Gaining Entrepreneurial Insight through Mind Maps for Innovation: Applications in the Brewing Curriculum and Craft Beer Industry

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Abstract

A critical component of the entrepreneurial mindset is the ability to be innovative and creative. Often seen as the top soft skill for entrepreneurs, innovation entails far more than brain storming. One of the most useful tools of innovation is the mind map, a simple tool that blends related and unrelated stimuli into generating new ideas. Given the increased emphasis on craft brewing as a major component of the beer industry, many facets of brewing have become quite popular in higher education. Within brewing education, one must consider the process by how students learn how to engage in multiple activities, including innovation. To address innovation in new flavors, a study of students' abilities to create new beer flavors by brainstorming was compared with the same students who used mind maps in a pre- and post-test format. The result of the statistical study is to look at the concept of mapping innovation and the truncated findings with an emphasis on generating new ideas on beer flavors for a market with an expanding number of taste connoisseurs.

Introduction

Time and time again, one sees the notion of innovation as the pathway to success in many industries. The concepts of being a failure, perceiving something as impossible, and needing to devise a new idea all are fair challenges when it comes to innovation. Many of the best innovators note that one can't be afraid to fail. Understanding that failure is part of innovation, it is important to provide stimuli for ideas that will lead to success. To help with conceptualization, mind maps have become a great tool in inspiring and developing ideas that haven't come to light through general brainstorming. With proper deployment, mind maps have become a gateway to some of the best ideas for creating new products and services, especially in areas where standardization has resulted in an otherwise drab market.

Additionally, the same innovators realize that, if you haven't failed with some of your ideas, you aren't trying hard enough. This concept is quite important to the microbrewers who are always looking for the next great taste. Faced with increasing competition among craft brewers, homebrewers and even chefs, each looking for the utopian appeal to the palette, it is important to develop ideas that fascinate the consumers. By using mind maps, brewers can increase the number of ideas and the ability to add more products to the growing market. This can be accomplished by connecting common and uncommon ideas in a way that brings about things not thought of in the past. Hence, innovation in flavor is an important part of the product mix.

Similarly, students of the brewing process are great opportunists who, along with learning the craft, seek to find new flavors to call their own. Students are afforded the opportunity to learn while being innovative in beer flavors. As higher education continues to offer more brewing programs, it is obvious that students will continue to learn the craft of the industry with a passion for innovation. In the meantime, students' zest for flavor and an ability to try new things results in a combination that is great for the brewing industry. By combining learning with experimentation, students thrive in a virtual laboratory where new flavors can happen by accident. However, hopes are for a continuum of innovation with an emphasis on flavor.

To enhance the use of mind maps in the brewing curriculum, a study of students' ideas compared the number of new flavors that resulted from brainstorming sessions to those accrued with the use of mind maps. Using pre- and post-test statistics, results were evaluated to determine the effectiveness on ideas from the students. Specifically, are mind maps a statistically significant component of generating new beer flavors? Results will be used to evaluate the effectiveness of mind maps in the brewing curriculum as it relates to innovation in new beer flavors. One would assume that, if mind maps are statistically significant as an innovate tool for beer flavors, they could be used in both brewing curriculum and the craft industry.

Search of Literature

The concept of innovation is by no means new but has gained plenty of awareness and application as individuals and firms seek new concepts leading to greater market share. It has become one of the buzzwords associated with growth and freshness in ideas. Innovation has a way of allowing firms to adjust to market dynamics and business cycles, regardless of the size of firm and market (Utterback, 1994). This becomes a base point for considering the ideas gained from innovation and how it is so important to various firms, regardless of size, age, and market share. By making innovation a critical part of strategy, all types of firms can use new ideas to adjust to the markets given to them by the industry of choice. By fostering innovation, firms increase the likelihood of success in any market. The craft beer industry is a prime example as, among other things, new beer flavors are all the rage and are considered a bellwether measure of what is deemed innovative to the industry. Beer tastes and flavors have created a new frontier for the brewing industry.

