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Lighting the flame of entrepreneurship among agribusiness students

RESEARCH ARTICLE

Lindsey M. Higgins[a]ⓘ, Christiane Schroeter[a], and Carlyn Wright[b]

[a]*Associate Professor, and* [b]*Agribusiness Student, Agribusiness Department, California Polytechnic State University, 1 Grand Ave, San Luis Obispo, California 93407, USA*

Abstract

Entrepreneurship and innovation play a key role in combating problems facing agribusinesses, including the need for water conservation, sustainable packaging, and environmental protection. These issues have led to an increasing demand for college graduates with technical skills and innovative ways of thinking. The objective of our research is to provide insight into character traits that signal entrepreneurial skills. We conducted a survey to examine entrepreneurial interests and perspectives among U.S. agribusiness students. A cluster analysis revealed that entrepreneurial-minded students were more likely to be male, consider themselves risk takers, and have parents directly engaged in production agriculture. Our results emphasize the importance for universities to build students' experiences through industry partnerships, where students can interact with entrepreneurial mentors and get hands-on knowledge through applied coursework and internships in entrepreneurship. In addition, our study aids industry managers to learn more about future employees and their perceptions of entrepreneurial activities.

Keywords: agribusiness, women, entrepreneurship, innovation, critical thinking
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ⓘCorresponding author: lhiggins@calpoly.edu

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1. Introduction

A recent study found that more than 90% of executives believe that the long-term success of their businesses depends on their ability to come up with new ideas (Brooks, 2013). In order to make a profit, successful entrepreneurs must have the capacity to develop, organize, and manage a business venture, along with any of its risks. However, an integral part of entrepreneurship is the ability to be innovative (Deller and Conroy, 2016; Price *et al.*, 2013). Entrepreneurs who are willing to assume the risks of taking on a new business venture must also be able to successfully implement new ideas to set themselves apart from competitors.

Entrepreneurship and innovation play a key role in combatting problems facing agribusinesses, including the need for water conservation, sustainable packaging, and environmental protection (The Economist, 2016). According to United Nations (UN) estimates, the world population will increase to 9.7 billion people by 2050 (UN Department of Economic and Social Affairs, 2015). In order to keep up with the growing demand for food, the global agricultural industry must double its production and efficiency.

While increasing production may be a solution to the need for food, it may also lead to negative externalities, such as resource scarcity. One of the biggest issues facing the global agricultural industry is water conservation and utilization. 60% of fresh water in America is used strictly for agriculture, although less than 10% of farms practice advanced on-farm water management, which includes moisture sensing tools and computer-based irrigation-scheduling tools (Zimmerman, 2014). In order to improve water usage in agriculture, the adoption of more effective irrigation systems that maximize the efficiency of the water used, while also minimizing waste, will become critical.

As the populations of cities begins to grow there are more one to two-person households rather than larger suburban households, leading many companies to shy away from large, bulk packaging to smaller more compact packaging (Muratoglu, 2015). This shift has been motivated by taxes on plastic shopping bags and the promotion of compostable packaging in several countries such as Belgium and the United States (Chanprateep, 2010). While it may be difficult to completely eliminate these plastics given their ubiquitous use in food packaging, more food and beverage companies have been developing innovative solutions for bio-degradable packaging and bio-plastics made from crops such as corn or starch. By adopting innovative practices and products, innovative growers will be in a better position conquer potential threats to global agribusiness.

Being innovative is an important quality for an agricultural entrepreneur, especially when the business faces strong competition and operates in a rapidly changing environment. Successful agribusinesses are those who adapt to changing environment to capture the opportunities from such disturbance and outperform those who do not adapt (Shadbolt and Olubode-Awosolab, 2016). It was once thought that entrepreneurial skills were innate, but now research has led to the conclusion that entrepreneurial education and exposure to entrepreneurial activities can help build a strong entrepreneurial skillset in entrepreneurship (Charney and Libecap, 2000; Souitaris *et al.*, 2007). The demand for entrepreneurial education has increased globally, especially at the undergraduate level (Robinson and Josien, 2014).

In recent years, the number of working Americans interested in pursuing a career in entrepreneurship has been on the rise. The Startup Activity Index, an early indicator of new entrepreneurship in the United States, registered another increase in 2016, after sharp increases two years in a row. New entrepreneurs who started businesses in order to pursue an opportunity rather than from necessity, reached 86.3%, which is more than 12% higher than in 2009 at the height of the Great Recession. Nearly 30% of all new entrepreneurs in the U.S. are first-generation immigrants, which is the highest level for just the second time in 20 years, climbing steadily from 13.3% in 1996 (Kauffman Foundation, 2017).

