

EVALUATING THE INTERESTS OF BUYERS IN A VOLUNTARY ECOSYSTEM  
SERVICES EXCHANGE

A Thesis

by

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This thesis meets the standards for scope and quality of  
Texas A&M University-Corpus Christi and is hereby approved.

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August 2017

## ABSTRACT

Ecosystem services provide essential benefits that humans rely on for life, and humans have put substantial pressures on natural systems that provide these services. Numerous efforts have been made to halt, or reverse, this trend; however, new mechanisms are needed to support restoration and conservation efforts. Payment for ecosystem services (PES) is an approach by which resources are funneled toward these objectives. While compensatory mitigation markets are in place—and are evolving—research regarding the interests of market participants in voluntary arrangements is underdeveloped. It is important to note that compensatory mitigation is geared toward “no net loss” compliance and therefore cannot be said to be improving the status quo. To better understand the interests and expectations of the voluntary buyer, we wanted to know if those buyers are willing to participate in a voluntary market, how they would like it to function, and what they might want it to deliver. After surveying 300 respondents, from three separate groups of 100 each (architects, businesses, NGO’s), results suggest there is significant enough interest in these voluntary purchases to develop them further. In addition, survey respondents expressed the desire to engage with a voluntary market that would also support business objectives. Results indicate that there is a willingness to participate in these types of arrangements and that the desires of the different groups are similar.

## DEDICATION

For my daughter, Abilyn Quinn, and her children.

## ACKNOWLEDGEMENTS

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## INTRODUCTION

### ECOSYSTEM SERVICES

Ecosystem services (ES) are the services provided by nature that humans depend on for vital environmental functions, as well as for benefits related to the quality of life (TEEB, n.d.; D. Yoskowitz, Carollo, & Santos, 2013). Given an unprecedented level of degradation in marine and terrestrial ecosystems, the need to find ways to protect and restore these ecosystems and the ES they provide is pressing (Millennium Ecosystem Assessment, 2005). Within market-based approaches, payment for ecosystem services (PES) is emerging as a vehicle to provide income streams for restoration, sustainable use activities, land management and conservation (Mercer, Cooley, & Hamilton, 2011; Salzman, 2010; UNEP, 2008). PES incentivizes landowners to alter their patterns of land use towards conservation through monetary compensation. In the past few years, a growing body of work has discussed what ES buyers may look like in theory (DEFRA, 2013; Ezzine-de-Blas, Wunder, Ruiz-Pérez, & Moreno-Sanchez, 2016; Mercer et al., 2011; Mulder, ten Kate, & Scherr, 2006; Salzman, 2010). However, little has been done to identify the main attributes of voluntary buyers and to approximate their interests and perceptions regarding PES. This study proposes to identify possible voluntary buyers of ES and gain insight into their level of interest and desired outcomes.

Typically ES have been divided into categories: provisioning, cultural, supporting, and regulating services (Millennium Ecosystem Assessment, 2005; Saarikoski et al., 2015; TEEB, 2010; Yoskowitz et al., 2016). Supporting services include those from habitat, pollination, as well as the maintenance of genetic diversity and others. Regulating services are many and varied and include carbon sequestration, pollination, erosion prevention, and wastewater treatment.

Provisioning services relate to the ES that provide material or energy, such as fresh water, raw materials, and food. Cultural services include benefits afforded to human's spiritual experience, recreational opportunities and tourism (TEEB, 2010). Recent discussions have begun to look at ES in terms of the final goods and services produced (Landers & Nahlik, 2013). However they are classified, the wide range of benefits afforded by ES show they are of vital importance to people and have value—both monetary and non-monetary.

Ecosystem services were seen by economists as being “free” in classical economic thinking. Neo-classical philosophies, despite some progressive thinking regarding depletion, generally excluded ES, as they had no exchange value (Gomez-Baggethun, de Groot, Lomas, & Montes, 2009). Originating in the natural world, these free inputs (resources available without cost) have often been perceived as a given and as such, were rarely protected. This led to the exploitation by industrialized societies of valuable material resources with apparent little forethought in terms of sustainability or future conservation. Recently, the interaction of long-term environmental, economic, and societal changes has increased the degradation of ES within coastal habitats (Millennium Ecosystem Assessment, 2005). The MEA report expresses that, “human activity is putting such strain on nature that we are undermining the Earth's capacity to support current and future generations. We are living beyond our means: recent gains in quality of life have come at considerable cost to the natural systems on which we all depend” (Island Press, 2007, p. 2). In terms of sustainability, it is worth noting that the MEA report found that current demands on ES are so great they are worsening opportunities for the people of today and tomorrow. Given this description of the current situation, it is important to understand that ES are vital, they are being overburdened, and action needs to be taken.

## PAYMENT FOR ECOSYSTEM SERVICES (PES)

To help remedy the problem of environmental degradation, one possible solution is taking shape in the form of PES. PES are mechanisms by which an income stream is directed from public and/or private entities toward land management, conservation, sustainable-use activities, and other restorative measures (UNEP, 2008). Payment for ecosystem services has been used as a tool to internalize the environmental externalities that result from some human actions, as happens in mitigation banking (Bellver-Domingo, Hernández-Sancho, & Molinos-Senante, 2016). Voluntary PES markets can broaden its application by increasing the access to these markets to any interested party. In this fashion, landowners can receive financial compensation for making land use decisions that meet the expectations of the buyers. While simple in theory, the practical application has proven thus far to be extremely adaptable to accommodate complex situations, which is evidenced by numerous case studies (DEFRA, 2013; Leimona, van Noordwijk, de Groot, & Leemans, 2015). For example, governments can pay for ES from tax revenue, businesses can pay for ES and pass the costs through, and the actual end user can pay for ES—like paying for a ticket to enter a National Park (WWF, n.d.). This adaptability can be seen as both a strength and a weakness. Adaptability is a strength of PES in that it allows for its application across geographies, cultural boundaries, and to a variety of problems (UNEP, 2008). However, despite this flexibility, it has come into question if the PES contracts are adaptable enough to different conservation scenarios and local conditions once in place (Hayes et al., 2015). Adaptability has come with a cost, too, in a reduction of uniformity across the spectrum of PES applications. PES deals are often constructed on a one-off basis, resulting in a high degree of specificity per transaction (Island Press, 2007; Mercer et al., 2011; Salzman, 2010; Waage, 2007). This can increase transaction costs, potentially limiting

participation. One implication of this fragmentation is that there are currently a limited number of frameworks available to execute these transactions and evaluate the evolution of the tool generally.

