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College Choice Criteria Utilizing Conjoint Analysis Enabled on a SaaS Platform

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College Choice Criteria Utilizing Conjoint Analysis Enabled on a SaaS Platform

Alison Munsch
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ABSTRACT

College enrollments and low to moderate household incomes are stagnating while tuition costs are increasing. The New York State Legislature enacted the nation's first tuition-free degree program, the Excelsior Scholarship, designed to make a college education more affordable to middle class families. This legislation can impact what institution of higher education students will choose upon high school graduation. In order to understand the choice criteria for selecting an institution of higher education, a research study was conducted among a representative sample of high school upper classmen and parents of this respondent segment. The data collection and analysis were accomplished using an information management technology platform leveraging a statistical technique; "choice based conjoint analysis (CBC)". This is a SaaS platform called Discover CBC. The platform is developed by Sawtooth Software, a leading technology provider in information management for complex problems, especially when understanding and predicting consumer choice is required. Key themes discovered in the research in terms of choice criteria for a college/university are relatively low cost but also the importance of college/university campus racial and ethnic diversity among parents and college bound high school students.

KEYWORDS: College choice, University choice, Conjoint analysis, Rational choice theory, SaaS

INTRODUCTION

College is still an important choice after high school in recent years. This is indicated by the overall college enrollment rate for young adults (18 – 24) that increased from 35 percent in 2000 to 41 percent in 2016. During this period, the rate increased at 4-year institutions (from 26 to 31 percent) but did not change measurably at 2-year institutions. Over a more recent time- period, the overall college enrollment rate in 2010 was not measurably different from the rate in 2016, but the rate at 4-year institutions was lower in 2010 (28 percent) than in 2016 (31

percent), and the rate at 2-year institutions was higher in 2010 (13 percent) than in 2016 (10 percent) (Fain, 2017). Nevertheless, in the fall of 2017, 20.4 million people enrolled in colleges or universities, per the National Center for Education Statistics (2018). This amounts to approximately 6.2% of the American population. This represents an increase of 5.1 million students from the fall of 2000 overall.

Despite the relatively large number of young adults heading for colleges and universities across the country, public and private high school class sizes are stagnating; potentially leaving university and college enrollments likely to drop because of a smaller population of students heading to college. According to the National Student Clearinghouse Research Center (2018), overall postsecondary enrollments decreased 1.5% in the spring of 2017, compared with the previous spring. Enrollment numbers are predicted to be flat or decreasing over the next 15 years except for an increase in enrollments predicted in 2023. Each region of the United States will feel the enrollment drop differently as student populations change. For example, the Northeast and Midwest will likely see drops in enrollment, while the South and West may see increases. The Northeast may be most affected because of its greater concentration of higher-education institutions and a projected drop in the student population.

Further complicating the issue of enrollment is the cost of a higher education. Tuition and fees for a college education in the United States are rising at a faster rate than the financial aid and family income needed to cover costs (The College Board, 2018). Prices for full-time students at public four-year institutions have increased for eight straight years and for seven straight years at public two-year colleges. The increases are evident for those at private nonprofit colleges and universities. Across private nonprofit four-year institutions, net tuition and fees collected per full-time undergraduate student averaged \$14,530 in 2017-18. That was up from \$13,890 the year before, meaning net tuition and fees increased by a substantial 4.6 percent. At public four-year colleges, net tuition and fees averaged \$4,140, up from \$4,010, an increase of 3.2 percent. As such, the average student keeps paying more for college each year (Fain, 2017).

The increasingly higher cost of higher education drives questions about its affordability. According to the The United States Census (2012), although wages are trending up, it is not enough to keep pace with the cost of college. Median family income grew modestly at an average rate of 0.4 percent a year after inflation between 2005 and 2015, while incomes rose 0.8 percent between 1996 and 2006. College and universities try to offset the financial burden of a higher education. In 2016-17, institutions provided 47% of all grant aid to postsecondary students. Although institutional grant aid has increased rapidly for students, federal grant aid

has declined. Furthermore, the number of colleges and universities eligible to award federal financial aid dropped by 5.6 percent in 2016-17. This is because institutions that closed or merged with others were for-profit colleges, and more than 30 private nonprofits were among them (The College Board, 2018). These increases in tuition costs, combined with incomes for many families that are slow to grow, and constrained financial aid raises concerns about ensuring educational opportunities for low-and moderate-income students.

New York State has created The Excelsior Scholarship to help lower to moderate income students afford the cost of higher education. The Excelsior Scholarship provides tuition awards to eligible students attending New York State's public colleges and universities, specifically, The State University of New York (SUNY) and The City University of New York (CUNY). This scholarship, in combination with other student financial aid programs, allows students to attend a SUNY or CUNY college tuition-free. The Excelsior Scholarship applies to tuition only and does not cover the other costs of college (e.g., books, room and board, etc.). To meet eligibility requirements, an applicant must: be a resident of New York State and must have resided in New York State for 12 continuous months prior to the beginning of the term. The student must also be a United States citizen or eligible non-citizen; have either graduated from high school in the United States, earned a high school equivalency diploma, or passed a federally approved "Ability to Benefit" test, as defined by the Commissioner of the State Education Department (New York State Higher Education Services Corporation, 2018).