Simultaneously, a much larger proportion of undergraduate students are attracted to the idea of creating a startup after graduation. College graduates are twice as likely to choose an entrepreneurial career path

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compared to those with no high school education, and almost 50% more likely than high school graduates (Babson College, 2011). Universities and alternative online colleges are creating more entrepreneurial-focused curriculums, programs, and organizations for students interested in starting their own business (Schroeter and Higgins, 2016). Entrepreneurship is one of the fastest growing subjects in undergraduate curricula, responding to the pent-up demand from students, university administrators, and employers. Across the United States, entrepreneurship clubs, associations, internships, and even entrepreneurship-related majors at universities have sprung up (Kauffman Foundation, 2001).

Many agribusiness programs have begun to respond to the demand for including concepts of innovation and entrepreneurship into their curriculum (e.g. Schroeter and Higgins, 2016). However, out of the approximately 40 universities in the U.S. with agribusiness programs, there are only a few that offer agricultural entrepreneurship programs or coursework. While it is important for agribusiness students to learn general business skills, there is also the need to acquire knowledge related to new opportunities and trends in the agricultural industry, given its dependence on limited resources like land and water.

These issues will require college graduates with technical skills and the ability to come up with innovative ways of thinking. Given the increasing the demand for graduates who possess entrepreneurial skill sets required by agribusinesses, the objective of our research is to provide insight into the character traits among recruits who are likely to possess entrepreneurial skills. We aim at assessing opportunities that would encourage college student to pursue entrepreneurship. These findings are important for educators as well as industry managers, because there will be an increased pressure to incorporate concepts of innovation and entrepreneurship into college curricula. Understanding the entrepreneurial intent among college students will aid with developing tools and programs that expose students to the concepts of entrepreneurship.

2. Background

2.1 Characteristics, traits and attributes of entrepreneurs

Prior research has helped shape our understanding of characteristics that are common of entrepreneurs (Sancho, 2010). Entrepreneurs tend to be risk-takers who push boundaries and enjoy being faced with challenges. Not only are entrepreneurs creative, but they also have the ability to communicate their ideas (Oosterbeek *et al.*, 2010). These ideas represent the foundation on which entrepreneurs' new products or services are built. Entrepreneurs tend to be driven by self-motivation and creativity, and the capacity to implement them (Knudson *et al.*, 2004). Entrepreneurs are determined, persistent, and committed when it comes to their business ventures (Hand, 2010). Sometimes this commitment leads to entrepreneurs being deemed as selfish or self-focused individuals.

Because of their intense motivation, innovators are considered goal-oriented people (Breugst *et al.*, 2012). The ability to set and achieve a goal is seen as the most important trait for an entrepreneur to have; however, other traits and characteristics recognized among entrepreneurs are persistence, optimism, innovativeness, having a strong work ethic, and the ability to take initiative (Hand, 2010). While the characteristics and attributes of current entrepreneurs is well studied, little is known about these characteristic precursors in terms of undergraduate students pursuing an entrepreneurial career.

In a study of university students, Ozaralli and Rivenburgh (2016) identified three over-arching themes in terms of potential influences that drive entrepreneurs: personality factors, social factors, and societal factors. The personality traits important for entrepreneurs are optimism, innovativeness, risk-taking, and competitiveness. In terms of social factors, the authors believe that constant exposure to new experiences and perspectives, like travelling or trying new things, boosts ones' creativity. Other social factors include entrepreneurial education and family exposure to entrepreneurship, while societal factors include perceptions about the economic and political climate.

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The majority of all college graduates are women; yet, they are less likely to pursue entrepreneurial paths (Anderson, 2016; Francis, 2007). Previous research suggests that women are less likely to become self-employed or engage in other aspects of entrepreneurship. However, on a global scale, women represent one third of all professionals engaged in some form of entrepreneurship. In 2008, there were 10 billion firms owned by women, and those firms employed 13 million people. One major hypothesis for the increase in female entrepreneurs has been their frustration with the gender wage gap. While the wage ratio increased by 11% between 1980 and 1990, it only closed by an additional 5% from 1991 to 2005. Women who perceive they are not being equally valued in the workplace, are more likely to leave the traditional work environment and start their own business. Another important factor pertaining to women in entrepreneurship has to do with the development status of the country of residence. Female entrepreneurs in under-developed countries may face more problems entering the business world due to social beliefs about women in their country. Increasing the knowledge about female entrepreneurs and to females interested in pursuing an entrepreneurial path gives us insight into the modern-day business world, where both genders are more equally represented in the work force (Kobeissi, 2010).