Innovation is a process that continues regardless of the amount of success and failure achieved along the way. It is possible to consider several tasks that are important to innovation. Kanter (2000) looked at four primary tasks as part of innovation, including idea generation, coalition building, idea realization (prototyping), and diffusion (commercialization of the product). Based on these tasks, one must presuppose that organizational culture is susceptible to fostering effective innovation. Additionally, management is a significant factor in impacting the ability of employees to be innovative. As such, innovation has no boundaries in terms of which employees can partake in the process. In relating to the craft beer industry, successful firms realize the significance of having an innovative culture in relationship to the market. Conversely, the industry has little room for stagnation as the beer market continues to climb out of a purely oligopolistic structure.

To create innovation within the organization, one must be willing to consider all ideas as options while understanding that failure is part of learning and can lead to long-term success. Far beyond the general process of brainstorming, vast approaches can be used to stimulate ideas. Mind maps are an effective tool that allows for the visualizing, diagramming, and connecting ideas with stimuli that results in progressing individuals into new areas of thinking. Tony and Barry Buzan (1996) offer excellent advice, examples, and how-to methods in a resourceful book entitled *The Mind Map Book: How to use Radiant Thinking to Maximize Your Brain's Untapped Potential.* Buzans' process of mind mapping has permitted many individuals to tap into innovation by connecting things that wouldn't be considered part of the standard protocol of brainstorming. By evaluating connected with unconnected ideas, one can enhance innovation through stimuli needed for new ideas. This could be vital to the brewing industry as one can combine related with unrelated ideas in fostering effective combinations for various flavors and styles of beers. The race to find the best new flavor can be augmented with the visual stimuli offered by mind maps.

Mind maps have become part of various formats in education as either standalone ideas or in conjunction with other effective learning strategies (such as collaborative learning). Educators have learned that mind maps can help enhance idea generation and are important for students of all demographics. Budd (2010) employed various experiments where mind maps were used as part of the classroom procedure. By employing mind maps in various economic courses, plenty of new ideas were generated. Additionally, the mind maps resulted in a refreshing of students' thoughts and allowed for creation of otherwise unthinkable ideas. This same application is part of the experiment conducted to verify the use of mind maps as an effective tool in creating new beer flavors for the promising brewing students.

Mind maps can aid both students and brewmasters in creating new beer flavors. Why all the haste to develop new beer flavors? Mintel, which deems itself as the world's leading market intelligence agency, has offered several data points and results from analyzing the craft beer industry. One such point revealed that new beer flavors have grown to 27% of total beer launches in 2015, an increase of 80% over a five-year period between 2010 and 2015 (Arthur, 2016). Hence, one sees the significance of evaluating flavors as a critical point for the brewing industry as the development of such flavors signifies differentiation in an increasingly crowded market.

Along with providing visualness and a process of diagramming ideas, mind maps can serve as a tool for building a large array of ideas. This occurs in the number and quality of ideas. Individuals are afforded an ability to share ideas in new and unique ways (Wheeldon and Faubert, 2009). Thus, ideas aren't just generated but are interpreted in several ways. Innovators tend to say that all ideas are valid but may not be effective as devised concepts. There is strength in both the quality and quantity of ideas originating from mind mapping exercises. As the study will show, the map provides strength in numbers as a complex mind map can spawn many more ideas than what is gained by brainstorming or other rudimentary tools of innovation.

As a long-standing industry, beer has been entwined in the fabric of society. So much so that the Smithsonian's National Museum of American History launched an initiative to collect and preserve items related to brewing's impact on agriculture, manufacturing, advertising, and community life (Bernot and Fowle, 2018). Although prohibition was a setback to the industry, it has survived standardization from the

oligopolistic market structure that followed the period of prohibition. With the expanding craft market segment, one can look at a few disruptors that are important to the future of the industry. According to Christensen, Raynor, and McDonald (2015), disruptors first appeal to low-end or unserved customers and then migrate to the mainstream market. By beginning as a small-scale experiment, one sees the connection to microbrewing as many of the best microbeers started as brew-at-home ideas that expanded into consumable products. As craft brewing evolved as a major part of the industry and drinkers yearned for quality products, a new beer segment spawned many brewers capable of disrupting the once oligopolistic market. This has created the need for, among other things, innovation and education necessary for supporting this expanding market.