There are additional requirements in addition to attendance at a SUNY or CUNY college, (which includes statutory colleges at Cornell University and Alfred University). The student must have a combined federal adjusted gross income of \$110,000 or less; be enrolled in at least 12 credits per term applicable towards a degree program and earn at least 30 credits each year applicable toward a degree program. If the student attended college prior to the academic year for which an award is sought, he or she must have earned at least 30 credits each year (continuously enrolled). Moreover, the student must be in a non-default status on a student loan made under any New York State or federal education loan program or on the repayment plan of any New York State award. Additionally, the student must follow the terms of the service condition(s) imposed by a New York State award that they have previously received. The student must execute a contract agreeing to reside in New York State for the length of time the award is received. Finally, to be eligible for the award, if the student is employed during such time, the student must be employed in New York State.

An estimated 75,000 people applied for the scholarship in the 2018/2019 academic year, but an initial projection from the governor's office said only about 23,000 would receive it. Officials from several schools said the biggest reason students were disqualified was because they receive other need-based grants that already cover the full cost of tuition. Other students are disqualified because their family income is too high. The income limit will rise to \$125,000 for the 2019-20 school year and thereafter. It is possible that this scholarship opportunity may create enrollment competition among private colleges especially in the New York area among lower to moderate income families of college bound high school students qualified for The Excelsior Scholarship. This is because the opportunity cost of a private college/university may be too high for their families (Erdmann, 1983).

Problem Statement And Research Questions

College/university enrollments are not as robust as they were in previous decades. This is due to shifts in demographics but also the opportunity cost of a higher education. Specifically, tuition costs are rising in colleges and universities across the country and are likely a contributing factor for the trend of lower enrollments (Fain, 2017). Moreover, the incomes of many families are not growing at a rapid enough pace to offset the burden of high tuitions that are often not fully supplemented by institutional, private, or governmental financial aid opportunities (Flint, 1993), (Paulsen et.al. 2002). These realities pose a challenge to lower to middle income families to support the higher education goals of their college bound high school upper classman (Heath, 1993).

The Excelsior Scholarship created by New York State was developed to help lower to moderate income students afford the cost of higher education. The Excelsior Scholarship provides tuition awards to eligible students attending New York State's public colleges and universities (SUNY and CUNY). This scholarship, in combination with other student financial aid programs, allows students to attend a State University of New York (SUNY) or City University of New York (CUNY) tuition-free, making higher education a feasible choice for families. However, there are many considerations for college choice and cost is among them (Erdmann, 1983), (Broekemier, 2002). This research explored the choice criteria for selecting an institution of higher education. As such, the primary question for this research study was:

1. Is low cost the most important choice criterion for selecting a college for education beyond high school?

The secondary research question was:

2. What other important choice criteria factor into the decision of college/university choice in addition to the cost of the education?

The third research question was:

3. Whether a SaaS platform can help us to understand and predict consumer choice?

METHODOLOGY

In this study the research questions were explored using choice-based conjoint analysis (CBC). This analytic technique is used for discrete choice modeling, now the most often used conjoint-related method in the world (Orme, 2010). The main characteristic distinguishing choice-based conjoint from other types of conjoint analysis is that the respondent expresses preferences by choosing from sets of concepts, rather than by rating or ranking them. The choice-based task is similar to what consumers do in the marketplace in terms of purchase decision making. Choosing a preferred product from a group of products is a simple and natural task that occurs in consumer behavior. CBC is often used to study the relationship between price and demand. One of the strengths of CBC is its ability to deal with interactions, such as in this research, where college choice is a complex problem to untangle (Cabrera et.al. 2000). Different colleges and universities have a variety of benefits, advantages and disadvantages to consider in addition to the cost of attendance. CBC was used in this research to evaluate interactions of this kind.

The software platform used in this research to conduct the CBC analysis is Sawtooth Software's Discover CBC. This platform is a smart system for the complex research problems facing modern day business. Discover CBC is considered SaaS software (Software as a Service) and resides on a web server. The researcher did not need to install any software but simply logged into the service using a browser connected to the internet. All questionnaire authoring, data collection, and analysis (including tabulations and market simulations) occurred on the web server for this study (Sawtooth Software, 2018).