While one's personality, gender, and nationality plays a big part in determining their likelihood to become entrepreneurs, another aspect is the impact of role models on potential entrepreneurs. Role models serve as an example for entrepreneurs to follow and imitate. Research shows that entrepreneurs with higher levels of education are more likely to have a role model than entrepreneurs who do not. Entrepreneurs' role models tend to be close to home, including family members, close friends, and former employers or colleagues (Bosma *et al.*, 2012).

2.2 Entrepreneurship and the undergraduate student

Despite having innovative, risk-taking, and competitive skill sets, relatively few students in the U.S. anticipate becoming an entrepreneur (Ozaralli and Rivenburgh, 2016). An explanation for this may be the perceived risks of taking on a new business venture; American students tend to prefer the idea of a salaried job rather than investing in their own risky start-up (Ozaralli and Rivenburgh, 2016). In general, male students have a more positive perception of entrepreneurship prior to taking any entrepreneurial courses; however, evidence suggests that entrepreneurial education promotes and removes perceived barriers to entrepreneurship (Packam *et al.*, 2010; Schroeter and Higgins, 2016). Students' exposure to new experiences contributes to higher levels of creativity, which in turn leads to a higher chance of pursuing entrepreneurial activities.

Universities are being pressured to produce new generations of workers who fit the workplace's demands, and many are starting to implement curricula pertaining to entrepreneurship (Ollila and Williams-Middleton, 2011). Many entrepreneurial programs initially focused on teaching entrepreneurship, rather than creating entrepreneurs. In 2001, the Chalmers School of Entrepreneurship (CSE) in Sweden took a different approach to entrepreneurial education. The main focus of the CSE was not only to educate students on entrepreneurship, but also instill a 'learn-by-doing' attitude and organize them into groups to apply their understanding on entrepreneurship and participate in real-life ventures. Students were able to pitch an idea or product and collaborate with professors, business advisors, and alumni to put together portfolios for their 'companies.' Educators at CSE found that students who participated in their simulation were able to improve their current business skills and acquire new entrepreneurial skills (Ollila and Williams-Middleton, 2011).

The majority of entrepreneurial education research revolves around the curricula and development of education, but it is also important to consider the effect of the teacher and how they present information to their students (Ruskovaara and Pihkala, 2014). Projects are the often used as the tool for teaching entrepreneurial skills. Group projects are a way for students to improve their ability to collaborate with others, exercise their problem-solving skills, as well as exposing them to both peer- and self-assessment throughout the project. Research found that in these kinds of scenarios, teachers move away from the traditional lecturer role and become more of a mentor for their students (Ruskovaara and Pihkala, 2014).

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While prior research has focused on entrepreneurial skillsets and perspectives of undergraduate students, little is known about agribusiness students, and the factors that contribute to lighting their entrepreneurial flame. Therefore, this research aims to isolate characteristics, perceptions, and entrepreneurial intent among agribusiness students.

3. Methodology

A 25-question survey was developed in order to measure the entrepreneurial intent among agribusiness students. A large undergraduate agribusiness program (~600 students) in California was selected as the sampling frame. The survey was sent out electronically to current and recent graduates of the agribusiness program. The survey was open for two weeks, with two reminder emails sent during that time period. As an incentive for completing the survey, respondents were entered into a drawing for one of four $25 gift cards to Amazon.com.

The survey included a list of 13 of personality traits characteristic of entrepreneurs including innovativeness, creativeness, and risk-taking ability (Hand, 2010; Knudson *et al.*, 2004; Ozaralli and Rivenburgh, 2016). Respondents were asked to indicate to what extent they identify with each of those characteristics. They also were asked to indicate their top five strengths from Gallup's StrengthsFinder test[1]. In order to get a better idea of students' perceptions of entrepreneurship, respondents were asked to indicate their agreement with a series of 10 statements related to entrepreneurship and entrepreneurial education. A 5-point scale from 'strongly agree' to 'strongly disagree' was used. Statements included: 'more schools are offering entrepreneurship programs than in the past' and 'entrepreneurs are more likely to be men' and were formulated based on the extant literature (e.g. Caliendo and Kritikos, 2011; Noyes and Linder, 2015).

