

# **The Business Model Canvas as a tool for building relevant business models for Engineering Firms**

Adekola Owolabi B.Sc, MBA  
Director - Centre for Entrepreneurial Research and Development  
Subsidiary of David Richard Associates  
22 Abeokuta street, Ikeja, Lagos  
NIGERIA  
kolaowo@yahoo.com <http://www.davidrichardass.com>

According to Wikipedia (the free online dictionary) the Business Model Canvas is a strategic management and lean startup template for developing new or documenting existing business models. It is a visual chart with elements describing a firm's or product's value proposition, infrastructure, customers, and finances. It assists firms in aligning their activities by illustrating potential trade-offs. Looking at the makeup of engineering firms, where innovation is a key component of the issues that form the core of activities, it can be said that the Business Model Canvas is an appropriate tool useful in capturing the essence of the organization. This paper goes to identify strengths of the Business Model Canvas and more importantly its weaknesses in order to determine how much it can be used to build business models in appreciating Engineering firms whose dominant competitive attribute is innovation.

*Key Words:-* Business Model Canvas, Competition, Innovation, business model

## 1 Introduction

A business model is a description of how a business intends to operate and make money. At the most basic level, it involves a producer making something and selling it directly to customers at a profit. A lot more creativity is needed to get noticed in a time-pressed world. A business is probably facing global competitors, and in many instances a widely dispersed audience who are increasingly difficult to reach in a cost effective manner. As a result, numerous alternative strategies have emerged to get a product to market, safely into the hands of the consumer and business model innovation has become increasingly popular.

In literature, [1] business models are considered essential aspects of successful businesses, as their main purpose is to differentiate a particular company from others and to provide it an advantage over its competitors. The research interest in business models has grown rapidly during the past decade and the concept has received increasing attention from scholars and business strategists interested in explaining firms' value creation, performance and competitive advantage. In brief, a business model refers to a firm's intended or actual response to how value is created.

Business Models of engineering firms are built around the concept of innovation which is one of the most dominant issues in engineering design. "In high performing engineering teams and companies, [2] innovation happens deliberately, and moreover such teams develop a number of systematic practices that support innovation and feed inspiration".

In a study that involved over 200 engineering consultancies it was discovered that “these companies don’t just wait for inspiration to strike, and they don’t just wait for customers to deliver problems to them. They actively seek opportunities for the sort of innovation that will produce Intellectual Property (IP) that they can sell. What was interesting was that this search was not just an individual, *ad hoc* process, but was something deliberate and thoughtful, and that the companies developed methods for pushing their thinking and then propagated those methods across the company.”

From this study, it is obvious that innovation is an integral part of any engineering set-up and any business model that is to appropriately capture and nurture the essence of engineering firms must of a necessity be able to position innovation properly as a value proposition that is central and connected to all activities of such firms.

The Business Model Canvas is a model building tool that has had wide use since it was conceived in planning for the future of an enterprise. It is used principally to identify the value inherent in a business activity and how such value will be packaged and offered to the target market. However, just like any other business concept, the Business Model Canvas has its drawbacks and researchers are quick to point to what it cannot do more than what it can do. The Business Model Canvas proposed by Osterwalder and Pigneur [3] is one such tool for describing, visualizing the existing business models or developing new ones in a shared language.

One of the most discussed failing of the Business Model Canvas is the yawning gap between the value proposition and the customer segment. It is commonly accepted that the most important aspect of a product or service that attracts a prospect to it is the value inherent in it and other considerations are regarded as secondary. It is argued that the Business Model Canvas fails to draw attention to this fact. It is even more pertinent when the concept is applied in Engineering where value proposition is the central consideration. Engineering design is done with what value that is available to the user of the end product or service. When the issue of innovation is addressed not based on the needs of the end customer, engineering firms come up with products and services that fail quickly or at most have limited success and are soon replaced with ones that emphasise competitiveness in both design and market introduction stages.

