

Clarifying Determinants of Business Innovation Capabilities for Technology Driven Entrepreneurial Firms

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Abstract

Due to lack of systematic studies and clear definitions, managing business innovation is still relatively a challenging task for business leaders, especially entrepreneurs of Information Communication Technology (ICT) firms and technology driven firms. Entrepreneurial firms focussing on technology or specifically information technology and digital services are constantly pressed for innovating their services and products. Innovation theories are evolving into distinct disciplines bridging applied engineering approaches to external open innovation. This article aims to explore the determinants for managing business innovation capabilities with special reference to technology firms who have superior engineering advantage, yet lacking business focus. This is done by secondary research review of recent literature for the key constructs and sub-constructs of business innovation. Also a select public qualitative data sources such as interviews and talks by innovation experts are contrasted to propose a set of candidate sub-constructs and determinants for practical managerial application by technology firms as well as other entrepreneurial ventures. By combining the key innovation subcontracts, an improvised Business Innovation Determinants Triangle is proposed with fifteen innovation determinants. Thus this study contributes to the existing knowledge by bridging the academic and practitioners' views of applied engineering to business innovation. Proposed determinants can be used as input to systematic development of scaled business innovation metrics addressing different business model patterns and service business models in ICT focussed entrepreneurial firms for practical use.

Keywords: Business Innovation, ICT entrepreneurship, Digital Transformation, Technology Innovation, Applied Engineering

INTRODUCTION

Innovation as a key factor for strategic and competitive advantage for business growth is well established and consented among researchers and business world. To create new opportunities and to grow sustainably, firms should think beyond applied engineering to managing innovation while advancing the benefits of advances in technology and engineering. In the past few decades, several researchers have made significant contribution in the field of innovation

management and applied engineering with cross references to entrepreneurship, technology management, business strategy and marketing studies. With the emergence of digitally connected global economy and Information and Communication Technology (ICT) driven business models, interests on innovation capabilities and how they can be applied to add business value to engineering advancements have gained strong prominence. Studies on business models and business model innovation (BMI) need to closely align with technology management and bring out measurable metrics for business success through engineering innovation. This is an emerging and recent domain of applied engineering research bridging many constructs and sub-constructs in business perspective for practical value and application. Understandably, majority of the contemporary business innovation frameworks attempt to categorize innovation efforts based on their impact over business outcome. One of the earliest works on BMI is based on degree of differentiation and degree of sustainability which differs vastly between established firms and entrepreneurial firms [1]. Due to diverse factors that affect such BMI efforts, there are no established studies on how technology enabled business firms can undertake business innovation and measure their innovation capabilities beyond engineering capabilities. This article is focused to bridging related constructs of business innovation especially for technology driven firms from academic and practical perspectives. We then attempt to explore views and discussions of select leading innovation experts from their publicly available talks, interviews and blog reports to validate how directly or indirectly their views concur and correlate with current state of business innovation research. Aggregating the underlying discussions, we propose a select set of innovation measures that can be mapped to business model components as in Business Model Canvas (BMC) for further empirical validation and practical application, especially by ICT entrepreneurial firms.

MOVING FROM TECHNOLOGY DRIVEN APPROACH TO DIMENSIONS OF BUSINESS INNOVATION

Beyond engineering prowess, successful entrepreneurship is mandated by three important considerations – needs and drivers for business change, potential value creation

opportunities of innovation, organizational innovation capabilities. Many technology driven organizations fail to understand the difference between technology innovation and business innovation. It is also imperative that there will be diffusion of innovation and effect of diminishing returns over time, if not properly addressed. Extant literature on business innovation is vastly heterogeneous with lack of empirical clarity and absence of innovation constructs as applicable to different business model typologies. A comprehensive literature review done by Wirtz, Göttel and Daiser [2] enlists six key research areas for future research, from where

business innovation constructs and higher order sub-constructs can be deduced. According to them, the key focus areas of business innovation are: Definition & Types, Design & Process, Drivers & Barriers, Frameworks, Implementation & Operation, and Performance & Controlling. Combining these focus areas and relevant possible metrics and subconstructs, we depict a conceptual framework of business innovation as in Fig 1 for further review of literature and discussions.