Respondents were then asked to provide a self-assessment of their strengths for skills related to entrepreneurial activities (e.g. risk management, marketing), as well as how likely they were to pursue entrepreneurial activities and what influenced their interest in entrepreneurship. The motivation for including these questions in the survey instrument were to compare findings with those of Bosma *et al.* (2012) regarding the importance of role models influencing young entrepreneurs. Learning more about the antecedents and variables that influence respondents' interest in entrepreneurship allows us to compare this sample of agribusiness students to those discovered more generally by Ozaralli and Rivenburgh (2016) in their study about influential factors of university students. The survey is attached in Supplementary Methods S1.

4. Results

During the two-week period that the survey instrument was available, responses were gathered from 132 individuals. To meet the University's Institutional Review Board requirements, responses to demographic survey questions were not required. Thus, this resulted in varying sample sizes by question, with response counts of 109 to 112 for demographic questions. The sample was distributed fairly equal among genders, with 48% males and 52% females (Table 1). Almost 70% of students surveyed were between the ages of 20 and 22, and nearly 80% of students were Caucasian, consistent with the demographics of the university. Although no incoming freshmen were surveyed, 31% of the respondents were juniors, 34% were seniors, and the remaining 36% were either sophomores, students going into their fifth year, or recent graduates. Roughly half of the students' parents obtained at least a Bachelor's Degree, and 57% of respondents came from a suburban hometown. The demographics of the sample are comparable to the agribusiness student population at the university of study, however it should be noted that the high percentage of Caucasian students many not be representative of agribusiness programs across the country.

[1] The Clifton's StrengthsFinder is a test that helps people determine dominant characteristics and strengths they possess related to the business world. The majority of students at this university complete the StrengthsFinder assessment during their first weeks on campus.

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Table 1. Demographics of survey respondents (where 'n' represents response counts).

Gender (n=109)	#	%
Male	53	48
Female	58	52
Age (n=110)		
17-19	23	21
20-22	77	69
23-25	10	9
25+	2	2
Ethnicity (n=109)		
Asian/Pacific islander	4	4
Caucasian	88	79
Hispanic/Latino	11	10
Native American	2	2
Other	6	6
Class level (n=110)		
Sophomore	13	12
Junior	34	30
Senior	37	33
5th year or above	14	12
Alumni	14	12
Parents' highest level of education (n=112)		
Some high school	1	1
High school/GED	8	7
Some college	18	16
Bachelor's degree	56	50
Master's degree	20	18
Adv. grad/Ph.D.	8	7
Not sure	1	1
Hometown (n=112)		
Rural	37	33
Suburban	64	57
Urban	11	10
Ag. background (check all that apply, n=199)		
Farming family	26	23
Ag. organization	32	29
Hobby farms	28	27
1+ parents work in ag	25	22
Prior work experience	37	33
No ag. background	47	42
Other	3	3

Students were asked to identify their strengths based on the results of their Clifton StrengthsFinder assessment. Interestingly enough, none of the respondents identified self-assurance as one of their strengths. This finding is consistent with the more than 6,000 students that have taken the assessment at the university of study; self-assurance is the least common strength, while achievement is the most common. It also suggests that our sample is representative of the university's study body. Gallup describes people who possess the self-assurance trait as 'confident in their ability to manage their own lives.' They possess an inner compass that gives them confidence that 'their decisions are right' (Gallup Strengths Center, 2017). While responses to the remaining 33 traits were distributed fairly evenly, over 56% of respondents possess the achiever trait,

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which is described as having strong work ethic and finds satisfaction in being productive. Another 27% of respondents share the competition trait, and 25% share the restorative trait, meaning they are good at identifying problems and finding solutions to them (Gallup Strengths Center, 2017). The top three strengths identified in our study confirm the key traits of entrepreneurs based on research by Hand (2010). Hand (2010) surveyed 257 current entrepreneurs who identified being self-confident and competitive as two major traits of successful entrepreneurs.

4.1 Gender differences

Students were asked to indicate the extent to which each of the 13 key entrepreneurial characteristics describes them (Table 2). In general, respondents strongly identified themselves as being tenacious (87%), versatile (86%), competitive (87%), self-motivated (92%), and open-minded (88%). A majority of respondents (91%) also said they work well with others and are not afraid to ask for help as needed. Although none of the students said they possess the self-assurance trait from the Gallup StrengthsFinder, they still described themselves as being self-motivated.