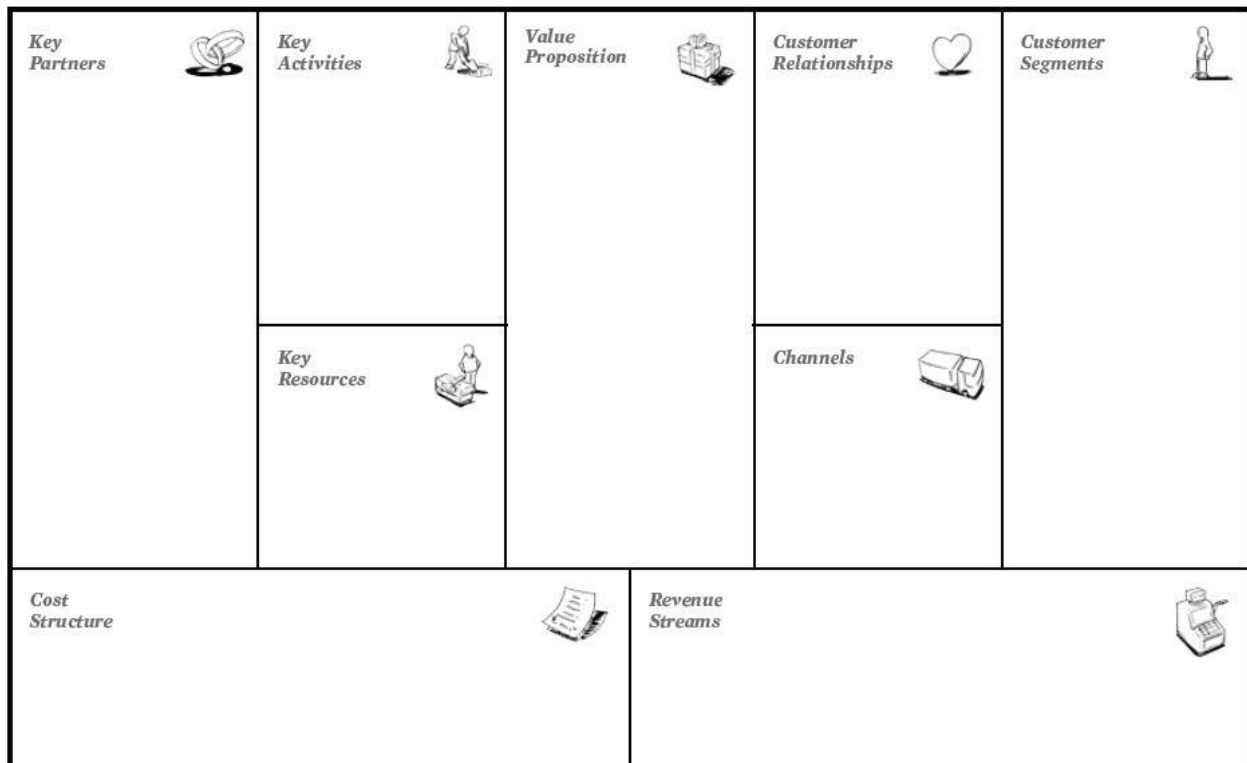
This paper examines the most popular criticisms of the Business Model Canvas in detail and considers an alternative that has been proposed to address the apparent shortcomings of the concept particularly as it relates to the way engineering firms do business. The paper goes on to examine in detail this variant of the Business Model Canvas, the Innovation Canvas, which is proposed to address the issue of innovation vis-à-vis other interrelated activities of firms with the intention to enhance competitiveness of engineering firms and spawn value creation activities that will offer superior return on investment.

In this direction, the paper comes up with a prescription of the proper positioning of innovation as a value proposition in the interplay of other activities within a normal engineering firm.

## 2 Literature Review

The roots of the Business Model Canvas, [4] lie in a PhD dissertation that started in 2000 and was introduced in Business Model Canvas. Users put the Canvas to work in very different areas of their organizations. The majority of surveyed users apply the Business Model Canvas to develop entirely new businesses, launch new products and services, or revamp their existing business model and strategy. The Business Model Canvas is also widely used by academics. Top ranked business schools around the world like Stanford, Harvard or IESE are adopting the Business Model Canvas in their class rooms. Students are learning how to apply the Canvas in strategy and innovation in leading MBA and Executive programs, and they are bringing this cutting-edge knowledge back to their organizations. An increasing number of users apply the Business Model Canvas to describe current and future strategy.