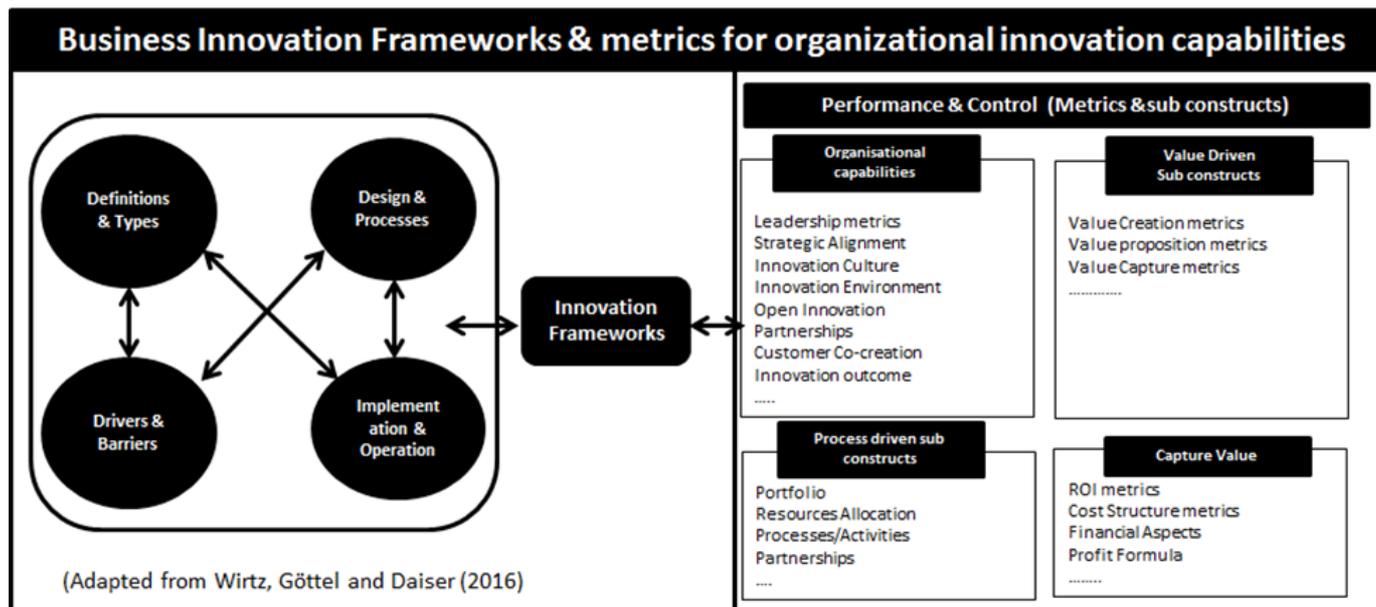


Figure 1. Innovation Frameworks & metrics for organizational capabilities

Most of the contemporary business innovation studies are generic and mostly applicable to larger organizations or manufacturing companies. Approach to innovation by established large firms and small and medium sized firms vary substantially. Smaller and entrepreneur firms have the advantage of flexibility and agility to quickly adapt for innovation initiatives. However, a pragmatic innovation environment and culture of innovation are necessary for effective organizational innovation results [3]. Well planned innovation approach shall result in significant change in the firms' business performance irrespective of their size. Gassmann, Frankenberger and Sauer [4] have identified seven schools of business innovation such as strategic choice school, process school, activity system school and others with a call for further empirical validations. Also, a recent systematic study of manufacturing firms on measuring BMI effectiveness suggest a set of scale based metrics and clarifies how business leadership can identify organizational innovation challenges, establish innovation environment and manage the innovation outcome with measurable metrics [5]. Such connected views of business innovation as they related to technology innovation reflect that business model components and business transformation are the key dimensions for clarifying innovation determinants.

Business model is a reflection and tactical realization of firm's strategy and are related but different constructs [6], [7]. To be a source of competitive advantage, a business model must be something more than just a good logical way of doing business and needs to be innovated [8]. Innovating business models requires considerable insight and engagement from leadership and organizational teams to creatively engage with customers, partners and other external actors for creating better customer value and protecting the business model from imitation and exploitation by competitors. Open innovation culture – 'the use of purposive inflows and outflows of knowledge to accelerate internal innovation, and expand the markets for external use of innovation, respectively' plays a vital role in shaping business innovation capabilities [9], [10]. However, open innovation researches are mostly focusing larger firms and practically none with respect to small and medium establishments (SMEs) or entrepreneurs. Due to lack of understanding, smaller firms are not fully equipped to understand and implement BMI initiatives [11]. Kutscha [12] has come out with an empirical study of SMEs to assess the roles business environment and strategic agility over business transformation. Applying open innovation and value co-creation as determinants of business innovation needs better working definitions for constructs of business models, transformation and innovation capabilities [13].

