 3. Inter-construct Correlations

	1	2	3	4
1. Total citations	1			
2. H-index	0.03	1		
3. Age	0.22	-0.20	1	
4. Page count	0.25	0.05	0.10	1

Our regression analysis **lends support** to **H1** (Table 4): explorative knowledge does, on average, lead to higher citations than exploitative knowledge (0.458***). Further, the interaction effect between the dummy for explorative vs. exploitative research and h-index is negative and highly significant (-0.011***) suggesting that author's reputation has a higher effect for exploitative research **lending support to H4.**

Table 4. Poisson Regression Results

Dependent variable:	**Total Citations**
Explorative vs. Exploitative Research	0.458***
	(0.020)
H-Index	0.012***
	(0.001)
Explorative vs. Exploitative Research X H-Index	-0.011***
	(0.001)
Age	0.052***
	(0.001)
Page Count	0.052***
	(0.001)
Constant	3.157***
	(0.025)
Observations	211
Log Likelihood	-26,346.320
Akaike Inf. Crit.	52,704.650
McFadden R2	0.1780067

Note: *p**p***p<0.01

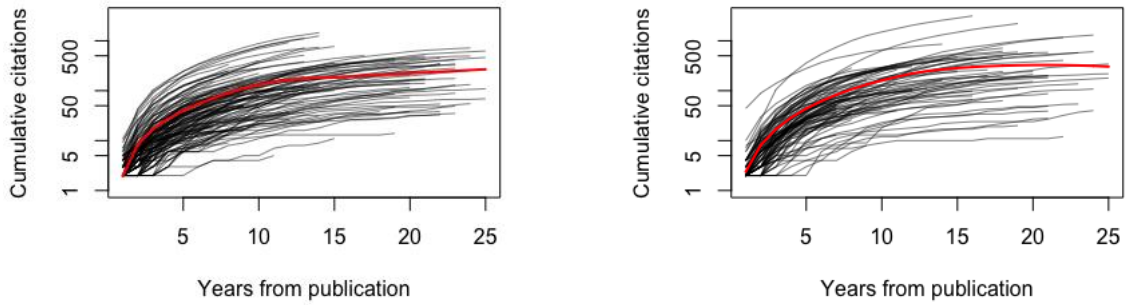
To validate H2 and H3 we analyzed how the citation patterns evolve over time. By using a latent growth curve model we regressed the intercept and the slope onto a dummy variable representing explorative vs. exploitative research. While the effect of the dummy variable on the slope of the growth curve is large and positive (2.352), it is not significant (p=0.314). Hence, the claim that growth in citations is steeper for explorative knowledge is only partially supported **(partial support for H2)**. We next tested the difference in variance across the two groups of articles (exploration vs. exploitation). The variance of the slope for exploration is 439.57, while the variance of the slope for exploitation is 139.84. By constraining the variance across a multiple-groups model showed that the difference is statistically significant (χ_2-diff = 33.979, p<0.001) **lending support for H3.** Last, we analyzed the effect of the time-varying h-index and found that it had a strong positive effect on citation growth over time, as expected (see Table 5 below).

Table 5. Latent Growth Curve Model

Predictor	Estimate (Standard Error)
Time-variant effects of h-index	
Year 1	0.056*** (0.014)
Year 2	0.598*** (0.157)
Year 3	1.306*** (0.297)
Year 4	2.095*** (0.429)
Year 5	2.980*** (0.557)
Year 6	3.858*** (0.679)
Year 7	4.750*** (0.796)
Year 8	5.630*** (0.910)
Year 9	6.440*** (1.018)
Year 10	7.198*** (1.120)
Year 11	7.870*** (1.217)
Year 12	8.509*** (1.315)
Year 13	9.065*** (1.408)
Year 14	9.522*** (1.501)
Year 15	9.873*** (1.588)
Year 16	10.190*** (1.676)
Year 17	10.389*** (1.745)
Year 18	10.564*** (1.815)
Year 19	10.708*** (1.882)
Year 20	10.803*** (1.945)
Year 21	10.869*** (2.006)