Business Model Canvas [5] consists of nine basic components of a business model. Instead of simply having them in a row, they are put on a canvas so the visualization of the different issues' relation is improved. That helps the user to map, discuss, design and invent new business models. The whole thing can basically be divided in the product on the left side and the market on the right, while the value proposition is obviously divided in half – see fig. 1.



**Figure 1.** The Business Model Canvas

On the very right we have the ‘Customer Segments’, all the people or organizations for which you are creating value, including simple users as well as paying customers. For each of the

segments we have a specific 'Value Proposition', all the bundles of products and services which create value for your customers. The 'Channels' describes through which touch points you are interacting with your customers and delivering value, while the 'Customer Relationships' outlines the type of relationship you are establishing with your customer. Closing the right part of the canvas, the 'Revenue Streams' makes clear how and through which pricing mechanisms your business model is capturing value.

Indispensable assets of your business are shown in the 'Key Resources' on the left directly under the 'Key Activities', the things you need to perform well. 'Key Partners' are all those who help you leveraging your business model, since you will not own all key resources nor perform all key activities yourself. And with understanding your business' infrastructure, you will get an idea of its 'Cost Structure'.

The alternative business model, which is an adaptation of the Business Model Canvas that was designed to capture the essence of Innovation in the development of products and services that will enhance competitiveness among engineering firms, is the Innovation Canvas. The Innovation Canvas - A Tool to Develop Integrated Product Designs and Business Models [6] "focuses attention on critical technical, market, resource, and execution issues that can determine the success of a new design or venture. The canvas inspires innovation by examining the difficult challenges from multiple perspectives and encouraging the rapid association, revision, and alignment of critical themes." The canvas includes themes from product design and systems engineering processes and merges them with themes from the popular Business Model Canvas from the entrepreneurship field." In addition "By focusing attention on key design and market themes and not process steps, the proposed canvas presents an innovation inspiring approach to design that is more closely aligned with the realities and complexities of developing a successful product, process, or service".

The innovation canvas has been able to fuse the expectation of researchers and educators in dimensions that involve design and market realities. "For educators, the innovation canvas is a teaching tool for design and entrepreneurship courses that integrates technical and market content. In design courses, the canvas can improve product and service development by including business and market issues in the development process. In entrepreneurship courses, the canvas can improve business model generation by incorporating high level design themes as integral components of the venture vision."

### Importance of Innovation

The paper [6] further dwelt on the importance of Innovation "The term "innovation" has become a priority for all types of organizations (corporate, academic, and government) to ensure prosperity and future success. In a Boston Consulting survey of corporate executives, innovation was named as a top three corporate priority by 72% of respondents. A recent Ernst and Young report notes that "it is not enough to just be innovative, it is essential to be innovative *all the time*" and they further their argument by presenting a spiral model for business model innovation. Wagner notes that "the solution to our economic and social challenges is the same: creating a viable and sustainable economy that creates good jobs without polluting the planet.

And there is general agreement as to what that new economy must be based on. One word: innovation.” Wagner also notes that parents, teachers, employers, and our education system in general must take bold steps to develop the capacities of young people to become innovators. As the field of innovation emerges as an organizational competency, it has become essential for engineering educators to ensure that their graduates enter the workforce with skills that will allow them to be effective innovators and to be able to function effectively in innovative organizations. Innovation can take place at a variety of levels and during many activities within an organization including business model innovation, product and process innovation, and enabling and managing for innovation. In this paper, we consider innovation in the context of developing innovative designs in the context of business and market factors.”

In their consideration of engineering design processes [6] it was stated that design is a fundamental skill in engineering. It is essential that teaching tools be developed that promote the skills of design and innovation within design.

The paper also examined the **Business Model Development Process**. “Historically, the education of students for entrepreneurial activity has taken a reductionist approach. The goal has been to collect and organize information for a group of tasks in different business areas which collectively should result in a successful venture. Through a written business plan, the entrepreneur or venture team describes the business model for the venture, plans for commercializing the product offering, and develops strategies for maintaining a sustainable advantage in the marketplace. The plan also includes operational and financial details including projections of revenue, costs, and funding needed. In practice, successful ventures and commercialization do not work this way. Ventures succeed as a result of dynamic and complex processes that rapidly adapt to new information as it becomes available. New businesses with meticulously documented plans often fail while others with gaps and obvious weaknesses manage to survive and thrive.