In theory, functioning of the market mechanism should determine pricing that is suitable to all involved, yet the structure of the exchange may affect the willingness of participants to engage in transactions. In current US schemes, much of the activity in PES is often regulatory in nature, as mandated by the permitting processes of the US Corps of Engineers (commonly referred to as 404 permitting: named after the appropriate section of the Clean Water Act) (Owley, 2013). These mitigation banks have seen significant growth since inception, expanding from one bank (the first) in California in 1995 to hundreds nationwide in 2012 (Bunn, Johnson, & Moyle, 2014). A mandated action is not one that allows for the dynamic nature of price discovery to occur organically but is a line item “must have” included in the cost of doing business. Consequently, this may not be the best place to determine buyers’ willingness to participate on a voluntary basis. Furthermore, mitigation banks require high levels of verification to sell offset credits (Laska, 2008; Strand, 2009). Participants in a voluntary ES exchange are not beholden to the same rules though they may want some level of verification. Understanding that more verification probably means more cost, it will be imperative to understand the balance that voluntary buyers want between cost and verification. I expect to find that they want more than minimal verification (enough to give the transaction legitimacy) but not so much as to make participation cost prohibitive. Finding out what the buyers want this to look like will be a crucial part of the design and success of the marketplace.

In addition, current PES structures are extremely fragmented; there is no centralized repository readily available that gives these structures transparency—both in terms of price and

time—as they relate to transactions (Ezzine-de-Blas et al., 2016). There are case studies and annexes detailing who the buyer and seller were and the scope of some individual projects, but pricing information is scarce (DEFRA, 2013; Leimona et al., 2015). Without this background of historical pricing, it is difficult to estimate where pricing will likely garner buyer interest, so that may not be a fruitful endeavor (Gomez-Baggethun et al., 2009). In addition to the lack of transactional information, there is also a lack of information regarding the desired outcomes of the voluntary buyer in a PES marketplace. Studies are beginning to try to describe this market segment, such as the work done by Roesch-McNally and Rabotyagov (2016), but that research is aimed at comparing interest in mandatory vs. voluntary payments systems. This type of investigation often revolves around the “willingness to pay” (WTP), which mainly targets individuals and how much they say they are willing to pay for various restorative efforts. Currently there is a gap in this type of information that, if filled, would help builders of PES platforms be more effective identifying the buyers and defining their level of interest and their desired outcomes. Instead of being concerned with WTP and/or willingness to accept (WTA), the focus would be on the design of the market and the deliverables—letting the market set the price. By understanding the needs and wants of the buyers, the *marketplace itself* can be constructed to make those deliverables possible.

To dissect the use of market mechanisms in the realm of conservation, it is beneficial to clarify a few foundational concepts. The first of these is the idea relating to the “market.” When non-business oriented individuals hear the term, the thought that may come to mind might be “money.” There has been much interest from both the investment community and the academic community regarding how to harness conservation finance (Bos, Pressey, & Stoeckl, 2015; Credit Suisse, WWF, & McKinsey & Co., 2014). When the environmental manager thinks about

finance, they are thinking in terms of money coming into their coffers. When the capitalist thinks of finance, they are thinking in terms of generating *return on investment* (ROI). While these ideas may not be mutually exclusive, it is an important distinction, as the players may be looking at the “market” from different points of view and with different expectations (Bos et al., 2015). In terms of the mitigation/compensatory markets, there is no ROI, but rather the purchase of credits from a bank is simply a line item expense in the permitting process. In terms of the environmental manager (particularly of public lands), one of the challenges is that they need to offer the ROI investors demand to commit large amounts of capital or redefine how they are positioning the ROI they can offer. For these reasons, it might clarify the general understanding of PES to separate the mitigation/compensatory and the ROI seeking activities from the purely voluntary PES discussion. While all of these activities are voluntary by definition, they have such different points of aim that keeping them in one discourse muddies the issues. Without this clarification, those discussing the issues from different points of view are prone to misunderstanding.

Compensatory mitigation is designed to offset the damages caused by human activities for regulatory purposes, usually associated with the US Army Corps of Engineers “404” permitting process (US Army Corps of Engineers, 2010). Again, the term 404 comes from the relevant section of the legislation mandating the action. This process is a useful tool and is typically employed for permitting and the goal of “no net loss” to wetlands (Hook & Shadle, 2013; Womble & Doyle, 2012). It is difficult to classify the “no net loss” policy as proactive conservation when it is designed only to offset destruction elsewhere. ROI driven investment is designed to deliver a return on capital, so it will only be drawn to efforts that can provide this. While this green investing has potential benefits to the environment and the investor, this

mechanism will only funnel money into projects that can offer those returns. The structure of these devices—mitigation and green investing—has emerged to cater to the goals of the relevant players, and using the same frameworks for the purely voluntary buyer may simply not make sense.