Year 22	10.906*** (2.063)
Year 23	10.909*** (2.114)
Year 24	10.901*** (2.164)
Year 25	10.860** (2.207)
None-time variant effects	
Explorative vs. Exploitative -> Intercept	0.339 (0.545)
Explorative vs. Exploitative -> Slope	2.352 (2.337)
Page Count -> Intercept	0.011 (0.045)
Page Count -> Slope	0.860** (0.438)
Fit statistics	
Chi2	23696.02***, df=968
RMSEA	0.334
Note: *p <0.10 **p<0.05 ***p<0.01	

Our findings suggest that we deal with two distinct distributions. Explorative knowledge, in general, has a longer and "fatter" tail" (as indicated by the higher variance in the growth of explorative papers). The overall slope of citations over time indicates that on average there is a steeper slope for explorative knowledge, even though the difference is not statistically significant. The visualizations in Figure 1, which also show a Loess fit line, illustrate the differences in cumulative variance between explorative and exploitative knowledge. In summary, our results are consistent with the proposition that the overall variation in citation counts is higher in explorative knowledge, suggesting that this type of research involves a high-risk, high-reward strategy when compared to the lower cumulative variance of citations in exploitative knowledge which suggests a safer publication strategy.



Exploitative knowledge **Explorative knowledge**

Figure 1. Cumulative Citations per Relative Age

Finally, we tested for differences in the distributions of IT artifact treatment across the two forms of IS research. As shown in Table 6, the nominal view dominates the treatment of the IT artifact at 39.52% in exploitative research whereas a broader range of views is used in explorative research. Most prominently, the ensemble view has a stronger position within explorative research. The difference between the distributions (χ^2=62.697, df = 9, p<0.01) is significant and **H5 is supported**.

Table 6. IT Artifact Distributions

	Exploitative	Explorative
Computational	11.29%	6.90%
Ensemble	7.26%	19.54%
Nominal	39.52%	26.44%
Proxy	25.00%	24.14%
Tool	16.94%	22.99%
Grand Total	**100.00%**	**100.00%**

6 Discussion

In order for the IS field to stay dynamic and relevant multiple forms of research are needed (Taylor et al., 2010). In this article, we posit that the two main forms of research that need to be pursued in the field can be captured by distinguishing between exploitative and explorative knowledge outcomes for the field. Each form of research and associated learning comes with costs and benefits for both the field as well as for the individual researcher. As can be extrapolated from the extant literature on organizational innovation and learning (e.g., Jansen et al., 2009; Kang & Snell, 2009; Li et al., 2008; Raisch et al., 2009), exploration is likely to lead to higher variation in the scholarly impact as reflected in citations, and therefore comes with a greater chance of producing outliers (i.e., outstanding research contributions which become highly influential). This also means that on average the scholarly impact of such research is likely to be higher when compared to exploitative knowledge. Furthermore, for such studies, reputation effects tend to have less of an impact on their uptake. Rather, it is the persuasive nature and originality of the ideas included in their exposition that drives their scholarly recognition and value. In explorative papers it is also more likely that novel and more refined conceptualizations of IT artifacts are exposed, thereby providing a foundation for more indigenous conceptual development. Exploitative studies tend to be associated with nearly an opposite effect—the likelihood of receiving a certain, expected level of citations with less variance is higher, if accepted standards of methodological rigor and conceptual development are met. Furthermore, in such settings reputation effects tend to exert a stronger influence on the scholarly impact as reflected in exploitative research citation counts. The authors behind such studies define or signal intellectual authority in the field and are likely to be recognized as such in treatises on their chosen research topic and its scholarly impact.