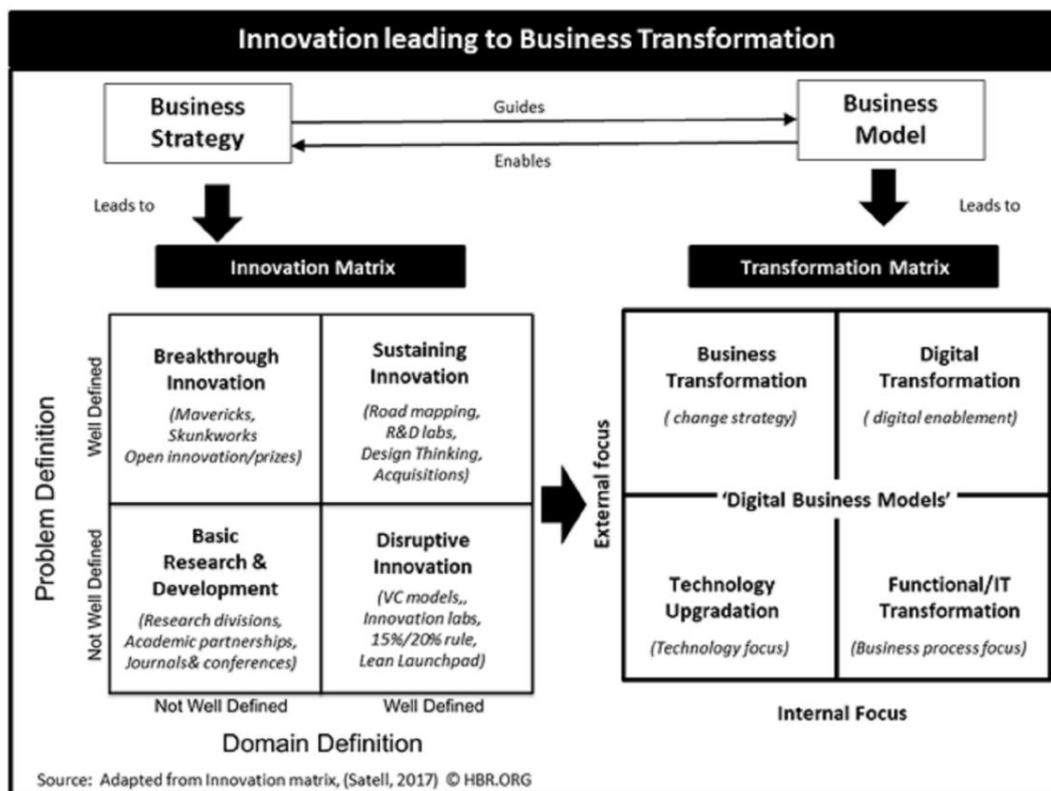


Figure 2. Innovation matrix and transformation matrix

Innovation and business transformation debates have gained lot of momentum in recent times. Business innovation approaches may be incremental or radical based on the intensity and extent of innovation. Understanding of relation between innovation and transformation is still ambiguous due to lack of clear definitions. To combine the discussions so far, we adopt the popular innovation matrix which spells four types of innovation based on how well the problem and the domain of innovation are defined. From the business model elements perspective, innovation is essentially a process of novelty to add more value, may be changing one or few elements of the business model. Transformation on the other hand may be seen as change strategy towards the firms' value creation ability and may involve innovating or changing entire business model elements. Thus, linking innovation, transformation and business models, Fig 2 provides an extended view of innovation matrix, depicting how types of innovation and transformation can be linked to business strategy and business model. We observe that business transformation and digital transformation are more external focused while technology upgradation and functional/IT transformation are more internally focused. Reminder of this article will further probe on the key determinants of business innovation capabilities and suggest a group of measurable key determinants which may help developing a contextual business innovation framework with more practical value for entrepreneurs and ICT or technology driven business managers.

AGGREGATING KEY DETERMINANTS OF BUSINESS INNOVATION CAPABILITIES FROM ACADEMIC LITERATURE

Recent constructs of business innovation are chiefly drawn from the related domains of business strategy, entrepreneurship and technology management. While there is increasing consensus among academicians about the influence of business strategy over business models, innovating business models as a whole and how to control and measure business innovation are still emerging. Extant business model and business innovation literature suggest that there are notably four key dominant paradigms of business strategy that have significant influence on business innovation. They are (1) Competitive forces approach (2) Strategic conflict approach (3) Resource based perspective and (4) Dynamic capabilities perspective [14]. Among these, resource based views of organisational capabilities to establish competitive advantage and its relation to Barney's VRIO framework has strong impact on business value creation and performance outcomes [15]. Stampfl and Prügl [16] provide a layered approach for business innovation especially focusing on external environment and dynamic capabilities perspectives as well as dynamics due to changes in business model components.

Foss & Saeibi [17] strongly relates innovation to business models around four different streams - (1) Conceptualization and classification of BMI, (2) BMI as a process, (3) BMI as an outcome and (4) BMI and organizational implications/performance. Of these, organizational

implications as determinants of business innovation are relatively new and under researched. Innovation efforts by organization as a whole have more profound influence than individual innovator. Nature and type of innovation being attempted reshapes the business model in stages, thus setting priorities for business innovation [18]. Also, apart from individual characteristics and team characteristics, innovation management by leadership within the organization has significant role to play in making the individual innovation efforts bring value [19].