While there were no significant differences in the responses on personality characteristics based on class standing, we found that students who stated a higher interest in becoming entrepreneurs, thought of themselves as risk-takers (*P*-value of 0.000). Further, we found some interesting results when making comparisons by gender (Table 2). Male respondents, in general, are more confident that they possess entrepreneurial characteristics. Of the 13 characteristics used in the survey, female respondents were likely to possess creativity, self-motivation, open-mindedness, and not being afraid to ask for help (although none of those differences were statistically significant). On the other hand, male respondents were significantly more likely to indicate that they were risk-takers, innovative, willing to fail in order to learn, versatile, competitive, decisive, persuasive, and work well with others. All of these characteristics are important to becoming an entrepreneur.

Among the seven topic areas, agribusiness students were most confident in their knowledge of economics and trends/issues in agribusiness (Table 3). Interestingly, compared to the personality characteristics question (Table 2), there was more gender parity with regard to their knowledge assessment. In fact, the only statistically significant difference was found in female respondents indicating they were more likely to have a good understanding of marketing products and services. These results suggest that while both genders may have

Table 2. Personality characteristics by gender on a 5-point scale (where 5=describes me completely and 1=does not describe me at all).

Characteristics	Male	Female	*P*-value	Signif.[1]
Works well with others	4.6346	4.3333	0.027	**
Competitive	4.6154	4.1404	0.005	***
Self-motivated	4.4808	4.6140	0.273	
Versatile	4.4231	4.1754	0.090	*
Tenacious/persistent	4.3077	4.2982	0.947	
Open-minded	4.2692	4.3333	0.664	
Persuasive	4.1923	3.7321	0.005	***
Willingness to fail to learn	4.1569	3.6491	0.008	***
Not afraid to ask for help	4.1154	4.2143	0.583	
Innovative	3.9231	3.4211	0.002	***
Risk-taker	3.8462	3.3333	0.001	***
Decisive	3.8462	3.3333	0.015	**
Creative	3.7885	3.9649	0.335	

[1] Significance levels denoted by ***, **, and * for the 0.001, 0.05, and 0.1 levels, respectively.

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Table 3. Self-assessed knowledge levels by gender on a 5-point scale (where 5=strongly agree to have a good understanding of the topic and 1=do not have a good understanding).

	Male	Female	*P*-value	Signif.[1]
Economics	4.0000	3.7368	0.131	
Trends and issues in agribusiness	3.9615	4.1786	0.209	
Marketing products and services	3.8850	4.1404	0.064	*
Legal issues related to business	3.7500	3.4561	0.108	
Innovation	3.6923	3.4737	0.225	
Entrepreneurship and what it means to be an entrepreneur	3.6731	3.4386	0.197	
Policies and laws pertaining to businesses	3.5577	3.4737	0.636	

[1] Significance levels denoted by * for the 0.1 level.

the same knowledge levels, female students are less likely to give themselves credit for certain personality traits and, as a result, may be less likely to see themselves as an entrepreneur.

In order to determine how much emphasis students place on the importance of entrepreneurship and innovation in agriculture, and their perceptions of entrepreneurship, we asked respondents to indicate their level of agreement with different statements about entrepreneurship. After comparing the student responses and categorizing them based on class level, gender, background, and their likeliness to pursue future entrepreneurial activities, we discovered that perceptions of entrepreneurship and agribusiness were fairly homogeneous among the respondents (Table 4). However, male respondents were significantly more likely to agree that entrepreneurs are more likely to be men (P=0.009).

Respondents were asked to rate their likelihood of pursuing entrepreneurial activities, followed by a question asking them to identify what influenced their interest, or disinterest, in becoming an entrepreneur. Nearly 70% of the respondents indicated they are likely or extremely likely to pursue an entrepreneurial career. Respondents who expressed their interest in entrepreneurship indicated that they know someone who is an entrepreneur (52%) or simply have a personal interest in becoming an entrepreneur (57%).

Table 4. Level of agreement with statements related to entrepreneurship (where 5=strongly agree and 1=strongly disagree).

Agreement statement	Male	Female	*P*-value	Signif.[1]
Meeting the world's food demands will come as a result of innovation in agriculture	4.673	4.614	0.636	
There are many problems facing the global agribusiness industry	4.327	4.368	0.744	
Entrepreneurship and innovation is crucial for the agribusiness industry to continue to grow	4.327	4.456	0.369	
There will be more start-ups in the agribusiness industry in the near future	3.827	3.649	0.293	
Improving water usage in agriculture can be solved using technology we already have	3.808	3.456	0.071	*
More schools are offering entrepreneurship programs than in the past	3.789	3.667	0.352	
Entrepreneurs are more likely to be young rather than old	3.692	3.474	0.230	
Students are more comfortable working with students of the same major	3.529	3.754	0.226	
Entrepreneurs are more likely to be men	3.289	2.772	0.009	***
There are more entrepreneurs in industries like technology and medicine than in agribusiness	3.039	3.000	0.850	

[1] Significance levels denoted by *** and * for the 0.001 and 0.1 levels, respectively.