## RESEARCH OBJECTIVES

There is currently a lack of information regarding the characteristics and desires of the possible buyers in a voluntary ecosystem services exchange. This research tested the following hypothesis: **Voluntary buyers from for-profit and not-for-profit organizations will be willing to participate in an ecosystem services exchange.**

To this end, the following research questions were addressed:

- **What do buyers want the transaction to look like?**
- **What do buyers hope to gain from the transaction?**
- **What level of verification do these buyers want in place?**

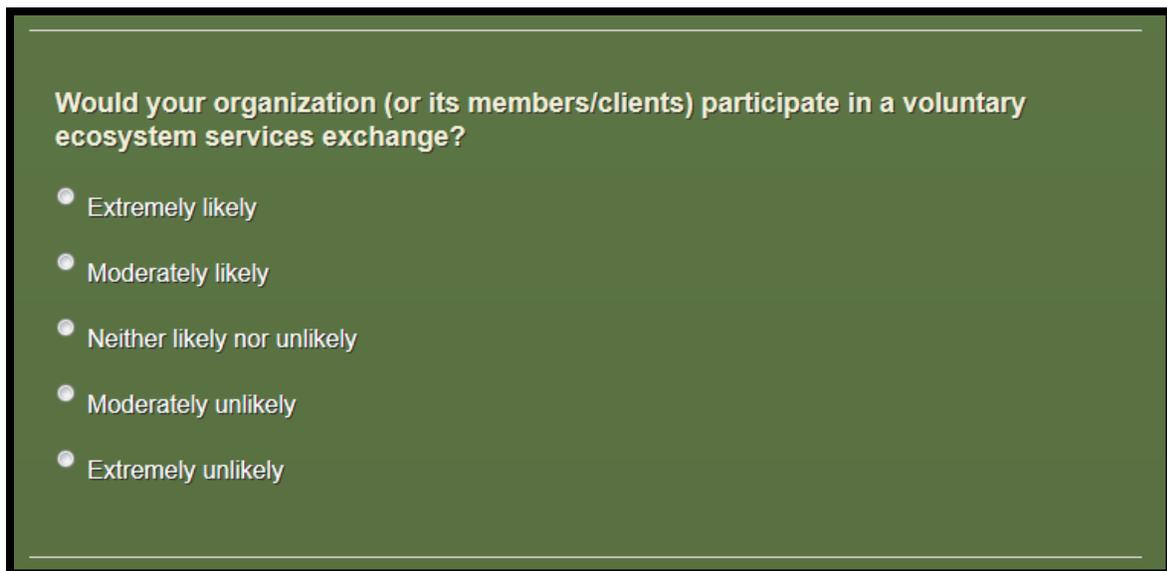
## METHODS

This section characterizes the methods, instruments, sampling techniques, and data analyses that were used to address the research questions outlined above.

### SURVEY

To answer the research questions, we designed and fielded a cross-sectional survey, which used non-probability (purposive) targeting with quotas to quantify the interests and describe the expectations of potential buyers in a voluntary ecosystem services exchange. From the population of those who may be interested in participating as buyers in a voluntary

ecosystem services exchange, the sample frame was comprised of a construction group (architects/builders/general contractors), an NGO group, and a group of other businesses. Survey design came after a literature review, engagement with researchers at the interdisciplinary Harte Research Institute, and with the team at Rice University's Severe Storm Prediction, Education and Evacuation from Disasters (SSPEED) Center between fall 2015 and spring 2016. From these experiences, we determined that the information available regarding potential buyers in a voluntary arrangement was underdeveloped and that we might fill some of the gap in this knowledge by exploring that space. All groups responded to an identical set of questions and then responded to additional questions that were specific to their subset. The questions were constructed in a variety of formats, including Likert Scaled questions, multi-select type questions, and open-ended questions. An example of one of the questions can be found in Figure 1, and a complete version of the survey, and the information provided with it, can be found in the Appendix.



**Figure 1: An example of a Likert Scale question from the survey.**

After developing the survey during the spring and fall of 2016, the survey was built on the Qualtrics platform, and pilot testing began by sending the survey to 10 respondents who had general familiarity with the concepts. After receiving feedback from this pilot, the survey was edited and sent to another 10 respondents, half with prior knowledge of the material and half with none so that we could understand how functional the survey was for non-experts. Respondents from the second pilot were interviewed about their experience, and the survey was edited again.

Through this process, not only were the survey questions evaluated and modified, but also the background information, definition of terms, and how this information was presented were also refined. When the survey was fielded, a piece of background information was presented at the start of the survey, then the definition of terms was presented at the beginning of both the section that all groups saw, and each group's particular questions. That way, the information was readily available to the respondents and eliminated the need for them to reference another page of verbiage or click a link. Both the preliminary information and the in-survey information is available in the Appendix.

Qualtrics was retained to conduct the online survey. Their staff was also used to further improve the survey flow and function. This involved sharing the survey with the initial point of contact, who had both front end and back end experience and access to Qualtrics' subject matter experts. After this review, a project manager was engaged to provide further expertise. After incorporating some of their logistical suggestions, the survey was again piloted (via Qualtrics) to 30 respondents. This data was collected and scrutinized, and the survey was adjusted. Following this iteration, the survey was sent to 15 respondents, and after quality assurance diligence was performed, the full sample of 300 was collected.

## SAMPLING

Due to the specialized nature of the study, a purposive sampling technique was used to identify survey participants. This technique is valid and effective when the target sample is a subset of the population that has specialized knowledge (Bernard, 2006; Tongco, 2007). The samples were collected from throughout the contiguous US, and respondent locations are plotted on the following map in Figure 2:



**Figure 2: Map of survey respondent locations across the contiguous US (+1 in AK).**

Respondent groups were chosen from the for-profit and non-profit sectors. The for-profit sector has a history of philanthropy generally and thus has empirically demonstrated their willingness to fund many different causes. If they generate pollution, they may have a desire to

further branding efforts via voluntary mitigation, and if they have a significant number of employees in the community, they may want to protect and enhance that community. In addition, during the preliminary research, the idea of voluntary carbon neutrality seemed to be gaining traction and growing over the past decade (Hamilton et al., 2008). Architects/builders may use this type of arrangement to offer their clients an avenue to green certification, which may enable them to work around building site constraints. Interest groups, or non-profit organizations, may see these arrangements as a way to funnel their dollars to projects that support their mission without having to engage in the actual transformative labor involved in project execution. Groups are summarized on Table 1.