Overall, our findings support most predictions that emerge from theorizing the scholarly impact associated with the two forms of research, as well as related institutional claims made in past research explaining why particular forms of theorizing tend to dominate the field (Grover et al., 2015). Most research suggests that explorative knowledge and its diversified forms lead to higher variance and originality. Studies which draw on explorative knowledge are more likely to theorize around the IT artifact in an original and nuanced way. As expected, we did find that explorative knowledge receives a higher number of total citations compared to exploitative knowledge (H1). We also find partial support for the hypothesis that the slope of explorative papers, which received a higher number of total citations, is steeper (H2). Similarly, our results suggest that the process of receiving citations by explorative research shows larger variance than exploitative research (H3). This suggests that explorative knowledge and its uptake is less influenced by structural factors, in the sense that the current community, its research expectations, social and citation networks, as well as reputation effects are less likely to explain why the article with strong explorative leaning receives its citations. As a result, we can surmise that such papers are more likely to receive citations across a wider set of audiences, an inference which is also supported by the higher variance of citations.[5]

Our study also demonstrates that reputation effects (i.e., h-index) interact with the type of knowledge utilized: reputation effects grow stronger when more exploitative knowledge is applied compared to when explorative knowledge is applied (H4). This indicates that reputation effects increase the overall level of citations of exploitative knowledge, but not for explorative knowledge. The most prominent, and less risky, strategy in our field is therefore to build a research platform and an associated community that can

[5] To truly test this, however, a more detailed analysis of the distributions of received citations and their origins would be required, a task which we leave for future research.

consistently be exploited over time. The theoretical underpinnings of such a platform can most likely be adopted from a reference discipline (Grover et al., 2006) which then allows for the construction of a stream of cumulative, continued contributions within a chosen domain. Over time, this results in visible reputation effects. Once obtained, the recognition already established is likely to ensure continued citations. Further, since the reference theories are not designed for IS phenomena, but retrofitted to them, exploitative theory searches will more likely rely on highly abstracted and largely exogenous treatments of the IT artifact (H5). Table 7 summarizes these results.

Table 7. Summary of Hypothesis Testing

#	Hypothesis	Evaluation	Evidence
1	Compared to exploitative knowledge, explorative knowledge will show higher average scholarly impact.	Supported	β = 0.458, p<0.01
2	Compared to exploitative knowledge, explorative knowledge will show greater growth over time in cumulative impact.	Partially supported	β = 2.352, p=0.314
3	Compared to exploitative knowledge, explorative knowledge will show greater variation in growth of scholarly impact over time.	Supported	χ^2 = 33.979 (1), p < 0.001
4	Compared to explorative knowledge, exploitative knowledge exhibits scholarly impact which is influenced by authors' reputation to a greater degree.	Supported	β = -0.011, p<0.01
5	The distributions of IT artifact treatments across explorative and exploitative knowledge differ in that exploitative knowledge favors the nominal and proxy views while explorative knowledge favors the ensemble view.	Supported	χ^2=62.697 (9), p<0.01

6.1 Implications for IS Research

Our research has several implications, both for individual researchers, as well as for the IS discipline. Below, we extrapolate from our results to offer implications for how individual researchers can balance risk and reward in publishing, as well as how the IS discipline can foster institutions that promote the achievement of a higher number of "signature contributions."

6.1.1 Implications for the individual researcher

Like nearly all research fields, the IS field tends to be inherently conservative and many times for a good reason—claims need to be grounded in evidence and they need to make sense with current theoretical explanations. An original abstract thinker proposing a truly novel theory is likely to be shackled throughout the review process by mimetic forces that constantly push for grounding the ideas in the established literature and demonstrating alignment with established empirics, thereby undermining its true potential for novelty. The review process often demands immediate testing of the ideas, therefore posing insurmountable barriers as the operationalization and instrumentation associated with explorative knowledge tends to be immature and in need of development. In response to such barriers to original publication, the laid down ideas are likely to be narrowed in terms of scope, leading to diminished impact. This is a rational response to alien ideas that cannot readily be benchmarked against some pre-existing schemata. Generally, such papers are riskier and have a higher likelihood of rejection given the current review standards and expectations (Grover et al., 2015). A safer option is therefore to not abstract and push novel ideas aggressively, but rather to rely on, and modify, extant theories as a means to frame and understand IS phenomena.