The software successfully allowed the researcher to compose a questionnaire with standard questions in addition to the CBC tasks, such as text screens (requiring no response such as a recruiting script), select-questions (multi-punch radio buttons and check boxes), numeric, grid-type, rank, constant sum, and open-end questions. The researcher also had the ability to add skip patterns and a progress bar to the

survey. The software also provided the researcher with the ability to develop graphical tabulation analysis for summarizing the results for non-conjoint questions. These questions were automatically made available as filters and banner points within the market simulator available in the Discover CBC SaaS platform for the data. The market simulator is an integral part of Sawtooth Software's Discover CBC SaaS platform, allowing the researcher to ascertain the optimal combination of attribute choices for college selection. Sawtooth Software's Discover CBC SaaS platform has specific requirements for the project questionnaire. The CBC questions are limited to 8 attributes (i.e., factors) with no more than 15 levels per attribute. In addition, no more than 8 concepts (profiles) per choice task with no more than 30 tasks (Sawtooth Software, 2018) per respondent. The researcher can provide a "none" option for selection by participants if the CBC concepts within the task profiles are not a choice that they would make.

It is important in the questionnaire development using Discover's CBC SaaS platform to specify which attributes have a known (a priori) utility order ascertained from other empirical sources (e.g., higher speeds are usually preferred to lower speeds or lower prices are usually preferred to higher prices). For attributes without a known utility order, the software adds ratings questions prior to the CBC tasks. As such, in this study, the college costs have a known (a priori) utility. Specifically, a lower cost of a college education is preferred to a higher cost (The National Student Clearing House Research Center, 2018). However, preference for campus diversity (included as a choice option in this study) does not have a known utility. As such, a rating scale to gauge attitudes about diversity was implemented. Furthermore, a question was added to determine the meaning of diversity among respondents. In addition, preference for the different college/university options (included as a choice in this study) does not have a known utility as well. Specifically, it cannot be assumed that an ivy league college is preferred to a private or public (i.e., state/city) institution of higher education. As such, a rating scale to gauge attitudes on preferences was implemented.

The rating scale applied to non-ordered attributes where a known (a priori) utility does not exist is optimally used with only a few scale points for the Discover CBC SaaS platform (Lattery, 2009). The scale allows respondents to differentiate among attribute levels using three broad categories of preference. It also offers a "no opinion" rating, so the software will not force respondents to rate levels they have no opinion about. The a priori and stated preference within attributes serve as utility constraints (monotonicity constraints) to permit robust individual utility estimation using logit with data augmentation via empirical Bayes (Sawtooth Software, 2018), (Orme, 2010). Moreover, the rating scales provide individual-level preference information, so dominated concepts can be avoided in the CBC tasks such as

concepts available as a choice that are all preferred versus all that are not preferred. The importance of attributes in the Discover CBC SaaS platform is estimated entirely based on the choices within the CBC tasks.

Selection Criteria

The data collection tool was administered to respondents as an online survey delivered via email addresses through the Discover CBC platform. Availability sampling (locating participants through the researcher's personal and professional network (Robson, 2002) was used to select participants for the study. The respondents were acquired utilizing a panel from a well-known sample provider, Survey Sampling International (2018). Specifically, panels such as the one used in this study, are groups of respondents recruited to voluntarily take part in several market research sessions or projects over a period (Zikmund & Babin, 2016). As such, the sample provider identified those households within their panel with children likely to be juniors and seniors in high school and obtained parental consent to survey the junior and senior high school students in their household. The email addresses were obtained from the sample panel provider.

Within the data collection tool, the purpose of the research was explained including potential benefits and any risks to the participant. Permission to proceed with the survey was acquired from each respondent although willingness to participate in the research is inherent in their membership in the panel (Zikmund, & Babin, 2016). The survey took respondents 7 minutes on average to complete. The field period for the survey was 10 days and the survey was offered on PCs, laptops, tablets and mobile phones. The research was conducted among 477 respondents with the following characteristics:

166 College Bound Juniors and Seniors in High School

311 parents of Juniors and Seniors in High School

Household income \$30,00-110,000 (In line with the Excelsior Scholarship income requirements)

Balancing to the United States Census (2012) was accomplished in age, gender and race for the household panel participants

Procedure

Consenting participants were surveyed using Discover CBC's online survey tool. The CBC questions in this research contained 6 attributes associated with college choice (Erdmann, 1983), (Bouse & Hossler, 1991), (Kern, 2000) with varying levels of each attribute. The a priori and stated preference orders of levels within each attribute were established among respondents.

The first attribute "college type" contained 4 levels including ivy league, private, public and (i.e., state/city). Respondents were able to rate each college option (ivy league, private and state/city) on a three-point scale in terms of preferred, not preferred or no opinion since the (a priori) utility for college/university type is unknown.

The second attribute was "average cost" and contained 3 levels associated with the estimated annual cost associated with each college type (The College Board, 2018). Specifically, the "average cost" level associated with the ivy league college type was \$54,000. The "average cost" level associated with the private college type was \$33,000. The "average cost" level associated with the state college type was \$9,000. These cost options were presented to respondents as a choice. This attribute has a known (a priori) utility with a lower cost preferred to a higher cost in choice decision making (Paulson et. al., 2002). As such, a rating scale was not administered.