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We conducted independent sample *t*-tests based on students' class level, their parents' highest level of education, gender, where they grew up, and background in agriculture. While there were no major differences among these groups, we found that female students, in general, were less interested in pursuing an entrepreneurial career path. For the likelihood of pursuing entrepreneurial activities, we found that male respondents had a mean value of 1.98 while female respondents had a mean value of 2.37 (based on a scale where 5 was 'extremely unlikely' and 1 was 'extremely likely'), a statistically significant difference (P=0.043).

To further understand the differences between those that indicated a likelihood of pursuing an entrepreneurial career and those that did not, we conducted a k-means cluster analysis. The two identified clusters had statistically significant differences in terms of class level, ag background, gender, self-assessed strengths, and the likelihood of pursing an entrepreneurial career. The clusters had a 1.47 ratio of largest to smallest cluster. The larger of the two clusters consisted of students who are significantly more likely to pursue an entrepreneurial career. We may call this the 'Entrepreneurial' cluster. Students in the Entrepreneurial cluster were more likely to be male, consider themselves risk takers, and have parents directly engaged in production agriculture. Further, those in the Entrepreneurial cluster were closer to graduation.

Cluster 2 consisted of students who were significantly less likely to pursue entrepreneurship. We may call this cluster 'Administrative', following the idea of Fairbrothers and Gorla (2001) that those opposite of entrepreneurs are more cautious and tend to focus on procedure. Administrative cluster students were more likely to be younger, female, and less likely to come from a production agriculture background. Consistent with previous research (Fairbrothers and Gorla, 2011; Stevenson and Gumpert, 1985), we find that Administrative cluster students are risk adverse. The results from our cluster analysis support our findings that showed that female students were less likely to strive for an entrepreneurial career path. In addition, the cluster analysis provides deeper insight into the profile of entrepreneurial students.

Students were asked to identify their level of interest in learning more about entrepreneurship or building an entrepreneurial skillset, as well as how they would like to go about doing so (e.g. entrepreneurial classes, internships, clubs, and getting in contact with current entrepreneurs). We found that 67% of students were interested in developing an entrepreneurial skillset, 85% were interested in entrepreneurial specific courses, and 79% wanted to get in contact with current entrepreneurs for future work. Students who indicated that they were less likely to become an entrepreneur were, in turn, less interested about learning more about it. Contrary to male respondents, female students indicated that they were still interested in learning more about entrepreneurship regardless of their likelihood to become an entrepreneur.

5. Conclusions

The purpose of this study was to examine the perceptions and influencers pertaining to agribusiness students' interest in entrepreneurship and isolate differences between male and female students. We determined that a large proportion of students (70%) are interested in pursuing an entrepreneurial career path after graduation. Regardless of a student's stated entrepreneurial intent, students still indicated interest in learning more about entrepreneurship (85% were interested in entrepreneurial specific courses). These students indicated they would be most interested in entrepreneurship-specific coursework and meeting current entrepreneurs to learn more about what makes them successful. Much like Bosma *et al.* (2012), who learned that a majority of the entrepreneurs had a role model that influenced their entrepreneurial interest, 52% of agribusiness students who indicated that they were likely to pursue an entrepreneurial career said they were influenced by a family member, friend, or coworker who is an entrepreneur. Further, those that ended up being in the entrepreneurial cluster were more likely to come from a background in production agriculture and, thus, may have been exposed to more family-owned farming operations, given that 97% of all U.S. farms are family-owned (United States Department of Agriculture – Economic Research Service, 2015). Consistent with Ozaralli and Rivenburgh (2016), having some form of a role model or current entrepreneur to look up to appears to be very influential to agribusiness students' interest in pursuing an entrepreneurial career.