Ethnography as a management research method has been employed mainly for public management studies till recently. However corporate ethnography as tool of business innovation has been employed by multinationals such as Intel Corp to understand unarticulated needs of customers. Some marketing researchers are promoting processes for consumer ethnography, customer ethnography and commercialization of innovative products and services. Connecting ethnographic methods to business innovation need to address factors such as user centric innovation, aligning innovation with organizational growth, sufficient budgetary support and adapting to continuous learning processes [20]. However, success of such novel approaches to business innovation mainly depends upon leadership support to clear the internal barriers for individuals and innovation teams within the organization. Performance measures and control of business innovation need to be supported by proper tools and techniques. As observed, current BMI research is mainly focused on definitions, design process implication, specific studies in larger originations and incumbent firms in mature industries. Among these diverse definitions and innovation constructs, there is lack of tools and metrics for BMI and how those metrics can be measured and controlled, especially in service business models [21]. Use of business model itself as a tool for market and technological innovation is prevalent among business practitioners in recent times. However, this firm centric approach to innovation by use of key resources and key activities of the firm alone is not enough and this needs to be complemented with broader organizational and institutional change process[22]. Another recent study by Geissdoerfer, Savaget and Evans [23] suggests a practical framework, namely Cambridge Business Model Innovation, which is bridging the gaps in design and implementation of sustainable business model innovation. Several such BMI contemporary frameworks need to be cross correlated and tested with empirical research for applicability to suit different business model typologies, especially suitable for technology driven firms.

Proliferation of ICT and digital technologies and connected business ecosystems have thrown open more challenges for business innovation. In recent times, many organizations across different industries are currently battling with two key major initiatives – digital transformation and/or innovation. Many contemporary studies and discussions refer business transformation and digital transformation almost synonymously. Digital transformation or more aptly, digitalization is concerned with applying IT and digital technologies as applied to firms' business model, products,

processes and organizational structure [24]. Innovation is on the other hand is a applied engineering and scientific management approach for better value creation in alignment with business strategy and vision. In essence, innovation and business transformation are closely related though not necessary that every innovation will lead to business transformation. Interrelationships between organizational capabilities, digital transformation, innovation driven business strategy will continue to be of great importance to business success[25].

Aggregating the key constructs from extant business innovation literature, we infer and summarize that measuring and managing business innovation and organizational capabilities need more granular sub-constructs and determinants. As depicted in Fig 1, these innovation sub-constructs and associated determinants contextually can be grouped under four different themes such as value driven, outcome driven, capabilities driven or organizational design driven approaches.

- Value driven view: Value Proposition metrics, Value Creation metrics, Value capture metrics
- Outcome based view: Leadership metrics, Organizational maturity metrics, ROI metrics
- Capabilities based view: Metrics for innovation drivers, Metrics for innovation capabilities, Metrics for outcome/results
- Organizational design view: Leadership & Strategy metrics, Structure& Planning metrics, Management & Operation metrics, Metrics for results.

Among these groupings, we find value driven innovation constructs are more prominently used by certain researchers and the sub-constructs suggested by them can be mapped into Business Model Canvas elements more directly [26], [16], [1], [5]. Capabilities based views are also very prevalent and found to have more in common as defined in some of the practitioner based publications and non-profit award committees instituted by industry organizations.

Apart from these groupings, there are more groupings emerging such as the one that address the role of organizational design in the process of BMI details in three distinct stages - motivation stage, implementation stage and outcome stage [27]. This particular research also attempts to explain how organizational complementarities may promote or hinder BMI initiatives. Thesis research by Fallahi [28] is based on process view of BMI and provides empirical observations in organizational innovation context postulating two distinct approaches - unintentional BMI leading new business innovations and purposeful BMI that leads exiting business model towards for new business model design. This approach is based on dynamic capabilities views and explains when external and internal forces put pressure on existing business models, how problem as new unit of analysis can be used to understand the challenges of business model transformation and conflicts between multiple business models.

Select groups of constructs and and sub-constructs for BMI & organizational innovation capabilities			
OUTCOME BASED VIEW		VALUE MANAGEMENT VIEW	
Sub-constructs Group1	BMC Element	Sub-constructs Group2	BMC Element
Leadership Metrics	KA, KR,KP	Value creation	
Input Metrics		New capabilities	KR
Output Metrics		New technology/ equipment	KR
		New partnerships	KP
		New processes	KA
Organizational Capability Metrics	KA, KR,KP	Value proposition	
Input Metrics		New offerings	CVP
Output Metrics		New customers	C
		New channels	CH
		New customer relations	CRM
ROI Metrics	CS, RS	Value capture	
Input Metrics		New cost	CS
Output Metrics		New revenue	RS
CAPABILITIES BASED VIEW		ORGANISATIONAL VIEW	
Sub-constructs Group3	BMC Element	Sub-constructs Group4	BMC Element
Innovation Drivers		1. Leadership & Strategy	KA, KR,KP
Masterminds, Strategy, Portfolio, Process	KA	Strategic alignment, BMI, Innovation Portfolio	
Partnerships	KP	Design Thinking, Open Innovation	
Innovation Capabilities		2. Structure & Planning	KA, KR,KP
Budget, Training, Technology, Centre	KR	Innovation teams, Innovation space design	
Innovation Results/Outcome		Innovation collaboration, External connectedness	
Business Growth Results	RS,CS	3.Management & Operation	KA, KR,KP
Customer Results -Innovation Perception	C, CRM,CVP	Innovation tools, Employee engagement	
Customer Results -Innovation Key Measures	C, CRM,CVP	Customer co-creation, crowdsourcing innovation	KR, CS, RS
Community & Sustainability Results	C, CRM,CVP	4. Results: Levels, Trends, Benchmarking	CS, RS , CVP
		Business Performance, Innovation Process results	
Business Model Canvas (BMC) components: Key Partners(KP), Key Resources(KR), Key Activities (KA), Customer Value Proposition(CVP), Cost Structure(CS), Revenue Streams(RS), Customer Relationship Management (CRM), Channels, (CH) and Customers (C).			