Along with the idea of mind mapping, one can consider the argument for the positive facets of the beer brewing curriculum where so many aspects of the student's studies occur in laboratory environments. This allows for an enrichment of ideas while permitting students to move from the classroom and traditional books into a hands-on laboratory setting. Gillespie and Deutschman (2010) note that curriculum is a connection between lecture and workshop content that results in flexible teaching and learning environments. Hence, adding innovation through mind mapping shouldn't be a problem in such a complex curriculum. The maps can be used in both classroom and laboratory aspects of the brewing programs. Such amalgamation results in an education climate conducive to innovation.

Process of the Study

To determine the effectiveness of mind maps on the ability to develop different flavors of beer, students in an applied innovation class were paired and asked to brainstorm ideas for new flavors of beer. Upon exhausting the number of new ideas, each pair was asked to tally the number of what they deemed new beer flavors they created during the brainstorming session. It was expected that some groups would be quite good at devising new flavors while others would be limited based on factors such as age (experience), preference for microbrews, lack of brainstorming instinctiveness, as well as other factors.

Following the brainstorming exercise, the same pairs were trained in the use of mind maps and asked to create a mind map that called for two related and two unrelated words that came to mind when thinking of beer flavors and could serve as a starting point for the exercise. The mind map used as the starting point for the experiment is shown in Figure 1. By selected five to seven ideas that came to mind when thinking of each of the related and unrelated words, each group would have between twenty and twenty-eight words that could be mixed in any assortment to develop new ideas for beer flavors. These words would act to stimulate thinking of new flavor ideas that weren't noticeable by random brainstorming. Upon finishing the mind map exercise, pairs were asked to calculate the number of what they deemed new beer flavors created during the mind map exercise.

Figure 1: Mind map for beer flavors
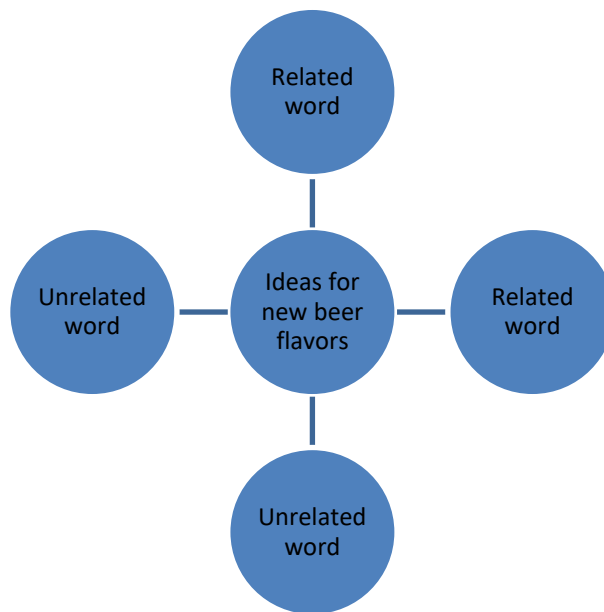
Upon completion of the pre-test (no mind map) and post-test (mind map), totals and averages were calculated for both techniques (Table 1). Hence, the experiment entailed a pre- and post-test where the mind map was absent in the initial study and was introduced to establish post-test results. By comparing the quantity of ideas created from brainstorming to the number gained from using mind maps, the study could establish the effectiveness of mind maps as a tool for innovation in the brewing curriculum. Specifically, would the use of a mind map be significant in helping students generate more ideas for beer flavors than what was gained from standard brainstorming? If so, students and brewmasters could partake in using mind maps to help innovative the brewing industry.