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Not only are agribusiness students interested in pursuing an entrepreneurial career, but most of these students possess the traits and characteristics of successful entrepreneurs. Previous literature suggests that successful entrepreneurs are often described as competitive, persistent, and innovative (Knudson *et al.*, 2004). The results from our survey show that most of the agribusiness students described themselves as self-motivated, tenacious, and versatile, which are some of the most common traits of successful entrepreneurs. One of our more fascinating findings came from students' StrengthsFinder results. We found that of the students who identified their StrengthsFinder results, 56% of them listed achiever as one of their strengths, followed by competition and restorative at only 27%, with the remaining traits present in anywhere from 2 to 18% of the sample. The large proportion of students possessing the achiever strength (meaning they have a strong work ethic and find satisfaction in being productive) suggests that agribusiness students possess many positive entrepreneurial traits. These students possess strong entrepreneurial traits, and they also have a good understanding of different aspects of business like economics and marketing. The combination of these personality traits and general business knowledge has led us to believe that students who are interested in pursuing an entrepreneurial career already possess the foundation of successful entrepreneurs and that there is an opportunity to further develop their entrepreneurial traits.

While the majority of students indicated they are interested in pursuing an entrepreneurial career after their graduation, we found that in general, female students indicated that they would less likely to become entrepreneurs. We also found that when students were asked to indicate the extent that each of the 13 entrepreneurial personality characteristics describes them, women seemed to be less confident in their skills related to entrepreneurship. Caliendo and Kritikos (2011) discovered similar findings when studying business women in Germany, who were less likely to be self-employed or engage in entrepreneurial work than their male counterparts. Despite the lack of interest in pursuing an entrepreneurial career, we found that female students are still interested in learning more about entrepreneurship and building an entrepreneurial skillset. Our findings suggest that entrepreneurship education with activities to build an entrepreneurial skillset will aid female students to eliminate the perceived barriers into entrepreneurship. Furthermore, previous research points out that anybody who is willing to be mastery-oriented, i.e. able to learn and face challenges with an unknown outcome, is an entrepreneur. Thus, all what matters is the passion to make an impact in life (Fairbrothers and Gorla, 2011).

Our research aims to encourage additional studies on entrepreneurship. One area of research would be to track students after graduation and follow them in their pursuit for an entrepreneurial career. It would also be useful to assess the possible precursors and influencers of students' interest in entrepreneurship. More specifically, it would be valuable to learn more about females' hesitations in pursing entrepreneurial careers, given their budding interest in developing an entrepreneurial skillset. In our study, we did not find a strong relationship between various demographic characteristics (ethnicity, class level, parents' education, background in agriculture, etc.) and the students' interest in entrepreneurship. In addition to demographics, there is a need for research that determines other antecedents that might influence students' perceptions of, or interest in, entrepreneurship.

This study of agribusiness students serves as a foundation for industry managers to learn more about future employees and their perceptions of entrepreneurial activities. In addition, our findings may help universities who are seeking to implement entrepreneurial education and promote students to venture out and pursue their entrepreneurial dreams. We found that a majority of students are interested in learning more about entrepreneurship. Given the increasing role of innovation and entrepreneurship in agriculture, universities may want to implement additional entrepreneurial education opportunities to meet the demands of students seeking to build an entrepreneurial skillset and pursue their own startup. Our results emphasize the importance for universities to build students' experiences through learn by doing exposure to entrepreneurship such as industry partnerships, where students could interact with entrepreneurial mentors and get hands-on knowledge through applied coursework and internships in entrepreneurship.

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Supplementary material

Supplementary material can be found online at https://doi.org/10.22434/IFAMR2016.0166.
Methods S1. Survey instrument.

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Lighting the flame of entrepreneurship among agribusiness students

Lindsey M. Higgins[a]Ⓟ, Christiane Schroeter[a], and Carlyn Wright[b]

[a]Associate Professor, and [b]Agribusiness Student, Agribusiness Department, California Polytechnic State University, 1 Grand Ave, San Luis Obispo, CA, USA

ⓅCorresponding author: lhiggins@calpoly.edu

Methods S1. Survey instrument.

Part I – Qualifying questions

Part II – Course completion and involvement in campus activities

Part III – Strengths Finder

1. Have you taken a StrengthsFinder test before?
    a. Yes b. No
2. Do you recall your top strengths from the StrengthsFinder assessment?
    a. Yes b. No
3. According to your StrengthsFinder assessment, what are your top 5 strengths?