(Source: Authors compilation)

Figure 3. Select groups of constructs for BMI capabilities

Combining the understandings of academic literature review done, we provide aggregated groupings of business innovation constructs and sub-constructs in Fig 3. We opine that these groupings and suggested determinants in each category can further be used as input to developing a scaled based innovation framework with measureable metrics of business innovation. Subsequent section will address how these candidate business innovation constructs based on academic research appeal to practitioners and innovation experts

AGGREGATING KEY DETERMINANTS OF BUSINESS INNOVATION FROM THE VIEW OF INNOVATION EXPERTS

Extending the aggregated sub-constructs as in the preceding section, we further attempted to contextualize the views of select innovation experts and practitioners to validate innovation determinants derived out of academic literature review. In order to avoid any bias, we opted to use the transcripts of publicly available interviews, expert views from industry reports, YouTube videos and other social media content as a data source. On careful scrutiny of collected data, we selected a collection of 8 TED talks (T1-T8) published after year 2010 with an average of more than two million views and four blog interviews (T9-T12) pertaining to business innovation by industry experts.

Table 1. Innovation sub-constructs as contextualized from the views of innovation experts

Transcript Reference#	Innovation Constructs	Leadership & Strategy	Structure & Planning	Management & Operation	Key Sub-constructs
T1	Open Innovation Era (Leadbeater, 2005)]	Move from traditional corporate model to open source model and involve customer who are more knowledgeable <ul style="list-style-type: none"> • Open Innovation • Customer Co-creation 	Planning for radical innovation for higher pay-off but with higher risks or enable incremental innovation as open models <ul style="list-style-type: none"> • Creative collaboration • Interactive innovation structure 	Smaller firms are relatively agile for radical innovation and bigger firms reinforce incremental innovation. <ul style="list-style-type: none"> • Customer driven innovation management • Sustainable innovation capacity 	<ul style="list-style-type: none"> • Open Innovation • Customer Co-creation
T2	Building a business to last 100 years (Reeves, 2016)	Leadership should move from mechanical thinking to biological thinking. (Reason: 32% of firms don't last more than 5 years if not innovative.) <ul style="list-style-type: none"> • Open innovation systems 	Size of the firm influences innovation structure and governance. Results to focus on creating corporate immune system, which is resilient, enduring. <ul style="list-style-type: none"> • Collaboration focus • Capabilities focus (firm size dependent) 	Operations process should clearly distinguish and synergize collaboration and capabilities. <ul style="list-style-type: none"> • Managed collaboration: redundancy, modular design, embeddedness; • Managed capabilities focus: adaptive, technology prudence, diversity 	<ul style="list-style-type: none"> • Open Innovation • Innovation Collaboration • Innovation Intensity
T3	Where ideas come from? (Johnson, 2010)	Strategy and leadership to look for ideas from anywhere. <ul style="list-style-type: none"> • Creating ideas network (i.e. open innovation) 	Structure should enable a "Coffeehouse" enlightenment <ul style="list-style-type: none"> • Innovation space design • Collaborative environment 	Create environment of 'eureka' light bulb moments. <ul style="list-style-type: none"> • Manage ideas crowd sourcing • Manage "slow hunch" delays in ideas incubation 	<ul style="list-style-type: none"> • Innovation Space design • Crowdsourcing innovation
T4	Team diversity for innovation (Lorenzo, 2017)	Team diversity fosters better innovation results. <ul style="list-style-type: none"> • Team diversity • Gender diversity • Cultural diversity 	Organization structure with diversity measures and targets <ul style="list-style-type: none"> • Modular organization size • Diversity measures enabled 	Stepwise targets to measure and manage diversity	<ul style="list-style-type: none"> • Innovation teams • Employees engagement (Innovators Engagement)
T5	Creative Problem solving (Radjou, 2014)	Limited resources forces innovation and ingenuity. <ul style="list-style-type: none"> • Exploit resource limitation • Frugal innovation 	Keep it simple and think and act horizontally <ul style="list-style-type: none"> • Flexible and flat innovation structure • Peer collaboration 	Manage 'Frugal Innovation' to create more economic and social value with limited resources	<ul style="list-style-type: none"> • Innovation Collaboration • Design Thinking
T6	Managing collective creativity (Hill, 2014)	Great conventional leaderships are not enough for innovation; Unlearn conventional notions of leadership <ul style="list-style-type: none"> • Creative leadership • Collective problem solving 	Leading innovation is about creating the space where people are willing to labor innovation <ul style="list-style-type: none"> • Structure as innovation facilitator & series of experiments • Create innovation communities 	Managing innovation by 3 distinct approaches: <ul style="list-style-type: none"> • Creative Abrasion: Collaborative problem solving (not just brainstorming) • Creative Agility: Discovery driven learning and Design Thinking • Creative Resolution: Inclusive decision making 	<ul style="list-style-type: none"> • Strategic Alignment • Design Thinking • Innovation Collaboration
T7	Two reasons companies fail (Haanaes, 2015)	Power of idea is practicality in exploring and exploiting opportunities (Do only new vs do more of same) <ul style="list-style-type: none"> • Balancing explore vs exploit 	Structure should support long-term goals of exploration and short term goals of exploitation <ul style="list-style-type: none"> • Exploring structure • Exploiting structure 	Manage innovation by balancing search efforts and success stories <ul style="list-style-type: none"> • Balance Search trap vs. Success trap • Manage innovation in multiple timescales • Invest in right talent • Be skeptical of success 	<ul style="list-style-type: none"> • Innovation Collaboration • Innovation tools • Innovation Process
T8	Becoming a now-ist not futurist (Ito, 2014)	New generation is more agile with low costs of innovation and collaboration <ul style="list-style-type: none"> • Move to Design Thinking driven innovation model 	Structure to push innovation to edges, though chaotic and hard <ul style="list-style-type: none"> • Structure for bottom up innovation 	Manage agile and dynamic innovation <ul style="list-style-type: none"> • Managed innovation by Design thinking techniques 	<ul style="list-style-type: none"> • Design Thinking • Innovation teams • Innovation Collaboration