In order to enhance the building blocks capacity of Business Models, additional canvases have recently appeared including the Lean Canvas, Product Canvas, Customer Journey Canvas, and Value Proposition Canvas.

#### Development of a Canvas to Develop Integrated Product Designs and Business Models

The goal of developing the innovation canvas has been to create a tool to develop successful product designs and business models in a framework that integrates design and market themes, encourages innovation, and more closely represents the process as it occurs in practice. In addition, the canvas should provide benefit for educators or practitioners in design or entrepreneurship fields. Specifically, it provides a means to help both novice and expert designers and entrepreneurs organize, communicate, refine, and reflect on their ideas. The canvas also provides a means of design-thinking documentation in which comparisons between initial, mid, and final versions of the canvas could be used to assess student learning. The prototype version of the innovation canvas is shown in fig. 2 below and is available online for educators and practitioners to test, evaluate, and provide feedback.

“During the development of the canvas, the following key thoughts were identified to be woven into the overall design:

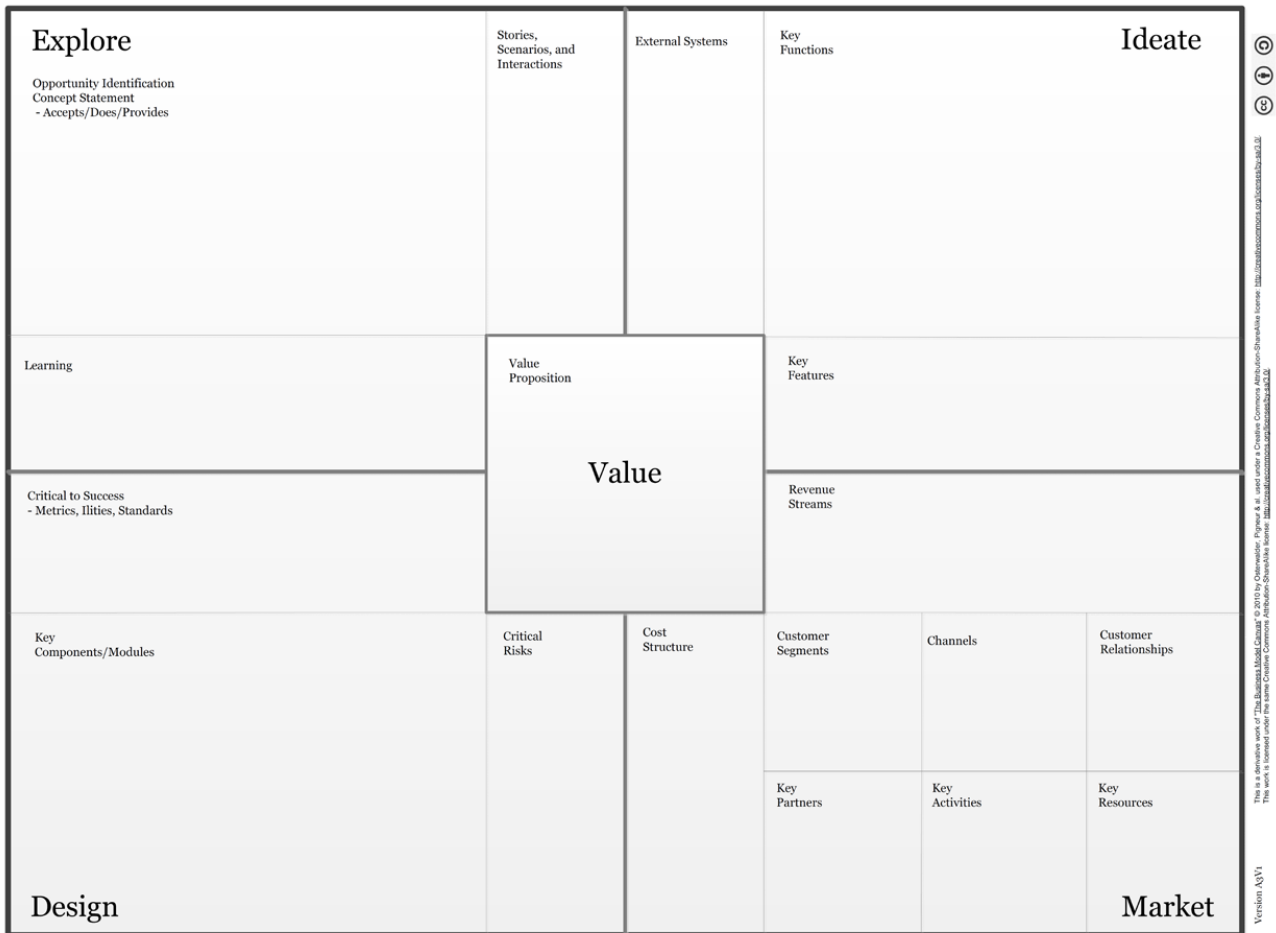
- Including key design content and themes applicable to a range of situations from simple mechanical designs, the design of complex electro-mechanical software products and the development of services or processes. The themes selected support a variety of design processes, tools, and methods. The themes include stakeholder input, interactions with external systems, key functions, features, and components, and risks and key measures of success. While not explicitly included as themes, concept generation, modularity, make vs. buy, and product version decisions naturally arise through the use of the canvas. It is noted that the themes included in the canvas are design content and not process steps or categories of information.
- Including key market and business model themes applicable to a wide range of situations. The themes from the Business Model Canvas have been used.
- Creating a tool that is applicable at several levels including product, service, and process design and from the design project to the new product and venture level.
- Establishing connections between product design and business model themes thereby creating a multidisciplinary framework enabling the alignment and association of themes between the two. The ability to associate and align information from diverse sources has been identified as a trait of innovators. In addition, this is well aligned with Ulrich who notes decisions in product development are contextual and boundary spanning.
- Creating a framework that supports a variety of design tools, models, and best practices. As a template, the framework should accommodate a variety of paths through the design process but also support a particular path should the instructor specify one.
- Being extendable to include other context themes such as cultural, societal, environmental, sustainable, and ethical. A key measure of design process success is developing a solution in a broader market and societal context.
- Creating a framework to encourage creativity and innovation by emphasizing teamwork, taking a fast and iterative approach, and integrating team input. This is well aligned with Dym who notes design is a social process and the resulting design output is the intersection of participants’ contributions.
- Developing a framework that captures the complexities and realities of the design and development processes in practice.