<b>Buyer Groups</b>		
<b>Construction</b>	<b>Other Businesses</b>	<b>Other NGOs</b>
<ul style="list-style-type: none"> <li>• Architects</li> <li>• General contractors</li> <li>• Builders</li> <li>• People in these fields that have an interest in “green” certification</li> </ul>	<ul style="list-style-type: none"> <li>• Culture of philanthropy</li> <li>• Plan for Carbon neutrality</li> <li>• Outreach Programs</li> <li>• HR-recruiting, employee relations</li> </ul>	<ul style="list-style-type: none"> <li>• Non-profits</li> <li>• Foundations</li> <li>• Interest groups</li> </ul>

**Table 1: Potential buyer groups targeted for data collection.**

Qualtrics hosted the survey and was contracted to collect the data from 300 survey respondents (100 from each group). Qualtrics is a member of the European Society for Opinion

and Marketing Research (ESOMAR) and has a published ESOMAR 28 document. In addition to following ESOMAR's best practices, Qualtrics complies with ISO 20252 for Quality in Market, Opinion and Social Research. Qualtrics utilizes Grand Mean certified sample partners; to ensure validity and prevent duplication, they check every IP address and apply digital fingerprint technology. For niche groups, Qualtrics uses specialized recruiting campaigns and collects hundreds of attributes to build respondent profiles. They also employ "speed bump" logic to ensure that recorded responses are not made too hastily. If respondents were completing surveys in under a minute and a half, they hit the "speed bump" and their data was not collected.

Qualtrics embraces an "opt-in" approach, meaning the default for any respondent is to reject them from inclusion in data collection unless that respondent has proactively identified himself or herself as belonging to a group. This quality control was taken a step further with the inclusion of an additional screening question at the outset of the survey. This question was set up as a "check all that apply," and the respondent was not given an opportunity to take the survey if they didn't check the response coded to opt them in. To increase the chance that this filter would have the desired effect, respondents were not given information about the survey or who was carrying it out before they had to respond to the screen out question. Even the browser window that popped up was sanitized so that the window itself was only titled "survey." Questions about an individual's opinion were not asked, and therefore, the survey did not require IRB approval. All questions were focused on business activities and perceptions.

Data was collected in early March 2017, and quality control/quality assurance checks were carried out. To do this, there were two open-ended questions that were examined. The survey was written so that all questions had to be answered for the survey data to be recorded, so unintelligible responses—such as "asdf"—were kept. Here, it may have simply been the case

that the respondent had nothing to say. Also, responses of the “none,” “We don’t,” and “I’m not sure,” variety were kept. The only samples that were rejected were the ones where a respondent took the time to write in the blank but with something clearly not related to the survey. Examples of these types of responses include “Meth” and “a mediano plazo.” After this analysis was done, eight of the recorded surveys were rejected (<3%), and Qualtrics reopened the survey to complete the collection for a total of 300 respondents and delivered the data both via their online report generation tool and via email in a data (CSV) file.

## DATA ANALYSIS

After data collection, the raw data was transferred into an Excel spreadsheet (Microsoft Office Software Package). Efforts were made to minimize the amount of data entry via direct import via CSV file. To avoid collecting surveys with missing data, only completed surveys were recorded. Summary statistics were initially gleaned from Qualtrics’ reporting platform. Exploratory statistical analysis was performed using the software R. Tests were selected based on the distribution of the data. Mean, median, and distributions (typically boxplots) were explored first to study the structure of the data. Then, differences between and within group responses (means) were tested with Westfall adjusted Tukey contrasts. Chi squared and Borda frequency weighting were used where appropriate. In most cases, binomial p-value calculations were able to be utilized to measure significance, and in the case of the ROI responses, this was done by using the binomial to arrive at the Bonferroni corrected 95% confidence intervals.

## RESULTS

Results are presented with a summary graphic, followed by the breakout of the metric by group, which are followed by the statistical analysis of the survey item being discussed as appropriate. All bar graphs depict choice count.

### WILLINGNESS TO PARTICIPATE

Organizations were asked if they would participate in a voluntary ecosystem services exchange and how they would like it to function. We asked: “*Would your organization (or its members/clients) participate in a voluntary ecosystem services exchange?*” Answers were formatted to collect Likert type data, meaning they could range from extremely likely to extremely unlikely, but there was no defined interval between those stops. When looking at all groups combined, 68% of respondents fell into the “extremely likely” and “moderately likely” categories with 22% “neither likely nor unlikely,” as shown in Figure 3.