The third attribute was "desired degree" in terms of whether the institutions had the student's desired degree. There were 2 levels to this attribute to indicate yes or no. The fourth attribute was "financial aid availability" in terms of whether the institutions would have this option available. There were 2 levels to this attribute to indicate yes or no. The fifth attribute was "high quality degree programs and instructors" in terms of whether the institutions would be established in this area. Respondents were able to rate each of these attributes on a three-point scale in terms of preferred, not preferred or no opinion since the (a priori) utility for these attributes are unknown.

Lastly, the sixth attribute was "campus diversity" in terms of whether the institutions would be diverse. Respondents were able to rate the college/university diversity option on a three-point scale in terms of preferred, not preferred or no opinion since the (a priori) utility for diversity is unknown. There were 3 levels to this attribute to indicate a high level of diversity, a low level of diversity or no diversity at all (i.e., that the campus population is homogeneous).

The sixth attribute of campus diversity was added to the analysis because Generation Z (those born 1997 and after) are among the most diverse age cohorts represented in the United States (The United States Census, 2012). The respondents in this research are likely members of the Generation Z age cohort and parents of this segment since the typical junior or senior in high school at the time of this research was born after 1997 (The United States Census, 2012). Thus, campus diversity is hypothesized to be an important college choice criterion. To determine the meaning of campus diversity among participants, an open-ended question preceded the CBC tasks asking respondent interpretation of the concept of diversity to enhance interpretation of the ending results. Respondents described diversity representation on campus in terms of racial, ethnic, gender and socioeconomic dimensions.

Although each respondent was screened to be college bound, a “none” option was included for each of the combinations of attributes presented to participants. This was done so respondents would not be forced to choose, if what was offered in the Discover CBC tasks did not represent a choice they would make.

Figure A summarizes the attributes and levels of attributes offered to respondents in the software platform.

Figure A: Attribute Levels

College/University Choice Criteria					
College Type	Average Cost	Desired Degree	Financial Aid Availability	High Quality Degree Programs and Instructors	Campus Diversity
Ivy League	54K	Yes/No	Yes/No	Yes/No	High Level
Private	33K				Low Level
Public (State/City)	9k				No Diversity(e.g. homogeneous)
None					

In this research, rather than asking participants what they prefer in college choice, or what attributes they find most important, the conjoint analysis employed a more realistic context of asking respondents to evaluate potential college choice profiles.

Each profile includes multiple conjoint college choice features (hence, conjoint analysis). Discover-CBC's recommendation wizard provided the number of tasks and concepts per task to ask, given the specific attribute and levels of attributes in the research. The researcher can choose to override the wizard's suggestion.

Furthermore, Discover CBC warns the researcher if too few tasks are specified to produce a good model. The recommendations are based on Logit Theory (Orme, 2010). By default, in the design, all attributes have a modest degree of level overlap (level repeating within a task). Respondents are exposed to randomized versions of each task that are system generated to reduce respondent context and order bias. Discover CBC's randomized versions have an adaptive element, to try to avoid dominated concepts (based on a priori rankings of attributes plus the additional rating information respondents provide about attributes). The platform's algorithms observe the respondent's preferences before generating the design versions. These designs are near-orthogonal and statistically efficient (Sawtooth Software, 2018).

For this research, 14 tasks were recommended by the Discover CBC Recommendation Wizard with 3 concepts per task offered to respondents with a "none" option. The researcher accepted this recommendation because the number of concepts and versions as recommended pretested well among a small sample of respondents before the final launch of the survey.

Tasks gave the respondent the opportunity to choose the attributes and levels of attributes associated with college/university choice. For attributes that did not have a priori utility, (for this research, college type, degree availability, financial aid availability, high quality programs and instructors and college campus diversity) the rating scales to gauge preferences were presented to respondents prior to the task. Any combination of attributes were allowed in the task versions exposed to respondents. Figure B illustrates a task example with one version of the many potential versions offered to respondents generated randomly by the software.

If these were your only choices for college, which would you choose? Or would you choose not to go to college with the options presented?

Figure B: Example of a CBC Task

College University Type	Ivy League (e.g. Yale, Harvard, Princeton, Columbia, Brown, Dartmouth, etc.)	Private College/University (e.g. New York University, Pace University, Iona College Fordham University, etc.)	Public College/University (e.g., SUNY Binghamton, SUNY Stonybrook, City College, CUNY, etc.)	NONE: I wouldn't choose any of these
Average College/University Cost Per Year	\$9,650	\$54,084	\$33,480	
Desired Degree Availability	No	Yes	Yes	
Financial Aid Availability	No	Yes	Yes	
High Quality Degree Programs and Instructors	No	Yes	Yes	
College Campus Diversity	No Diversity (e.g. homogeneous student body)	Low Level of Diversity	High Level of Diversity	

Data Analysis

In a conjoint exercise, by independently varying the features that are shown to the respondents and observing the responses to the product profiles, the researcher can statistically deduce what combinations of attributes associated with college choice are most desired and which attributes have the most impact on choice. In contrast to simpler survey research methods that directly ask respondents what they prefer or the importance of each attribute, these preferences are derived from these relatively realistic tradeoff situations. Discover CBC provides 3 outputs for conjoint data analysis including, a full set of preference scores (often called part-worth utilities) for each attribute level included in the study. First, “utilities” are developed for each attribute levels to determine respondent preferences. The conjoint utilities are scaled to an arbitrary zero centered constant within each attribute allowing utility comparisons within the attribute levels. The second platform output produces importance percentages for each attribute. The importance percentages measure how much influence each attribute has on people’s choices. The third Discover CBC output are conjoint market simulators that allow the researcher to define specific contexts (e.g., specific college choice profiles in competition with another) and project the share of choices (shares of preference), given the respondent’s utility scores. These simulators provide the opportunity to create what-if scenarios for college choice (Sawtooth Software, 2018).