In practice, a team interacts with a poster sized version of the canvas and populates it with Postit® notes containing relevant information associated with each theme. The process is engaging, team oriented, and encourages revision and alignment of content across the canvas. The

instructor may either directly suggest a process and steps for using the canvas or allow students to independently find their own way. The process is somewhat similar to the group oriented ‘charrette’ which is used in architecture, industrial design, or urban planning settings.

As can be seen in fig. 2, the innovation canvas is arranged in four quadrants surrounding a center theme of value. Creating value is the primary objective of any design project or venture. The value proposition is a statement that describes how something of value is provided to customers or stakeholders and is one of the primary measures of success. The project may provide value for a number of stakeholders, and the concept of value may have meaning beyond just financial value to include societal, cultural, environmental, sustainable, or ethical considerations.

**The Innovation Canvas**



**Figure 2.** The Innovation Canvas

In the Explore quadrant, the main blocks include the concept, customer stories and scenarios, and learning. The idea or spark for a new venture may come from a wide range of sources. It may arise from an identified need, technical or market circumstances, new inventions, regulatory policies, or other sources. In the Explore quadrant, the concept or opportunity may still be

emerging and a clearer view of it is created. Often a new venture begins to take shape through conversations and discussions that over time begin to develop a clearer picture of the opportunity. Customer stories and scenarios are created to describe what the system or product does, who it interacts with, and how it might provide benefit or value. This is typically a 'words and pictures' process of bringing some clarity to the envisioned venture. Going through the process, feedback on the venture is received at various points and can be collected as learning to motivate further revisions to the venture concept. This feedback and revision is a central element in the lean startup approach and the minimum viable product.