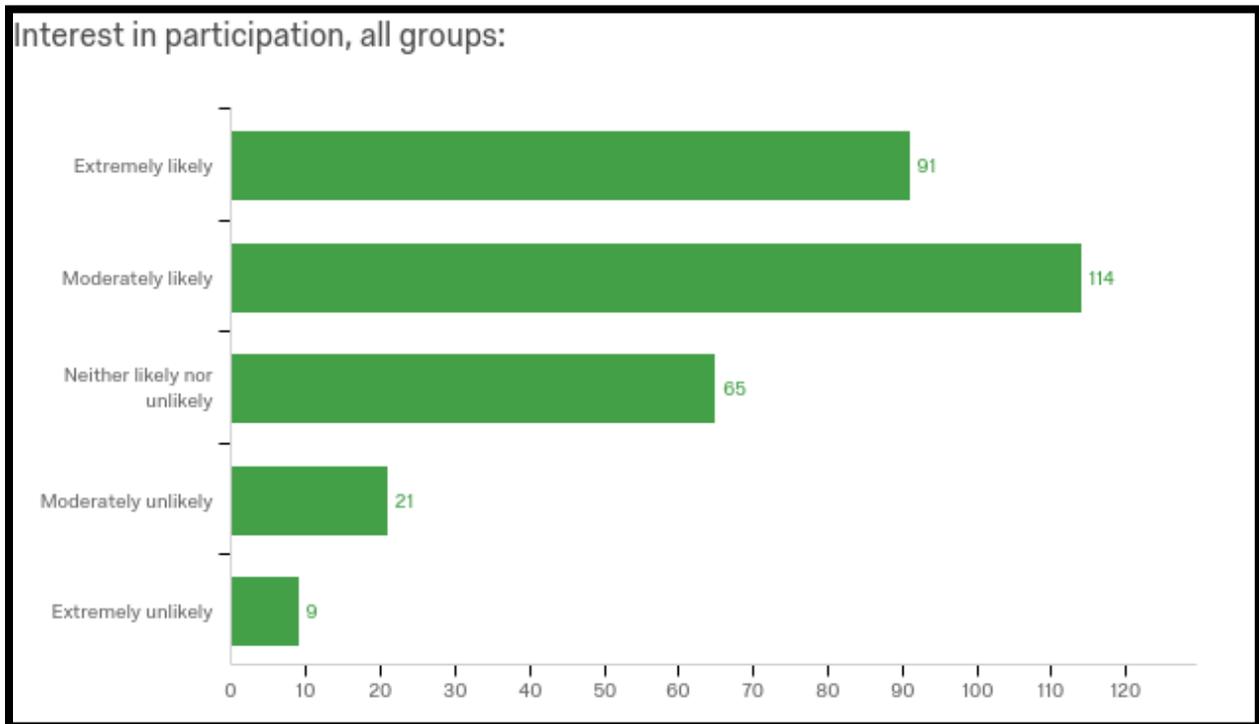
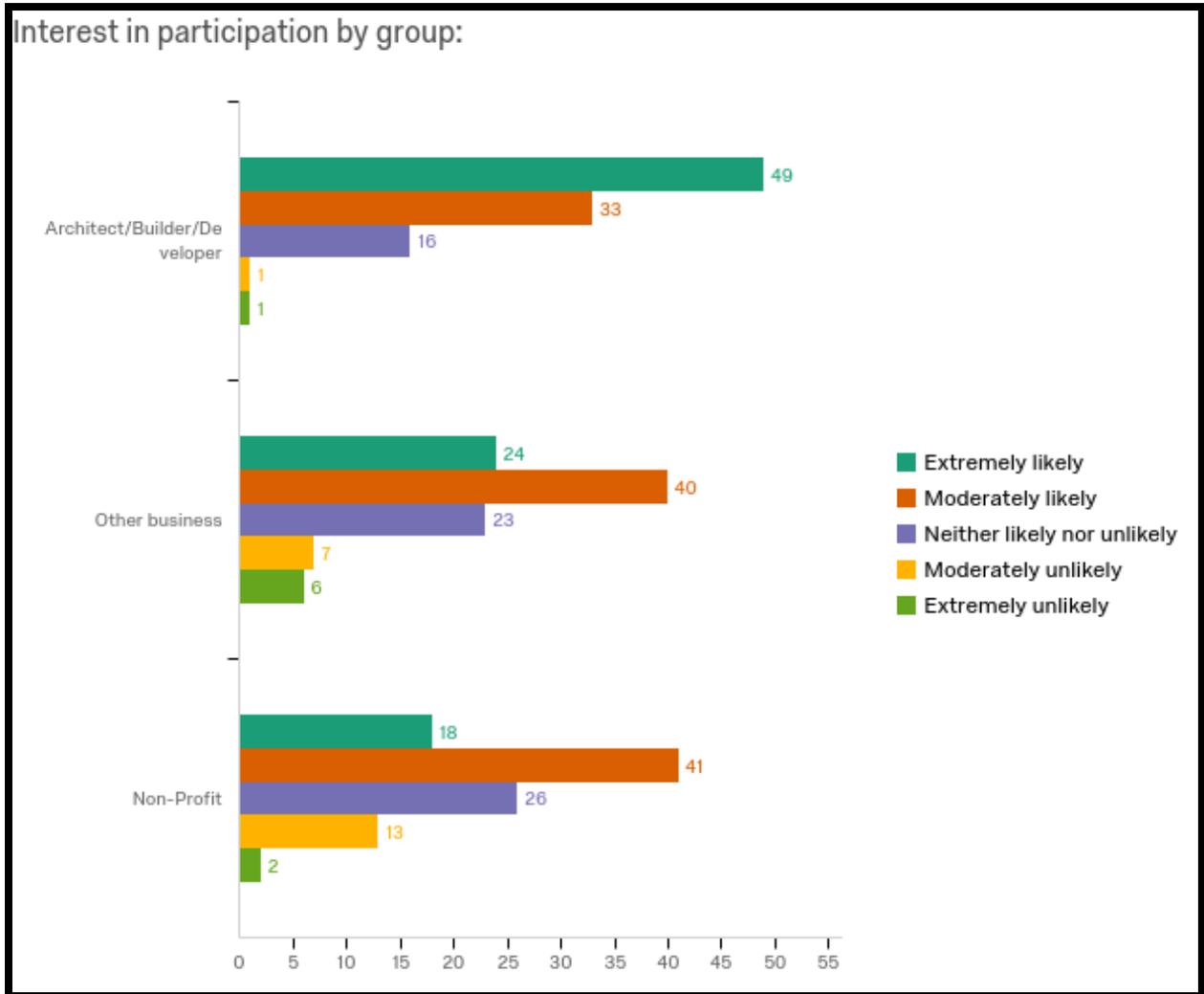