Table 1: Number of new flavors generated

Group Number	Pre-test (brainstorming)	Post-test(mind mapping)
1	8	12
2	9	15
3	11	20
4	9	20
5	8	22
6	2	24
7	11	19
8	10	18
9	10	2
10	9	11
11	8	11
12	7	20
13	6	9

14	9	11
15	11	19
TOTAL	128	233
AVG	8.533333	15.53333

Results

The first analysis of the results was to look at the difference between number of ideas generated through brainstorming compared to those with mind maps. Looking at the results in Table 1, vast differences appear in the number of new flavor ideas generated by most of the fifteen groups. A total of 128 ideas were generated in the brainstorming session while 233 flavors were noted because of mind mapping. A close look reveals that the average number of ideas almost doubled from 8.53 generated from brainstorming to 15.53 from mind mapping. Hence, one would assume that mind maps are an essential and effective tool that should be used in the innovative nature of the brewing curriculum and could be adapted to the craft brewing industry.

Furthermore, a pre- and post-test comparison was done with the data noted from Table 1 and resulted in statistical information offered in Table 2. There was a statistical difference in the number of ideas generated with mind maps versus random brainstorming, $t(14) = -3.97$, $p < .05$. Hence, one could conclude there is a statistically significant difference in using the mind map over general brainstorming in generating ideas for new beer flavors. Mind maps are statistically significant to brainstorming in creating new ideas for beer flavors and could be deemed important as a tool to the brewing curriculum with expectations that this would allow for similar processes to occur in the brewing industry.

Table 2

T-test: Paired two-sample for means

	Pre-test	Post-test
Mean	8.533333	15.53333
Variance	5.409524	35.98095
Observations	15	15
Pearson Correlation	-0.18056	
Hypothesized Mean Difference	0	
df	14	
t Stat	-3.97879	
P(T<=t) one-tail	0.000686	
t Critical one-tail	1.76131	
P(T<=t) two-tail	0.001372	
t Critical two-tail	2.144787	

Conclusion

By evaluating literature, innovation is a process that can be implemented in any size firm and by any employees. Additionally, innovation occurs when the firm offers an environment conducive to utilizing innovation as a process for all aspects of operations and employees. The focus of innovation is to bring about change, regardless of the number of failures or poor ideas created from the initial process. Such failures are part of innovation and can be overcome by the quantity and quality of new ideas. It seems important to bring about stimuli that allow individuals to create out of the box ideas that go beyond standardization and can serve to offer disruptions to the standardized industry. For many analysts, disruptors are a measurement of success and are pertinent to help bring about future change.

The brewing industry is one that has seen vast changes over the past century. It started with many breweries, suffered through prohibition, and eventually returning to a market that has been infiltrated with many microbreweries. Innovation is an extremely useful concept for the microbrewing industry as individuals seek to find a niche by any of a variety of methods. One such method is flavor where brewers understand the importance of developing a distinctive flavor that will allow for an advantage in the market. This could be part of the lifeblood for students who become the future brewers in the industry.

To seek innovation, the concept of developing different flavors was enhanced by utilizing mind maps to offer stimuli for different ideas. In the best form, mind maps allow for the mixing of multiple ideas into a meaningful method for innovation. By combining related and nonrelated ideas, individuals are stimulated by what can be mixed into effective results. In the purest sense, mind maps serve to create an increase in both quantity and quality of ideas relating to a specific market. Additionally, they serve to visualize and create flow in nurturing effective innovation and can offer insightful results.

To evaluate the effectiveness of mind maps on the ability to create new beer flavors, students were offered brainstorming sessions to create new flavors and then were asked to do the same with mind maps. Results were quite impressive as the number of new ideas almost doubled and a statistical test proved significant in the use of mind maps. The mind maps offered more ideas and resulted in many more new flavors as opposed to standard brainstorming. It is quite possible that future microbrewers and students of the industry will benefit greatly from mind maps as a tool for finding innovative flavors for the beer market.

Using mind maps as a starting point, future research can focus on other tools of innovation and how they can be implemented into the brewing curriculum. Innovation isn't exclusive to mind maps, nor should one think of it as the only way to develop new ideas. As the brewing industry continues to evolve around new flavors and styles, progress should be made in evaluating the effectiveness of various tools of innovation and how each can help the industry to evolve in the future. This bodes well for both brewmasters and students who seek to share in fostering an occupation that thrives on innovation and results in product differentiation needed to survive in the increasingly competitive craft beer industry.

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