RESULTS

“Utilities” are developed for each attribute level in Discover CBC, so it can be determined what the respondent values within the attributes associated with college choice. As such, a utility estimate is the respondent’s subjective preference judgment representing the holistic value or worth of the attribute as presented. Moreover, the utility is an estimate from the conjoint analysis of the overall preference associated with each level of each attribute used to define college choice. Discover CBC creates a visualization of the attribute utilities. The utilities are calculated with a zero-based constant such that a positive utility score indicates relatively more preference than a negative utility, indicating less preference.

Specifically, when it comes to college choice, financial aid availability is preferred versus not. Public (State/City Colleges and Universities) have the highest utility, followed distantly by Ivy League Schools. Private Colleges and Universities hold the lowest utility scores, indicating lower preference. A college/university that has a student’s desired degree yields a higher utility, than those institutions that do not have a student’s desired degree. A college/university that has high-quality instructors and programs yields a higher utility, than those institutions that do not have a student’s desired degree. A lower cost of attending a college/university yields a higher utility, than those than more expensive options.

Higher levels of diversity associated with a college/university campus yields a higher utility, than those institutions with less diversity or no diversity.

Most of the respondents described diversity in racial and ethnic terms.

The utility scores were similar for the parents of college bound high school students and the college bound high school student segment in all areas except college type. Parents were more likely to prefer the ivy league college type (utility value = 2.1) than students (utility value = -1.2). The utility summary can be seen in Figure C.

Figure C: Utility Summaries Parents/Students/Total Sample

College/University Type			
Levels	College bound high school student (N=166)	Parent of a college bound high school student (N=311)	Total (N=477)
Ivy League (e.g., Harv...	-1.16	2.12	0.98
Private College/Univer...	-2.03	-4.80	-3.83
State University of Ne...	3.19	2.68	2.85

Average College/University Cost Per Year			
Levels	College bound high school student (N=166)	Parent of a college bound high school student (N=311)	Total (N=477)
\$54,084	-84.89	-92.72	-89.99
\$33,480 	-10.83	-10.42	-10.56
\$9,650	95.72	103.14	100.56

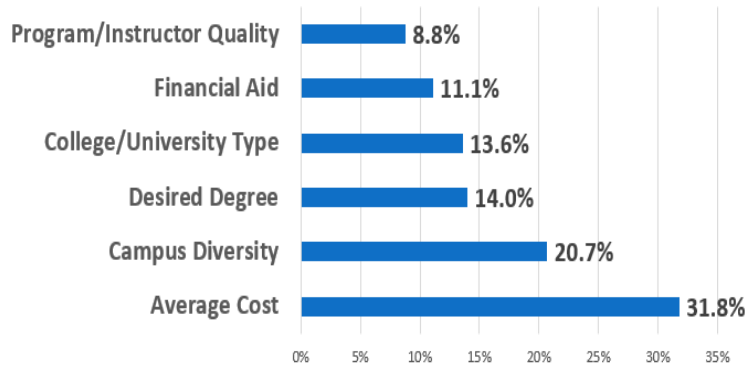
Desired Degree Availability			
Levels	College bound high school student (N=166)	Parent of a college bound high school student (N=311)	Total (N=477)
Yes	39.75	43.42	42.14
No	-39.75	-43.42	-42.14

Financial Aid Availability			
Levels	College bound high school student (N=166)	Parent of a college bound high school student (N=311)	Total (N=477)
Yes	35.09	32.27	33.26
No	-35.09	-32.27	-33.26

High Quality Degree Programs and Instructors			
Levels	College bound high school student (N=166)	Parent of a college bound high school student (N=311)	Total (N=477)
Yes	25.83	26.62	26.35
No	-25.83	-26.62	-26.35

College Campus Diversity			
Levels	College bound high school student (N=166)	Parent of a college bound high school student (N=311)	Total (N=477)
High Level of Diversit...	40.76	43.20	42.35
Low Level of Diversity...	-3.49	-5.22	-4.62
No Diversity (e.g. a h...	-37.27	-37.97	-37.73

The importance percentages with Discover CBC's platform measure how much influence each attribute has on respondent choices (Sawtooth Software, 2018). The research found that college and university diversity in terms of racial, ethnic, gender and socioeconomic status holds a relatively higher importance percentage among respondents, preceded only by the importance of the average cost of attending college as illustrated in Figure D.