So, what can we do as individual researchers when we wish to pursue novelty? Our contention is that as unique digital phenomena emerge widely and continuously, and we now have access to large samples of digital data, we need to "up our game" and shift the line between safer exploitative research and riskier explorative research. This is necessary to achieve greater fidelity with the phenomena we as a field generally follow and seek to observe. That is, as the digital world expands at breakneck speed, novel, indigenous conceptualizations and attendant theorizing of socio-technical phenomena (Sarker et al., 2019) are likely to become increasingly necessary. Hence, direct borrowing from reference disciplines is likely to become less useful.

A rational approach is one of accepting risk that is commensurate with the scholar's capabilities and status. Individuals (or teams) fall roughly on a continuum ranging from strong abstraction skills (i.e., theory development) to strong data manipulation skills (i.e., data analysis). A corresponding continuum can also be established based on the risk-taking propensity of the individual scholar. Researchers who take

comfort in building on extant knowledge can be expected to position themselves more on the exploitative side of the line and take measured risks *within the context of reference theories,* or if they are inclined toward data, build theories inductively (or abductively (see, e.g., Behfar and Okhuysen (2018)) by *leveraging their analytical skills on large datasets* (Berente et al., 2019; Lindberg, 2020). Both approaches involve measured and moderate proportions of exploration in conjunction with exploitation (i.e., the scholar seeks to explore within the (re-)framing of a reference theory, or examine well-established questions using novel techniques). In the former case, the exploration lies in pushing the boundary conditions of existing theories, while in the latter case exploration consists in inductively extracting insights from existing data through using untried novel techniques.

Specifically, in the case of reference theories, the risk lies in the aggressiveness of modifying the theory's concepts and relationships based on the idiosyncrasies of digital phenomena. If no such modifications occur, the theory is largely being tested "as-is" in an IS context, constituting an expansion of the external validity of the theory (Grover et al., 2015). A more aggressive stance would be to *not* treat the theory as immutable, look for boundary conditions, and seek to falsify the theory in a particular context. An individual researcher may also search deeper to uncover novel interactions between essential IS features and the resulting theory to enable the articulation of new conceptual relationships. The researcher may also examine digital phenomena from multiple theoretical perspectives as a means to resolve theoretical ambiguities, contradictions, or tensions across said perspectives (Grover, 2013). In essence, this approach engages in exploration within the context of exploited knowledge and incorporates more of the idiosyncratic IS phenomena into the borrowed theory. In the case of building theory from data, there is safety in exploiting a known toolset through which the data is analyzed. The risk lies in the degree to which well-established, yet important, questions will, or even can be, addressed through the dataset, versus the dataset being viewed as a fishing exercise to find something of interest and value.

Researchers with strong abstraction skills, particularly those with greater risk tolerance (that may come with seniority and job stability) can and should act more aggressively in searching for major mutations in reference theories through falsification, or abandoning the theories altogether by taking a "blue ocean" (Kim & Mauborgne, 2005) approach to theorizing. Researchers with a highly analytical bent can also engage in increased explorative behaviors by leveraging big data (Abbasi et al., 2016; Agarwal & Dhar, 2014) or new creative forms of mixing and integrating qualitative and quantitative datasets for new kinds of inferences (Berente et al., 2019; Lindberg, 2020). Researchers with both abstract skills and an analytic bent can identify new patterns from data and then abstract them to broader theories that transcend the idiosyncratic data pertaining to a particular phenomenon (Rai, 2017).

6.1.2 Implications for the IS discipline

In our view, the IS field finds itself at a perilous moment in time filled with danger as well as opportunity. Digital technologies have now become relevant to most fields housed at business schools—HR, entrepreneurship, strategy, management, organization theory & behavior, marketing, etc. Additionally, digital phenomena are breaking out of "organizational containers" (Winter et al., 2014) and are increasingly located in liminal spaces between organizations, across private and public spaces, civil and commercial, virtual and physical, etc. This suggests that considerable diversity is necessary for handling the multitude of phenomena being spawned by contemporary uses of a wide range of digital technologies (Burgess et al., 2017).