T9	Innovation is dead (Osterwalder, 2016)	Innovation means substantial innovation strategy implications <ul style="list-style-type: none"> Adapt to mix of innovation types- Process, product, service, technical, marketing, BMI, Management/Organizational 	Structure to manage and balance explore (act upon news types of data) vs exploit increase efficiency/sustain) <ul style="list-style-type: none"> Exploring structure Exploiting structure 	Manage innovation mix with key metrics <ul style="list-style-type: none"> Resource allocation for innovation -time, money, space Leadership engagement - face time with CEO 	<ul style="list-style-type: none"> Innovation Portfolio Innovation teams Strategic Alignment
T10	Innovation vs. Transformation (Shaughnessy, 2014)	Transformation is a journey and innovation leads to transformation agenda <ul style="list-style-type: none"> Move from Open Innovation to Social Innovation mindset 	Structure should enable transformation mode with clear strategic direction	Ensure social innovation process does not lead to promiscuity <ul style="list-style-type: none"> Measures to validate end user needs Measures to control self-grown lean iteration process Deploy means of moderation 	<ul style="list-style-type: none"> Open Innovation Strategic Alignment Customer co-creation
T11	Does your org have innovation mentality? (Ure, 2015)	Strong relationship between vision and innovation. And innovation is a mentality, with customer at centre. <ul style="list-style-type: none"> Purpose driven people with emotional connect with customers 	Environment to enable innovation and creativity to co-exist and flourish <ul style="list-style-type: none"> Structure with shared attitude, mindset, way of working, way of thinking 	10 linear indicators to check for innovative mentality <ul style="list-style-type: none"> Common vision, connected strategic planning, articulated innovation, senior management engagement, employees understanding of work level innovations, opportunities for employees by innovation, innovation environment, employees' active participation, collaborative innovative environment, courage and patience from leadership 	<ul style="list-style-type: none"> Innovation Collaboration Innovation teams Strategic Alignment Innovation Space design
T12	Strategy Innovation alignment: choice cascading model (Hobcraft, 2017)	Strategy informs innovation by art of investigative thinking; employees are not cost centers but value centers <ul style="list-style-type: none"> Art of investigative thinking by leadership enhances strategic innovation alignment Adaptive Strategic Planning & innovation 	Structure to enable contribution by everyone <ul style="list-style-type: none"> Build a cadre of strategic choice makers Structure to manage more uncertainties 	Manage innovation by Choice cascade model : <ul style="list-style-type: none"> Cascades down to fit lower order choices Cascading structure and principles that move in both directions Innovation governance design to manage innovation culture, innovation environment, choice mentality 	<ul style="list-style-type: none"> Strategic Alignment Innovation Tools Innovation Process

Reason of opting for TED talks is that TED as a phenomenon have grown substantially in the recent past given its real time and mass media appeal the concurrent topics to researchers, academicians and industry practitioners [29]. This selection is limited only those public talks from global TED directly and other industry sponsored regional talks such as TEDx were not included. Complementing these talks, four more blog reports by innovation experts including Osterwalder, the inventor of BMC were also included. After careful initial readings and subjective content analysis of the online, we summarized the salient points under the three key higher order constructs related to business innovation - leadership & strategy, structure & planning, management & operation. A summary of key takeaways and innovation constructs by the respective expert views are then added in the summary table as given in Table 1.