Figure D: Importance Scores - Total Sample

The importance percentages followed this pattern and were similar for the parents of college bound high school students and the college bound high school student segment in all areas as illustrated in Figure E.

Figure E: Importance Summary - Parents/Students

Attributes	College bound high school student (N=166)	Parent of a college bound high school student (N=311)
College/University Type	14.55 %	13.07 %
Average College/University Cost Per Year	30.10 %	32.64 %
Desired Degree Availability	13.25 %	14.47 %
Financial Aid Availability	11.70 %	10.76 %
High Quality Degree Programs and Instructors	8.61 %	8.87 %
College Campus Diversity	21.79 %	20.18 %

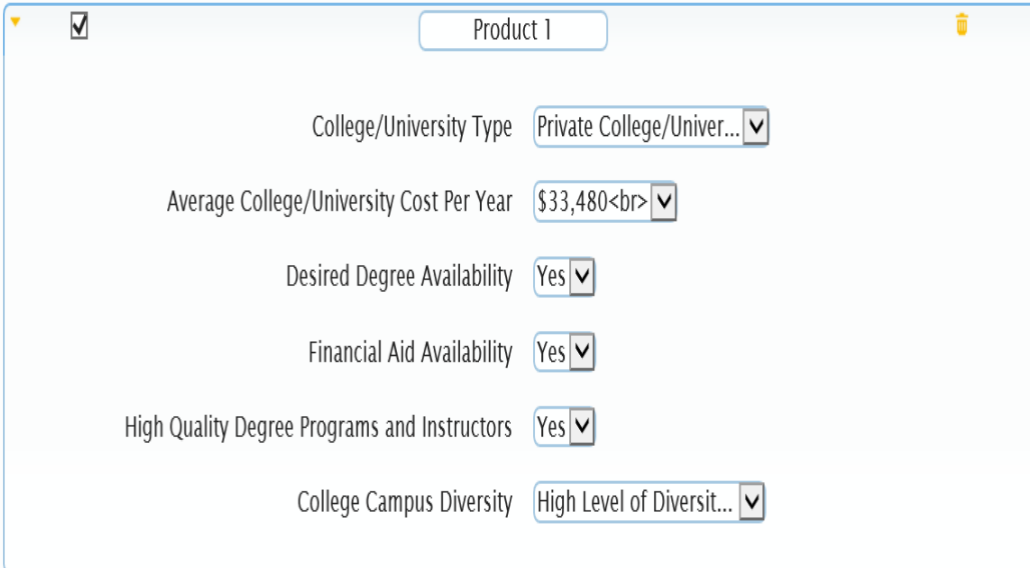
The market simulator with the Discover CBC's platform allows the researcher to conduct what-if scenarios to investigate which combinations of attributes provide the most impact among respondents. The market simulator allowed the analysis in this research to hold some college choice attributes constant while varying others to determine the optimized choice. As a what-if -scenario within Discover CBC's market simulator, college type and the associated average cost of that college type (\$54,000 for the ivy league option, \$33,480 for the private option and \$9,000 for

the public/state/city college type) were held constant in the research. Specifically, the private college/university type was held constant with its associated average cost of \$33,480 per year (The College Board, 2018).

This scenario was selected because of the large number of private colleges and universities that are hypothesized to lose potential lower to moderate income class students with the introduction of the Excelsior Scholarship (The National Student Clearing House Research Center). Also held constant and affirmative (i.e., available at the institution) in this market simulator scenario were the desired degree, financial aid and high-quality degrees and instructor attributes. The attribute that was varied in this simulation was the diversity level at the private college/university type.

Since there were 3 levels of the diversity attribute in the research (a high level of diversity, a low level of diversity and no diversity), there were 3 what-if scenarios generated to align with the diversity attribute levels. As such the market simulator produced 3 product types where “Product 1” showed high levels of diversity to respondents, “Product 2” showed respondents that no diversity would be present at the institution and “Product 3” showed respondents that low levels of diversity would be present at the institution. An illustration of the “what-if” scenarios follows in Figure F.

Figure F: What-if Scenarios



The screenshot displays a configuration window for 'Product 1'. It features a title bar with a checkmark icon on the left and a trash icon on the right. Below the title bar, there are six rows of settings, each with a label and a dropdown menu:

- College/University Type: Private College/Univer... ▼
- Average College/University Cost Per Year: \$33,480
 ▼
- Desired Degree Availability: Yes ▼
- Financial Aid Availability: Yes ▼
- High Quality Degree Programs and Instructors: Yes ▼
- College Campus Diversity: High Level of Diversit... ▼