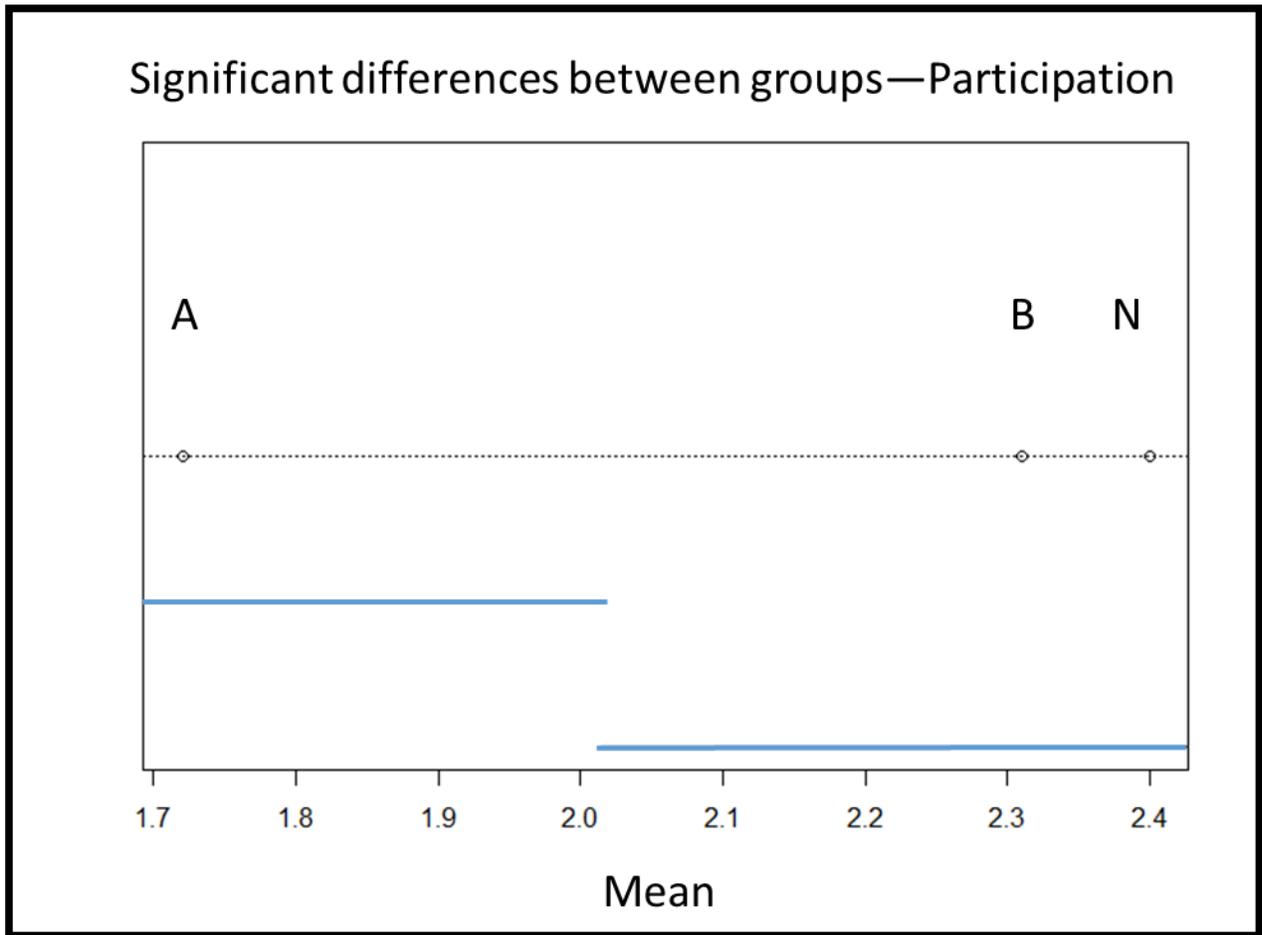
Figure 3: Summary statistic of all groups’ willingness to participate in a voluntary ES exchange.

To see how each separate group responded, we pulled them out and compared them to each other, as seen in Figure 4:



**Figure 4: Interest in participating in an ecosystem services exchange, as expressed by group.**

The architects are driving the response rate in the “extremely likely” category, but “other businesses” and the “Non-Profit” group look very similar. To see how similar they were and if the architects were different, we ran the analysis of variance, and the results (with Westfall adjustment) are below (Figure 5). Note that responses were coded 1 – 5, with 1 being “extremely likely” then moving to 5 (“extremely unlikely”).



**Figure 5: Analysis of variance between groups’ willingness to participate in an ecosystem service exchange.**

**“A” = Architect/Builders, “B” = other Businesses, and “N” = NGO**

The ANOVA indicates that the Architect/Builder group is significantly more likely to participate in an ES exchange than the other two groups, and there is no significant difference when comparing those two remaining groups against each other. In the graph above, means not connected by blue lines are not significantly different. The median of all groups is 2, and the 95% confidence interval of the mean is 2.0267-2.2599, and from the Westfall test, all means by group are lower than 3.

To test the hypothesis, that people will participate in a voluntary exchange, we looked at the results by totals and individual groups. The Westfall values above are predicated on calculations typically used for continuous data, so separate binomial calculations were also performed to generate more meaningful p-values in an evaluation of “yes or no.”

The middle response (“neither likely nor unlikely”) was numerically coded as a 3 on the Likert scale. In reality, we would expect some of those to move toward likely, and some toward unlikely, but for the purposes of this test, they were all coded as “unlikely,” a conservative reporting of results. Percentages were then examined by comparing the groupings of the two “yes” answers and the three “no” answers to see if they were significantly different from a probability of 50%. This probability was chosen because any respondent can indicate one of two preferences: yes or no.