For IS as a field, there are at least two options open for how to proceed. One option is to strive to "own" the IT artifact and export our ideas to other fields based on genuine research around what has been unique about IS research from its inception—the IT artifact and the organizing of information across various systems (Benbasat & Zmud, 2003). Another option would be to continue to base our research upon already established reference disciplines (Grover et al., 2006) and extend attendant reference theories to new topics and areas within which IT is applied. The latter option may possibly lead to an increasing dilution of the value that we can add as a research discipline—at the end of the day we might be left with nothing unique of our own, as other fields have eaten quite a bite out of "our cake." Indeed, scholars in adjacent fields, such as management and marketing, have warned against incremental "gap spotting" approaches, arguing that they lead to less interesting research (Alvesson & Sandberg, 2011), and suggested that more explorative knowledge is needed (Sudhir, 2016). To remain "owners" or "guardians" of the IT artifact, we may therefore need to continuously generate interesting theory (Davis, 1971) that other fields may be tempted to borrow in their own work (Baskerville & Myers, 2002; Yoo, 2012).

To stabilize and cement our position in a time of rapid change, we need to embrace risk and remain open to experimentation and novelty. This will require institutional changes, including changes in the norms of our review and editorial practices. If we urge the field to take more risks in creating indigenous knowledge, then our systems should have a compatible tolerance for risk. Ultimately, we need to work toward increasing the number of "signature contributions"—highly influential theories, concepts, and findings that have been developed indigenously in our field and can be exported for practical usage in other fields. These results, however, cannot be created by fiat. Rather, we need to cultivate conditions where such signature contributions are more likely to emerge. Based on the empirical evidence reviewed above, an explorative strategy remains a high-risk proposition for a single scholar. Therefore, we recommend that the field seeks to erect novel institutional forms which can foster and expedite explorative knowledge by using deductive, inductive, and abductive inferences enabled by new digital datasets and related analysis strategies (Lindberg, 2020). Without new institutional structures and support, however, it will be difficult for individual scholars to execute the agenda we are proposing.

In our view, the field should find ways to accommodate and encourage larger degrees of explorative knowledge. This can be done through sectioning of dedicated space in journals, through special issues or even "living" documents. Such spaces should promote aggressive research on the emerging digital world, and they should utilize alternative criteria for selecting reviewers and evaluating manuscripts. Simultaneously, searching for exploitative knowledge can and should continue, albeit with more openness to taking a more flexible stance on modifying theory as part of the empirics. If the field can put such institutional norms and structures in place, there will be a higher inclination for scholars to take the riskier path and create stronger indigenous explanations and empirics. Figure 2 summarizes the tradeoffs for individual researchers as well as for the IS discipline as a whole.