Part IV – Self-assessment

4. Please indicate your level of agreement with the following statements (5=strongly agree, 1= strongly disagree). I have a good understanding of:
    a. Legal issues related to business
    b. Marketing products and services
    c. Economics
    d. Policies and laws pertaining to businesses
    e. Entrepreneurship and what is means to be an entrepreneur
    f. Innovation.
    g. Trends and issues in agribusiness

5. Please indicate to what extent each of the following characteristics describes you:
   (5 point scale – does not describe at all to describes completely)
    a. Risk-taker
    b. Innovative
    c. Tenacious (persistent)
    d. Willing to fail in order to learn
    e. Creative
    f. Versatile
    g. Competitive
    h. Self-motivated
    i. Open-minded
    j. Decisive
    k. Persuasive

6. Among those characteristics in question 5, which one has been most developed as a result of major courses taken within your undergraduate curriculum?

7. Among those characteristics in question 5, which one has been most developed as a result of non-major courses taken within your undergraduate curriculum?

Part V – Entrepreneurship

8. Please indicate your level of agreement with the following statements:
   (5 point scale – Strongly agree, Agree, Indifferent, Disagree, Strongly disagree)
   a. There are many problems facing the global agribusiness industry.
   b. Meeting the world's food demands will come as a result of innovation in agriculture.
   c. Improving water usage in agriculture can be solved using technology we already have.
   d. Students are more comfortable working with students in the same major.
   e. There are more entrepreneurs in industries like technology and medicine than in agribusiness.
   f. There will be more start-ups in the agribusiness industry in the near future.
   g. Entrepreneurs are more likely to be men.
   h. Entrepreneurs are more likely to be young rather than old.
   i. More schools are offering entrepreneurship programs than in the past.
   j. Entrepreneurship and innovation is crucial for the agribusiness industry to continue to grow.

9. In thinking about your future career path, how likely are you to pursue entrepreneurial activities?
   a. Extremely likely
   b. Likely
   c. Indifferent
   d. Unlikely
   e. Very unlikely

10. If a or b in question 9, what influenced your interest in entrepreneurship?
    a. I know someone who is an entrepreneur (family, friend, coworker, other)
    b. I learned about entrepreneurship in school
    c. Previous work experience
    d. Personal interest
    e. Other:

11. If d or e in question 9, why are you not interested in entrepreneurship?
    a. I do not think of myself as an entrepreneur
    b. I do not know enough about entrepreneurship
    c. I have no desire to start my own business
    d. Entrepreneurship is too risky
    e. I don't have the resources available
    f. Other:

Part VI – Entrepreneurship education

12. To what extent has entrepreneurship been mentioned/discussed entrepreneurship in your major coursework? (often, sometimes, rarely, never)
    a. Homework assignments
    b. Projects
    c. Lectures or discussions
    d. Guest speakers
    e. Encouragement to join clubs / organizations / competitions pertaining to entrepreneurship / innovation

13. Are you interested in learning more about entrepreneurship or developing an entrepreneurial skillset?
    a. Very interested
    b. Interested
    c. Indifferent
    d. Uninterested
    e. Very uninterested

14. Please check the following you would be interested in:
    a. Classes related specifically to entrepreneurship
    b. Entrepreneurial internships
    c. Clubs, organizations, or competitions related to entrepreneurship
    d. Getting in contact with entrepreneurial professionals for future work
    e. Other (please explain):

Part VI – Demographics

15. How would you describe where you grew up?
    a. Rural
    b. Suburban
    c. Urban

16. Which of the following describes you background in terms of agriculture? Please check all that apply:
    a. I come from a farming family.
    b. I have participated in agricultural organizations/associations (e.g. 4-H, FFA)
    c. My family/I participate in hobby farming, gardening, raising livestock or poultry.
    d. One or both of my parents work in the agriculture industry.
    e. I have prior work experience in agriculture.
    f. I do not have an agricultural background.

17. What is the highest level of education completed by your parents?
    a. Some high school
    b. High school / GED
    c. Some college
    d. Bachelor's degree
    e. Master's degree
    f. Advanced graduate work / PhD
    g. Not sure

18. What year of college are you entering this coming fall term?
    a. Freshman
    b. Sophomore
    c. Junior
    d. Senior
    e. 5+

19. How old are you?
    a. 17-19
    b. 20-22
    c. 23-25
    d. 25+

20. What gender do you identify with:
    a. Male
    b. Female
    c. I do not identify with either/I identify with both

21. Ethnicity:
    a. African American/African/Black/Caribbean
    b. Asian/Pacific Islander
    c. Caucasian
    d. Hispanic/Latino
    e. Native American
    f. Other
    g. Prefer Not to Answer

Part VII – Contact Information for Gift Card Drawing