For all groups combined, the results significantly supported the failure to reject the hypothesis with a p-value < .001 and a 95% confidence interval of 0.6274 - 0.7356. These results, and those from the groups, are on the following Table 2:

Group	P-Value	95% Confidence Interval	Probability
All Groups Combined	<.001	0.6274 - 0.7356	68.33%
Architects/GCs	<.001	0.7305 - 0.8897	82%
Businesses	.007	0.5379 - 0.7336	64%
NGOs	.0889	0.4871 - 0.6874	59%

**Table 2: P-values of respondents as a whole, and by group, in terms of willingness to participate in an ES.**

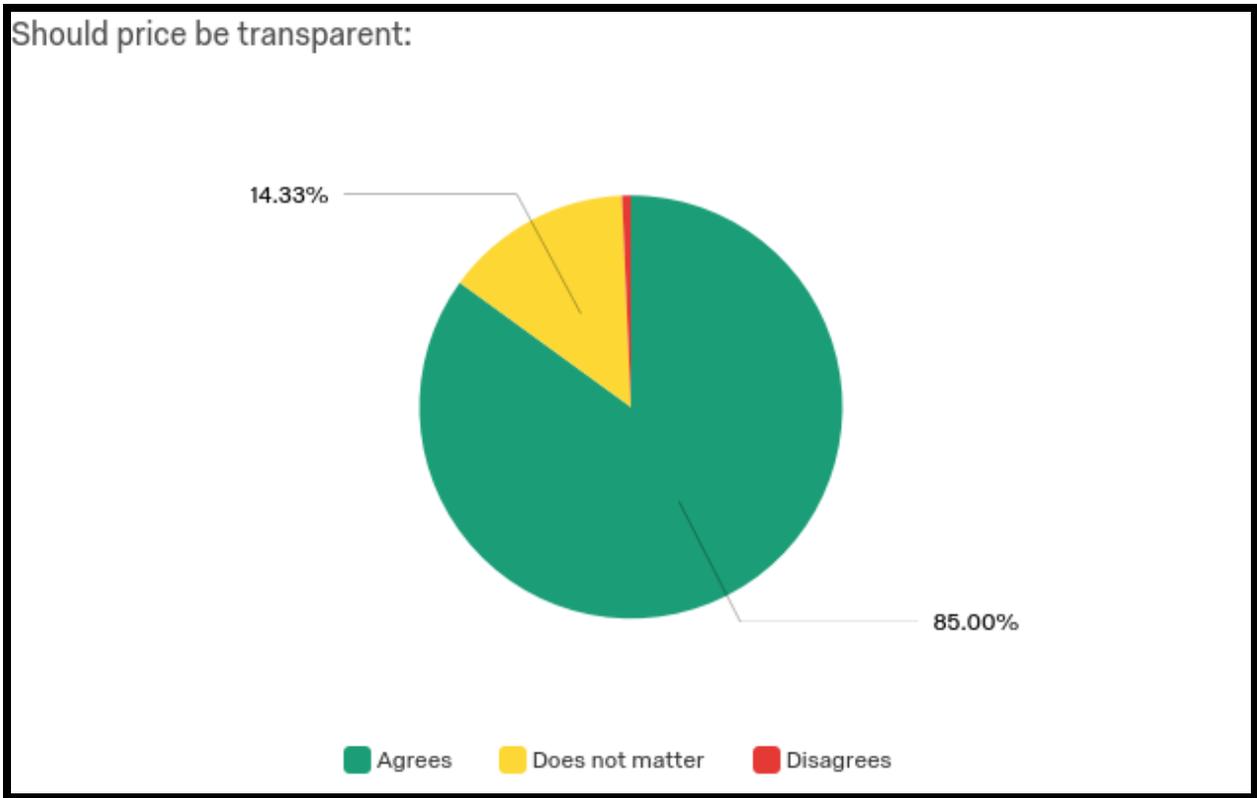
Non-profits were also asked if they thought that being able to offer their members access to an ES exchange would be useful for fund raising efforts. The majority responded in the

affirmative with a 78% chance of an individual saying it would be useful, with a corresponding p-value < .001.

All groups expressed their willingness to participate in a voluntary ecosystem services exchange in terms of mean, but when the binomial p-value was calculated, the NGOs cannot be described as having a significant chance of participating when alpha of .05 is used. Of the 100 responses in the calculation, 26 were marked “neither likely nor unlikely,” and all of these were coded as “no” responses. The construction group led the way, followed by the other businesses then the NGOs. Due to the p-value associated with groups’ indicated willingness to participate, we fail to reject the null, that people are willing to participate in a voluntary ecosystem services exchange.