In the Ideate quadrant, the main blocks include the key functions, external systems, and key features. The key themes in the Ideate and Design quadrants have been inspired by common design process themes and a model based systems engineering approach. In the Ideate quadrant, the focus is on considering what the system should do, not how. The key themes in the Ideate quadrant include the key functions of the system, the external systems that it interacts with, and the key features that will be marketed to the customer. There are several benefits to this approach. Functions and features are the basic building blocks of the design process. The creativity approach 'Scamper' suggests adding, subtracting, or combining functions for concept generation and to develop an innovative new design. Many other creativity and problem solving approaches such as TRIZ are also well supported by a functional analysis approach. Considering external systems helps to reveal the inputs, outputs, and interfaces of the system of interest necessary to implement the scenarios and stories collected in the Explore quadrant.

The key features are the operating behaviors or traits of the system that are marketed to customers. A feature is realized by the available functions. Implementing a new feature is either easily accomplished by the available functions or more difficult as new functionality must be developed. Connecting to the Market quadrant, different features may be necessary in the business offering for different customer segments. Connecting to the Design quadrant, different physical modules and components may be required to support certain features. While a large number of concepts, functions, and features may be identified in exploring the business venture, the lean startup approach suggests offering only the minimum set of features necessary to introduce an offering to the market. The canvas supports this approach of adding/subtracting features as the market responds to the system offering.

In the Design quadrant, the main blocks include the key components and modules, the critical to success factors, and the critical risk factors. As in the Ideate quadrant, the key themes have been inspired by common design themes and a model-based systems engineering approach. Here, the concepts, functions, and features identified in the Ideate quadrant are evaluated and prototypes may be developed. A final concept is selected and realized in components or modules. The focus is on a physical implementation or instantiation and how the system will accomplish the functions and features. Development considerations in the Design quadrant include integral and modular approaches, make vs. buy decisions, product line considerations, and satisfying the critical to success performance metrics and 'ilities' such as manufacturability or sustainability.



While two products targeted at different channels and customer segments may provide similar functions and features, they may appear very different in their realization to achieve acceptance in their target markets.

In the Market quadrant, the main blocks include the nine themes from the business model canvas. These include revenue and cost considerations along with customer themes and key activities, resources, and partnerships. In the Market quadrant, the focus is on the business model for the venture and information entered here directly feeds back to the other three quadrants. As noted above as an example, decisions about target customer segments and channels to reach the market often have direct implications for the features, functions, and components necessary in the design. For a new product development project, all themes in the market quadrant would be relevant. For a smaller design project, all themes may not be relevant but cost and revenue would be at a minimum.

### 3 Problem Formulation

Two concepts were analysed for the paper. The first is the Business Model Canvas. The strengths of the Business Model Canvas were highlighted and analysed against its weaknesses. The second concept analysed is the Innovation Canvas. The strengths of the Innovation Canvas were also analysed against its weaknesses.

The analysis was done using previous literature on the Business Model Canvas [5]. Blog entries were also which highlighted major strengths and weaknesses of the Business Model Canvas were used in the analysis.

The work on Innovation Canvas [6] proved valuable in highlighting the innovation dimension of projecting the value inherent in products and services against the background of competitiveness of firms. This was done to address the apparent weakness of the Business Model Canvas which fails to give any consideration to competitiveness of firms, which also weakens how much it can be applied to engineering firms.

### 4 Problem Solution

Positive talk [5] about the Business Model Canvas as the way young entrepreneurs all over the world develop, question and visualize business models in brainstorming. Here are three big positive features:

- Simplicity
- Practice-orientation instead of academic palaver
- Plug-and-Play principle (= the possibility to start from scratch)

The model also helps to bring all participating people on the same page, to talk about the same idea, especially for early ideas which haven't been thought through.

The negative side [5]

1. No broad analysis of competition
2. No taking in account of competition structures (and therefore potential synergy effects)
3. No formulating of business goals
4. No taking in account of KPIs and performance measurement
5. Applicable for innovation, not so much for transforming of existing models

Kraaijenbrink's [5] three main critics on the BMC are the following:

1. Excluding strategic purpose - mission, vision and strategic objectives

The Canvas somehow suggests that only financial success can drive entrepreneurs and startups. This cannot be true for social enterprises, NGOs, etc. And secondly it is also claimed by other people and authors that there should be more what drives entrepreneurs.