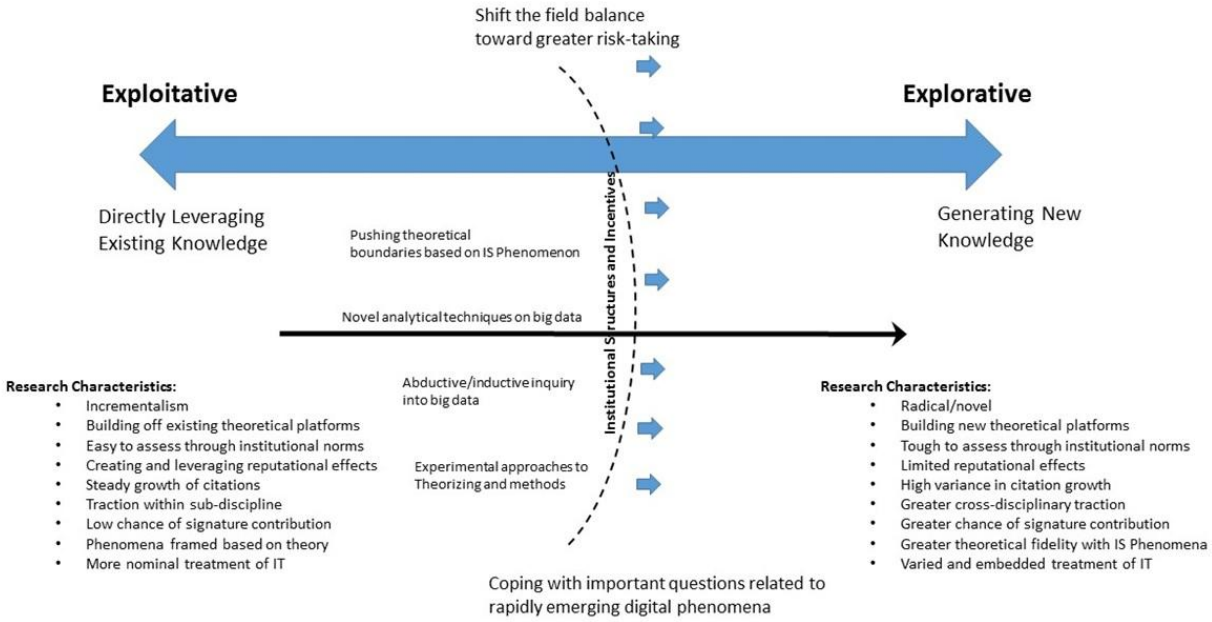


Figure 2. Changing the Research Balance

6.2 Limitations of Citation Analysis

This study provides only preliminary evidence of a risk-reward trade-off within current IS research. Papers were categorized dichotomously based on whether the knowledge utilized in each paper draws from external reference theory or is indigenous. Many papers have a mix of knowledge and theory, and the simplification we made presumes that one form dominates the other in every article. Also, other ways of classifying knowledge (i.e., the degree of generalizability, the accuracy of explanation and prediction, the level of predictability of the theory (such as effect sizes)) were not considered though all are important in influencing how knowledge is applied and how the community learns. Finally, the metrics used in the study are derived from observed citation patterns. It is fair to critique the study on the limitations that apply to any scientometric citation analysis study. It is entirely possible that the temporal window of citations

considered influences the results. It may be that truly indigenous papers have a greater impact across longer time windows. Partially the citation measure may be a proxy for the fact that citations are not attributed solely based on the originality of ideas and their power, but based on multiple other factors such as herd effects, perfunctory citing, citing for reasons other than the quality of the ideas, the size of the potential citing community, and so on (see, e.g., Hansen et al. (2006)). Clearly, we could not control easily for such sources of bias in our analyses. Overall, we need to expand and validate these initial findings with other datasets and with longer time windows.

7 Conclusion

There are many advocates of more indigenous theory in the IS field (Straub, 2019). As digitalization is sweeping across society, new emergent IT-based phenomena are becoming pervasive. It is important for the IS field to establish an original voice with regards to these phenomena—lest they be absorbed and studied by other disciplines. In this study, we frame the arguments in terms of learning through exploration and exploitation. This is based on the extent to which the community in its knowledge production draws upon established and often borrowed knowledge bases, and to which extent it seeks to create knowledge that deviates significantly from existing knowledge. By categorizing research into these modes, we find that explorative knowledge tends to result in greater, but more varied and uncertain scholarly impact. Such research also engages more with the features and relationships within the IT artifact, while exploitative knowledge tends to rely on prominent researchers serving as catalysts, while avoiding theorizing around the IT artifact. Too much exploitation may result in research silos, each with its own platform of incremental research, framed largely by the received theory. We surmise that this form alone is likely to miss important emerging questions around digital phenomena. Too much exploration is also risky, can easily become speculative, and is difficult to benchmark. It may also be, however, more likely to create theories that have higher fidelity with our focal phenomena and therefore offer, in the long term, greater utility. To advance our understanding of emergent digital phenomena, the field needs to relax its conservative stance and develop a more dynamic research portfolio that balances exploration and exploitation. This can happen by fostering mechanisms and structures that support riskier explorative research and theory development.