Mapping the key constructs from the practitioners' view as tabulated, we deduce following key constructs and sub-constructs as candidate terms for devising business innovation frameworks with select scaled metrics addressing different business model patterns.

- Leadership & Strategy: Strategic Alignment, Open Innovation, Innovation Portfolio, Design Thinking
- Structure & Planning: Innovation teams, Innovation Collaboration, Innovation Process, Innovation Space design
- Management & Operation: Innovation tools, Customer Co-creation, Crowd sourcing innovation, Employees engagement

Next logical step would be to further elucidate these practitioners' views with aggregated key determinants of business innovation capabilities as discussed in the previous section based from academic research review.

RESULTS AND DISCUSSIONS

Primary purpose of this article is to clarify the emerging trends of business innovation metrics from both academic and practitioners' points of view and propose a contingency framework of business innovation determinants. This framework should enable further development of scaled metrics, which can be used by entrepreneurial firms. First we explored and aggregated innovation determinants from academic view and then corroborated them with the views of innovation experts for practicality and relevance in line with business model components dimensions. We opine two key dimensions of business innovations based on value driven approach (value creation, proposition, value capture) and dynamic capabilities view (leadership, planning and managing) appear more pragmatic with further possible

higher order sub-constructs. Particularly sub-constructs of dynamic capabilities as they relate to contexts of strategy and business model elements can draw support from many of the developed organizational success determinants and metrics [14]. From innovation experts' point of view, business leaders are more concerned with realizing the innovation outcome by focusing on key determinants as they relate to outcome and business growth. This is in conformance with the value driven approach by academic experts. Careful analysis of views of innovation experts as in Table 1 led to deducing certain key innovation determinants such as innovation collaboration, strategic alignment of innovation, innovation tools, open innovation approaches and design thinking. Combining these key determinants based on their relevance and practicality, we propose a contingency framework in the form of a Business Innovation Determinant Triangle with grouped candidate innovation determinants under three sub-groups such as Leadership & Strategy, Structure & Planning and Management & Operation as in Fig 4.