Product 2

College/University Type Private College/Univer... ▼

Average College/University Cost Per Year \$33,480
 ▼

Desired Degree Availability Yes ▼

Financial Aid Availability Yes ▼

High Quality Degree Programs and Instructors Yes ▼

College Campus Diversity No Diversity (e.g. a h... ▼

Product 3

College/University Type Private College/Univer... ▼

Average College/University Cost Per Year \$33,480
 ▼

Desired Degree Availability Yes ▼

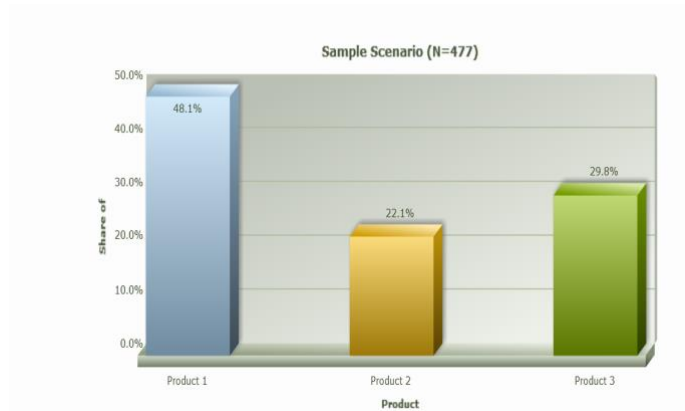
Financial Aid Availability Yes ▼

High Quality Degree Programs and Instructors Yes ▼

College Campus Diversity Low Level of Diversity... ▼

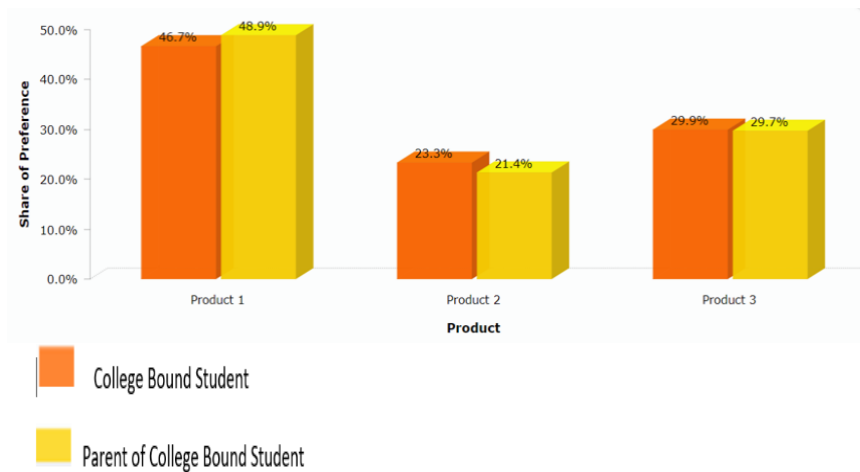
The results of the market simulator (Figure G) demonstrate that Product 1 is the optimized college/university choice. Product 1 simulates the high levels of diversity versus the other simulated options (Product 2 and Product 3) that show no to low college/university diversity levels respectively while holding all other attributes constant as discussed.

Figure G: Market Simulation – Total Sample



The optimized college choice criteria scenario of Product 1 (demonstrating high levels of institutional diversity) yielded similar results in the simulation among both the parents of high school students and the college bound high school student segment illustrated in Figure H.

Figure H: Market Simulation – Parents/Students



CONCLUSIONS

In the United States, more than half of Americans reported that higher education is not on track in this country. The majority of this group indicated that high tuition costs are a major reason why this is a belief (The Pew Center, 2018). As such, the cost of going to an institution of higher education is an important consideration for Americans. The findings from this research study demonstrate that among lower to moderate income college bound high school juniors and seniors in New York State and parents of this segment, the average cost of going to a college/university is among the most important choice criteria for an institution of higher education's selection. As such, The Excelsior Scholarship supports an important choice criterion for college/university selection in New York State, a reduced cost.

The research also explored what other criteria factor into the decision of college/university choice in addition to the cost among lower to moderate income college bound high school juniors and seniors in New York State and parents of this segment. The research found that campus diversity followed the average cost of college/university attendance as an important choice criterion. Moreover, the results of the Discover CBC market simulator further demonstrated the strength of the diversity attribute to influence college choice. The market simulation where the diversity level (high diversity, low diversity or no diversity) was varied, while holding other attributes constant, showed the simulated option with high diversity to be the optimal college/university choice among all respondents surveyed.

Sawtooth Software is a leading developer of technology in the area of information management for complex problems; especially when understanding and predicting respondent choice is required. The first version of CBC software was released by Sawtooth Software in 1993 as a desktop solution and now the developer has created a smarter system to address complex problems with Discover-CBC, released in 2014. This is a more streamlined technology that is a web-based application for CBC. The researcher used Sawtooth Software's Discover CBC as an information management system to complete the data collection and analysis for this research to gain insight into the complex problem of choice criteria in higher education. As such, the Discover CBC SaaS platform is an effective tool to help understand and predict consumer choice.