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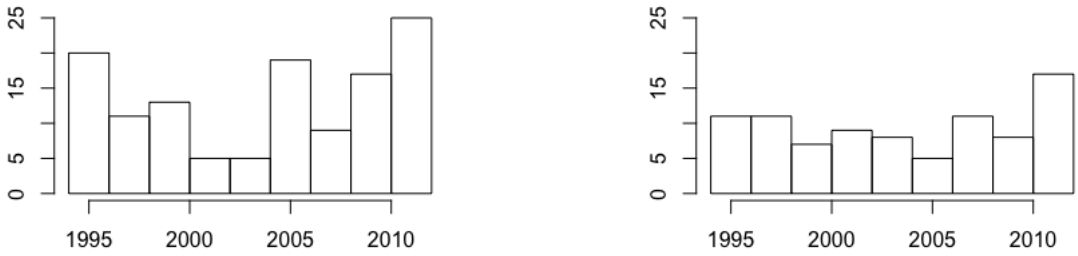
Appendix A: Temporal Distribution of Articles

To determine whether articles drawing on explorative (N=87) and exploitative knowledge (N=124) were distributed differently across time in terms of their publication years, we created two histograms showing the frequencies of articles across time (Figure 3).



Exploitative knowledge **Explorative knowledge**

Figure 3. Article Distributions over Time

We also conducted a Kolmogorov-Smirnov test of differences in distributions and found that the two distributions were not significantly different (p=0.7656).

Appendix B: Coding Scheme

For publication years between 1994 and 2012 we sampled every 5th article across the top two IS journals: MISQ and ISR. We excluded editorials, research notes, research methods articles, design science, IS teaching/education, and articles on the state of the field.

To validate the coding scheme discussions were conducted across three coders. These coders also coded a random set of 10 articles independently. To measure the reliability of this coding we used Fleiss' Kappa, which was 0.831 for exploitative/explorative knowledge and 0.735 for the IT artifact. This indicates acceptable levels of agreement.

Exploitative and Explorative knowledge

Exploitative knowledge was identified as articles which take existing concepts, configurations, or logic and simply applies them to a new context, or in a somewhat new constellation. This may involve some relabeling and operationalization adjustments but does not change the general nature of concepts and their linkages.

Explorative knowledge was identified as articles which use novel concepts, and therefore also new linkages across concepts to create theoretical value. This means that logics or configurations of concepts are also changed.

IT Artifact

We coded treatment of the IT artifact in each article using Orlikowski & Iacono's (2001) typology: tool, proxy, ensemble, computational, and nominal. The IT artifact as tool captures a view that sees IT artifacts as tools doing what their designers intended them to do. The proxy view represents the usage of a surrogate measure, such as investments in IT, to capture IT artifacts. The ensemble view suggests that IT artifacts represent the binding together of multiple types of resources, both social and material. The computational view focuses on IT artifacts as researcher-developed algorithms and models. Last, the nominal view treats IT artifacts as absent, often through simply situating a study in an IT context without including any particular conceptualizations of IT artifacts.

About the Authors

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Varun Grover is the George & Boyce Billingsley Endowed Chair and Distinguished Professor of IS at the Walton College of Business, University of Arkansas. Over his 30+ year career, he has consistently been ranked among the top five researchers globally, based on his publications in top journals, citations (>45,000) and h-index (of 98). In the 2022 edition of the top 1000 scientists in the world (at research.com), he was ranked 23rd in business and management, and a Stanford University study ranked him 6th (out of 17,971 authors) in the IS discipline. He is Senior Editor for MISQ Executive, Editor of the JAIS Section on Path Breaking Research and has served as Senior Editor for MISQ (2 terms), the JAIS (3 terms), and The Data Base for Advances in IS as well as AE or Advisory Board member for 14 other journals (JMIS, ISR, ISJ, JSIS, etc.) Dr. Grover’s current work focuses on the impacts of digitalization on individuals and organizations. He is an AIS Fellow and AIS LEO recipient for lifetime achievement.

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