2. Excluding a notion of competition

Of course, every decision about competition and competitors is crucial for every business model. And although it is understandable why Osterwalder did not add competition – keeping things simple – it limits the user relatively soon.

3. Mixing levels of abstraction

The components 'customer relationships' and 'channels' on the right side as well as 'key activities' and 'key resources' on the left side are on a different level of abstraction than other parts. This gives too much emphasis to certain aspects. The suggestion is to merge, omit or introduce these components later when more details is needed.

### Business Model Canvas Variation

In this section, one major variation of Business Model Canvas, the Innovation Canvas (fig. 2) is shown in order to get an overview of what was not possible with the original canvas and can now be achieved.

“While the business model canvas and lean canvas [5] have become popular with entrepreneurship practitioners and educators, the canvases only include a cursory reference to design themes. A successful design, project, or venture often comes as a result of a number of considerations and tradeoffs including technical, market, resources, and execution. Design of products and processes and development of business structure, strategy, and operations are inextricably linked and must be developed in simultaneous, connected ways. A framework for inspiring innovation must include both design and market issues to encourage integrating and making tradeoffs among these themes.”

### Tools and Approaches Supported in Each Quadrant of the Innovation Canvas

The canvas [6] itself supports a number of design tools, methods, and approaches as summarized in Table 2 below. Possible tools and methods for use in each quadrant are noted. As a teaching tool, instructors may suggest a process and steps for working with the canvas which may vary depending on the situation. For a new product development exercise, initial attention may focus

on the Explore/Market quadrants to develop background, needs, and concepts before proceeding to Ideate/Design. For a device redesign or reverse engineering project, initial attention may focus on the Design/Ideate quadrants to fully understand the current realization before considering the needs and context for improvements. However, after students gain some experience with the canvas, the instructor may leave it to students to determine their approach. The potential of the innovation canvas lies in its ability to be used as a structured design tool (in classrooms) or as an open, flexible, and unstructured design tool (for skilled students and practitioners) depending on the setting.

It is also envisioned that the innovation canvas could be useful in general design courses or more advanced situations including, but not limited to the following:

- Solving a design problem or revising an existing design
- Developing a component design or redesign at the project level
- Developing a new product design at the project level
- Developing a new product design for a new venture
- Characterizing an existing product or product line
- Evaluating extension of an existing product into a product line or new markets
- Comparing multiple products for strengths, weaknesses, and market potential
- Evaluating successful/unsuccessful products and designs
- Evaluating and comparing product and market strategies for different companies
- Development of new product and market strategies

## 5 Conclusion

The study has considered the Business Model Canvas as a tool of building relevant business models for engineering firms. In analyzing previous works on assessing the relevance of the Business Model Canvas, the weaknesses discovered point to the fact that the Business Model Canvas will be severely limited in evaluating successful products and designs from the perspective of competitiveness of the firm. Since the essence of businesses is to compete and which is done by coming out with products and services better than what competitors have to offer, it is inevitable that adjustments be made to the way the Business Model Canvas is presently structured.

This variation came in form of the Innovation Canvas which makes innovation a central attribute in the value proposition and also highlights how innovation is incorporated to make the firm more competitive. The innovation canvas no doubt has been able to address the apparent shortcoming of the Business Model canvas and will assist educators in the engineering field build more effective models to ensure that the virtue of innovation is well captured in how an engineering business concern will operate and make money.

It is universally accepted that the market will go for a product or service with superior value in terms of how much it meets the needs of prospects and at affordable price. In addition, superior value is identified when there are remarkable improvements in products and services over succeeding periods of time. Innovation is the platform for such incremental enhancement of

value and should be central in the value proposition of any business that hopes to stay competitive. A business model that does not highlight and give proper place to innovation and competitiveness will not be too appealing to engineering firms. It is heartwarming to see that succeeding business models to the Business Model Canvas, among which is the Innovation canvas have come to quickly fill the gap and are expected to help develop other valuable models to enhance ability of engineering firms to operate better and make more money.

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