Generational Perceptions of the Relative Advantages of Genetic Modification

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Introduction

Scientists and farmers are faced with a burden to deliver solutions to feed the expected population of 9.3 billion people by 2050 (United States Department of Agriculture, 2014). Possible solutions developed recommend producing food products utilizing genetically modified (GM) science in order to produce enough food to feed this increase in population (Mahgoub, 2016). Farmers have seen an expansion in production efficiency, an increase in yields, and enhancements to maintenance since the use of GM science in food production (Mahgoub, 2016). Although the improvements to the food production industry sound glamorous, consumer acceptance of GM as an innovation has been less than trendy. Mahgoub (2016) stated consumers are largely undecided whether they should accept or reject the innovation of GM food. Consumers are apprehensive to accept or reject GM food because they lack understanding of the advantages and setbacks of GM as an innovation. This study identified generational differences in the perceived relative advantages of GM science. According to The Center for Generational Kinetics (2016), generations are classified by year of birth, where each generation denotes a period of time. Generations define characteristics of each group of people by events, trends, and changes that occurred within that period of time (The Center for Generational Kinetics, 2016). The purpose of this study was to inform the development of extension programs focused on educating about GM in relation to relative advantages of GM by generation.

Theoretical Framework

Diffusion of innovations theory (Rogers, 2003) constituted the theoretical framework for the study. Diffusion of innovations is defined as a communication process in which the adoption or rejection of an innovation causes social change (Rogers, 2003). It outlines five characteristics that influence rate of adoption: relative advantage, compatibility, complexity, observability, and trialability (Rogers, 2003). This study focused on the characteristic of relative advantage as it pertains to GM in association to the rate of adoption using generational classifications. This research opposed previous research stating age or generation are not factors affecting adoption of innovations (Rogers, 2003). Rogers (2003) indicated a new innovation should be viewed as having an advantage over the innovation it is aiming to replace in order for relative advantage to play a part in the rate of adoption.

Methods

An online survey was created, reviewed by a panel of experts, and used to collect data. The survey was disseminated using nonprobability opt-in sampling techniques to 1,751 US residents (Baker et al., 2013). One thousand fifty-one responses were usable after quota sampling and attention filters were met, yielding a 60% usable response rate. The data were weighted according to the 2010 U. S. Census to increase generalizability of the study's results to U. S. consumers (Baker et al., 2013). While part of a larger study exploring public perception of GM, this study focused on respondents' age and perceived relative advantage of GM. First, the year respondents reported being born were coded into generational categories: *1981-2000 = Millennials, 1965-1980 = Generation X, 1946-1964 = Baby Boomers, before-1945 = Traditionalist* (The Center for Generational Kinetics, 2016). Respondents were then asked to rate their level of agreement or disagreement with eight statements on a five point Likert-type scale to capture perceived relative advantage of GM science. The statements were GM science: enhances the taste of food, increases the amount of food a farmer can grow, reduces the use of pesticides, combats plant disease, makes food more affordable, enables plants to grow when less water is available, is part of a solution to end world hunger, and fosters more opportunities for the next generation. An overall relative advantage score was calculated using the average

response to the eight statements and was found reliable (α = .92). A one-way ANOVA was used to determine if generational differences existed on the relative advantage index score. A Tukey post hoc test was used to decipher significant differences between generational groups.

Results

The results indicated the millennial and generation X groups both agreed GM science provided a relative advantage (Table 1). However, the baby boomers and traditionalist groups both neither agreed nor disagreed that GM science provided a relative advantage. The ANOVA test indicated a significant difference between generational groups (F = 16.03, p = .00). The Tukey post hoc test indicated there was a significant difference between millennials, baby boomers (p = .00) and traditionalists (p = .00) and generation X and baby boomers (p = .00). There was no significant difference found between millennials and generation X (p = .06) or between traditionalist and generation X (p = .10) and baby boomers (p = .97).

Table 1

Relative Advantage by Generation

Generation	*n*	*M*	*SD*
Millennials	333	3.78	.64
Generation X	295	3.63	.78
Baby Boomers	312	3.40	.77
Traditionalist	107	3.44	.73

Note. Real limits of the scale: *1.00 - 1.49 = strongly disagree, 1.50 - 2.49 = disagree, 2.50 - 3.49 = neither agree nor disagree, 3.50 - 4.49 = agree, 4.50 - 5.00 = strongly agree.*

Conclusion/Recommendations/Impact on Profession

Previous research stated that generations do not play a part in an adoption of an innovation (Rogers, 2003), however, this research presented argumentative results. Generational groups perceived the relative advantages of GM food products differently. The baby boomer and traditionalist groups' thoughts aligned more with each other when perceiving the relative advantages of GM food products. With this new research disagreeing with previous research, understanding generational groups and their corresponding degree of perception of the relative advantages of GM food products will be important in the education of GM science as an innovation (Mahgoub, 2016). To ensure consumers are informed when making decisions, Extension professionals should communicate the relative advantages of GM food products including decreased price, increased taste, enhanced safety, increased availability, enhanced nutritional content, and higher quality of food (Ringquist et al., 2016) to baby boomer and traditionalist groups. Selecting foods based on price, taste, safety, availability, nutritional content, and quality of food are factors that are within a purchasing consumer's control. Capitalizing on these relative advantages of GM food products that are within the consumers control as solely a purchasing consumer will contribute to an educated consumer base. Knowledgeable consumers are more likely to make educated purchasing decisions around their food products, ultimately deciding to purchase or not purchase GM food products. Extension professionals should encourage clientele in the millennial and generation X groups to educate their elders about the relative advantages of GM food products. With the millennial and generation X groups possessing a higher level of agreement toward the relative advantages of GM food products, those two generations are encouraged to be advocates toward the education of GM science as a possible solution to feeding the increasing population.

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