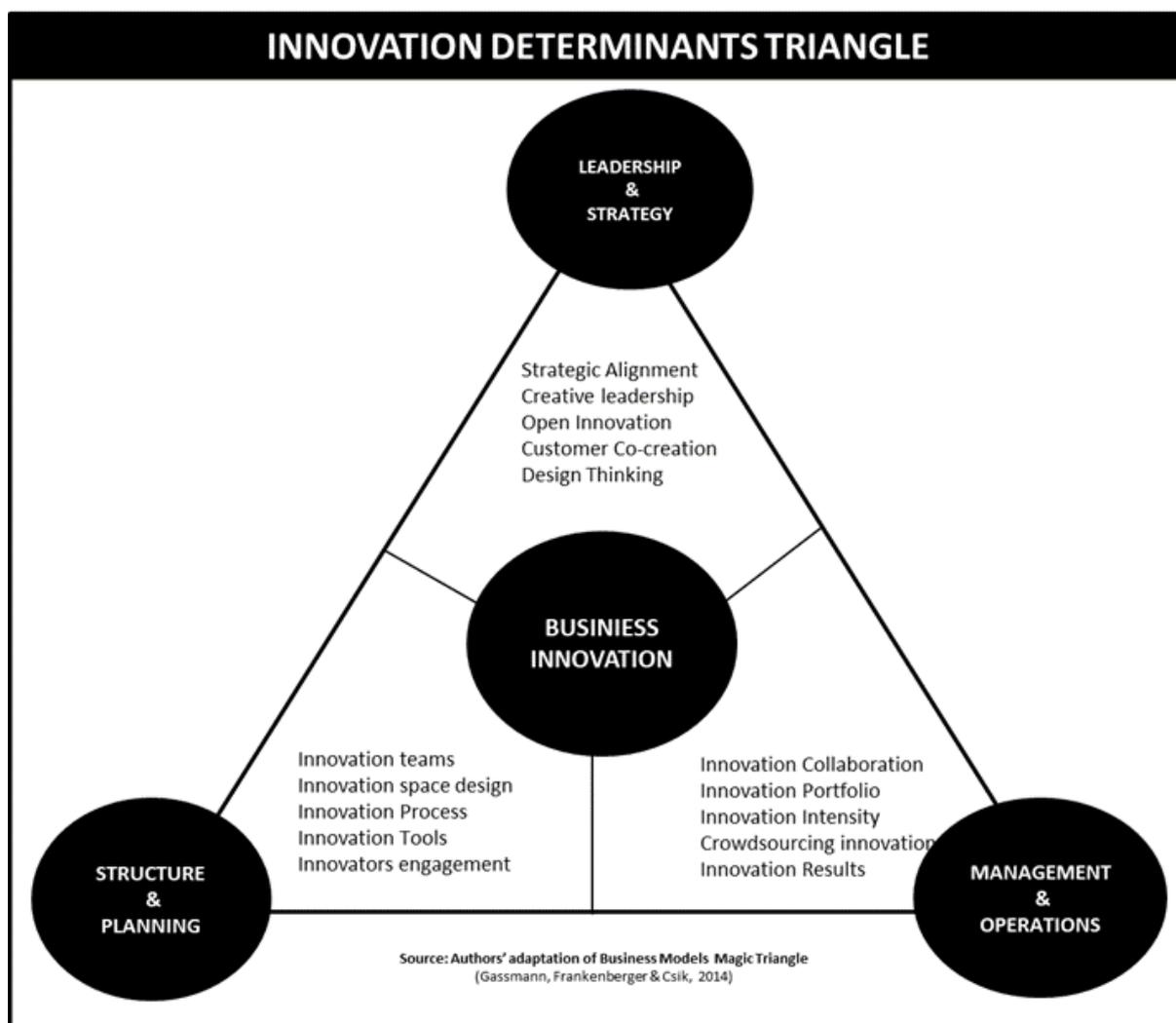


Figure 4. Business Innovation Determinants Triangle

We recognize there are various streams of similar research in studying the linkages between firm's strategy, innovation mindset of organizations and business model performance. However, current innovation metrics and determinants are so generic and diverse. Complementing the contemporary business innovation research outcomes, findings of this research paper and the proposed Innovation Determinants Triangle shall shed more light in to answering some of the managerial challenges and help technology driven enterprises and entrepreneurs to properly scale and measure their business innovation efforts.

- What are the key determinants of business innovation for firms in relation to the size of the organization and innovation intensity?
- Which innovation determinants can be used as benchmark for measuring business innovation as compared to technology innovation?
- What metrics shall be managed and controlled related to organizational innovation capabilities?

Substantiating the discussions on innovation determinants, we also recognize a recent research by Spieth, Schneckenberg and Matzler [30], who have reviewed a series of extant literature in an analytical perspective and examined the explanatory power of business model concepts to define and measure organizational innovation efforts. Firstly, we do concur and reemphasize the fact that more empirical researches based on grouped sub-constructs are needed to establish and measure the influence of innovation determinants of organizations as success of business innovation depends upon size of the firms, type of innovation, intensity of innovation and nature of business value. Additionally, factors such as ownership type, service based models, emerging market challenges and evolving entrepreneurship trends has significant influence on BMI, which calls more specific business innovation determinants and metrics.

Secondly, concurrence on mapping the higher order BMI constructs and innovation determinants over a suitable business model representation is also necessary, with a certain degree of generalization. For this, it is necessary to represent business model components in a more analytical perspective. This requires formulating and articulating business model components with standard performance measures and metrics [31]. Well known measurement models such as Balanced Scorecard (BSC) and business model representations such as Business Model Canvas(BMC) can be incorporated with business innovation determinants as metrics as suitable for entrepreneurs and mature organizations.

CONCLUSIONS AND FUTURE RESEARCH IMPLICATIONS

Exploring relationships between business innovation determinants as perceived by innovation experts is very timely, given the growing dynamic landscape of technology driven entrepreneurial firms especially in ICT related business. Goal of this article was primarily to (a) clarify and contextualize common determinants of business innovation as

they relate to the new paradigms of technology driven entrepreneurship and digital transformation and (b) suggest a contingency model with specific business innovation determinants for devising scaled innovation metrics. Operationalizing innovation is more challenging than defining the innovation metrics in dynamic business environments. To address the lack of critical assessment and practicalities, qualitative data sources such as TED talks were included despite the debate regarding academic relevance and validity of such public sources of data.

By restricting the focus to business innovation determinants, output of this research article is twofold. Firstly, we came out with a definitive set of key determinants of business innovation determinants categorized in three key dimensions of practical importance. We concluded this three-part grouping based on dynamic organizational capabilities with a value driven approach. Secondly, we propose that managing innovation will be more effective with clear visual representation of business innovation determinants mapped with metrics. This will also help in benchmarking and creating better competitive climate among firms complementing traditional financial metrics and will promote the use of new generation digital tools and analytics capabilities for business innovation, especially by ICT entrepreneurs.

Extending knowledge by secondary research and limited qualitative analysis will have its own demerits. Too much generalization or too specific focus will also be limiting factors for quantifying the higher order sub-constructs and innovation determinants. Moreover, qualitative studies like this should be complemented with quantitative empirical findings and case study outcomes. Innovation as a competitive advantage will play a major role specifically in the case smaller firms and technology driven service businesses as compared to larger firms. Hence more focused innovation frameworks suitable for SMEs and service firms need to evolve. New frameworks of innovation metrics can be improvised from the proposed Innovation Determinants Triangle as suitable to platform models, business ecosystems. Further research in these directions may enrich and enhance the maturity and practicality of business innovation capabilities of technology driven organizations.

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