Theoretical And Practical Implications

Enrollment numbers in institutions of higher education are predicted to be flat or down in the coming years in the United States (The National Student Clearinghouse

Research Center, 2018). The Northeast may be most affected because of its greater concentration of higher-education institutions and a projected drop in the student population in the area. In addition, a challenge to college/university enrollment numbers is the rising cost of higher education. High costs make higher education an unmanageable option post high school for American families. This may be especially true for those families with college bound students with lower to moderate incomes. The Excelsior Scholarship, with its free tuition benefit for qualifying families may be attractive where the student is required to attend a public college/university in New York State. Since cost is an important college/university choice criterion, The Excelsior Scholarship may create competitive enrollment pressure on non-public institutions to attract New York State college bound high school students from low to moderate income households.

Rational choice theory may help to explain the importance of cost considerations in higher education as found in this research. The theory assumes that all people try to actively maximize their advantage in any situation and therefore consistently try to minimize their losses. The theory is based on the idea that all humans base their decisions on rational calculations, act with rationality when choosing, and aim to increase either pleasure or profit (Mathis, Steffen, 2015).

This economic principle assumes that individuals always make prudent and logical decisions that provide them with the highest amount of personal utility. As such, these decisions provide people with the greatest benefit or satisfaction given the choices available. Moreover, the choices are theorized to be in the individual's highest self-interest. The rational choice paradigm does not provide or even purport to provide intentional explanations of social phenomena. Instead, rationale choice theory is best utilized as a set of tools useful in developing straightforward causal explanations of social phenomena (Lovett, 2006). As such, colleges/universities in the non-public sector (in New York State especially), may need to promote the value of their educational brand to effectively attract lower to moderate income students to their respective institutions. Revaluation and refinement financial aid packages may work towards this end as well because a lower cost college/university selection is a rationale choice among the lower to moderate income families where disposable income is limited.

The findings of this research have practical applications reflecting demographic trends in the United States. Specifically, the research found that second to average cost, college/ university diversity in terms of racial, ethnic, gender and socioeconomic status is a key choice criterion for the selection of an institution of higher education. Most of the respondents described diversity in racial and ethnic terms. The respondents in this study are members of Generation Z and parents of

this age cohort. Generation Z (individuals born 1996 and after) are projected to be the largest age cohort in the United States and they are the most racially and ethnically diverse (The United States Census, 2012). Moreover, Gen-Z is not just diverse in terms of absolute numbers, but they also hold a more positive view of the rising ethnic diversity in America than prior generations (Fromm, & Read, 2018). This group is also attracted to people who are of different ethnicities and races.

As such, in an environment where colleges/universities may be competing for a shrinking pool of potential students, institutions of higher education may need an enhanced focus on how to see the world through the diverse eyes of Gen Z. To better attract this age cohort to their institution, promotion of its diversity may be well served. The application of self-image congruence models are used in marketing products and services but may be applied effectively in the marketing of institutions of higher education, especially as it relates to diversity. Specifically, self-image congruence models predict that products will be chosen when their attributes match some aspect of the self (Solomon, 2017). These models assume a process of matching between product image and the consumer self-image. Therefore, Gen Z may be more likely to choose a college/university (the product in this case) where their diverse backgrounds are reflected.

METHODOLOGY IMPLICATIONS FOR FUTURE RESEARCH AND PRACTICE

This study utilized conjoint analysis as a quantitative research technique to understand college/university choice criteria. It was executed using a descriptive research design and is based on statistical analysis using data captured in a survey in the Discover CBC SaaS platform. This methodology helped determine how respondents as consumers value different attributes as related to college/university choice.

For the topic of college/university choice, there would be much value in qualitative inquiry in addition to quantitative because college/university choice involves so many attribute dimensions. With qualitative inquiry, insights can be garnered from hearing the voices of participants in a setting that would not be heard as intimately in a quantitative method of data collection (Creswell, 2009). Specifically, in qualitative studies, the research participant can tell his or her own story and create meaning-making that can be intrinsically beneficial to deeper understanding of human motivation. Moreover, a qualitative setting allows an opportunity to explore how and why phenomena occur in a more naturalistic setting where findings are in the respondent's own words and lived experiences (Miriampolski, 2008).

As an example, the parents of college bound high school students preferred the ivy league college type to public and private options and this differed from students. Like students however, parents preferred the less costly options associated with college/university choice and a more diverse college campus. Qualitative research would allow the researcher to probe more deeply to explore this possible paradox. This is because the ivy league college type is typically the more expensive college/university option associated with college choice. In addition, the ivy league college type typically has lower campus diversity (The College Board, 2018), (Ashkenas, et. al. 2017). As such, qualitative inquiry to further probe and thus explain the psychological and economic decision-making when it comes to college/university choice could yield additional insights to inform the research questions explored in this study.

Behavioral economics draws on psychology and economics to explore why people make choice decisions that are sometimes irrational. The discipline explores why and how consumer behavior does not always follow the predictions of economic models. Future research on this topic would explore the cross-sectionalism of rational choice theory with behavioral economics to uncover the psychological insights into human behavior associated with college/university choice.

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