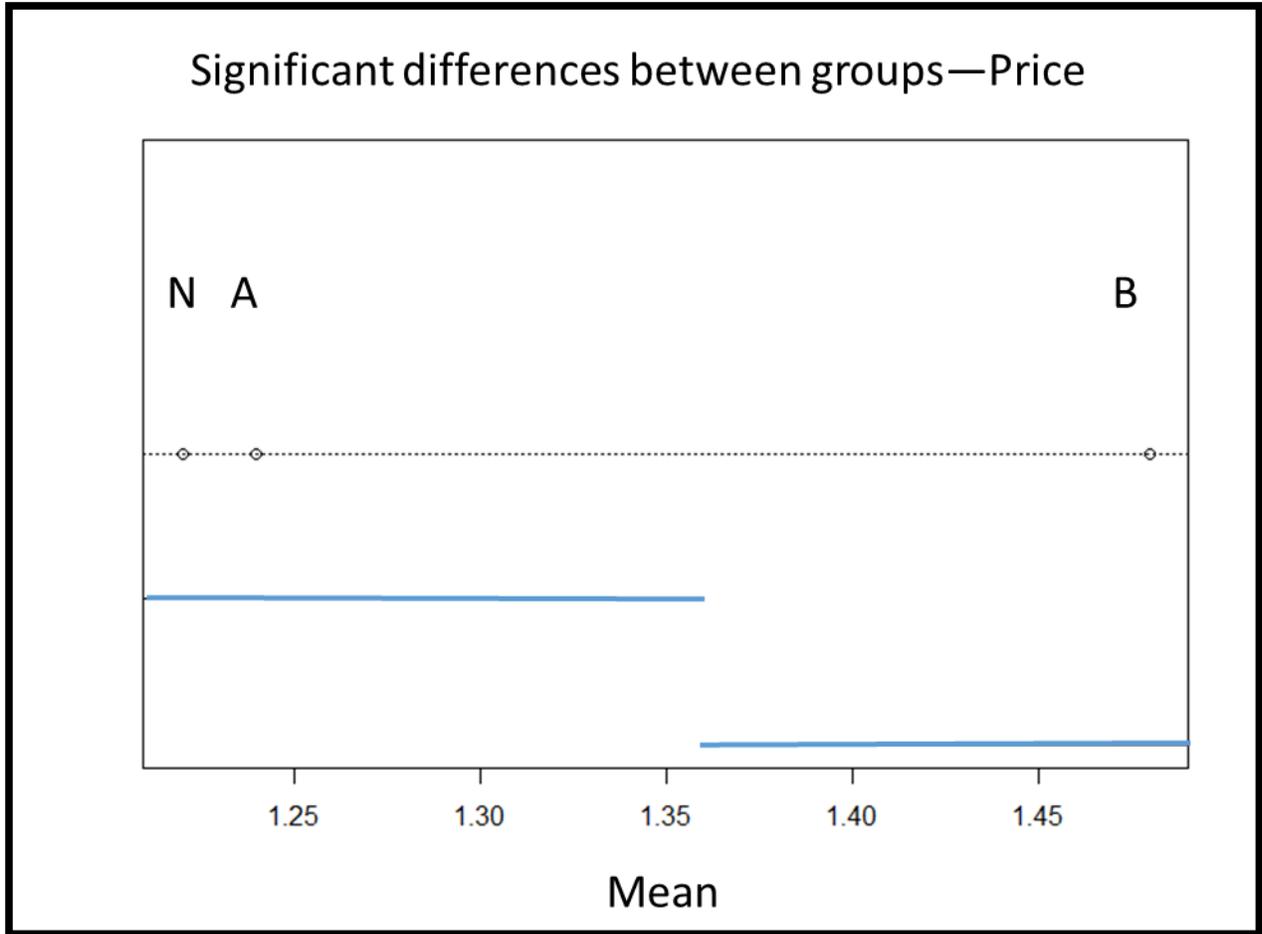
#### PRICE TRANSPARANCY

Respondents shared their opinion regarding how their organization would like to see pricing handled in terms of transparency, summarized in Figure 6 and followed by the measure of significant difference in Figure 7.



**Figure 6: Pie graph of all respondents' interest in having price transparency in ES markets.**

As with the previous question, significant differences were calculated by means using ANOVA with the Westfall adjustment (Figure 7).



**Figure 7: Analysis of variance between groups' desire to have price transparency.**

**“A” = Architect/Builders, “B” = other Businesses, and “N” = NGO**

In this case, Architects and NGO’s were not significantly different from each other but were both significantly different from the other businesses. Again, means connected by blue lines are not significantly different. p-values, calculated by binomial testing, with the “undecided” responses being included in the “no” category, can be found on Table 3.

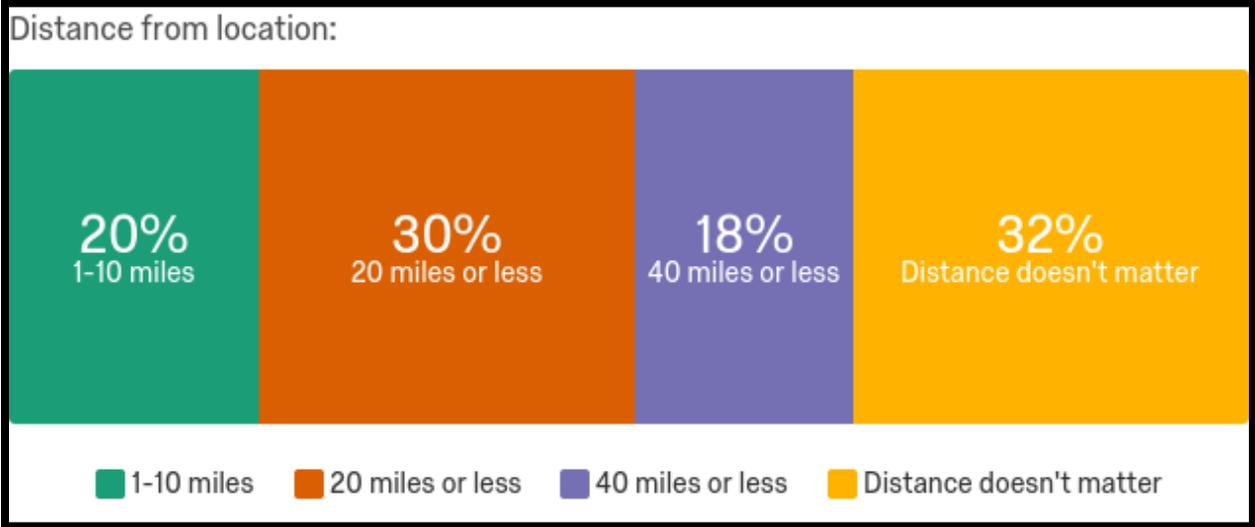
Group	P-Value	95% Confidence Interval	Probability
All Groups	<.001	0.8045 – 0.8884	85%
Architects/GCs	<.001	0.8117 – 0.9438	89%
Other Businesses	<.001	0.6751 – 0.8483	77%
NGOs	<.001	0.8117 – 0.9438	89%

**Table 3: P-values of desire to have price transparency.**

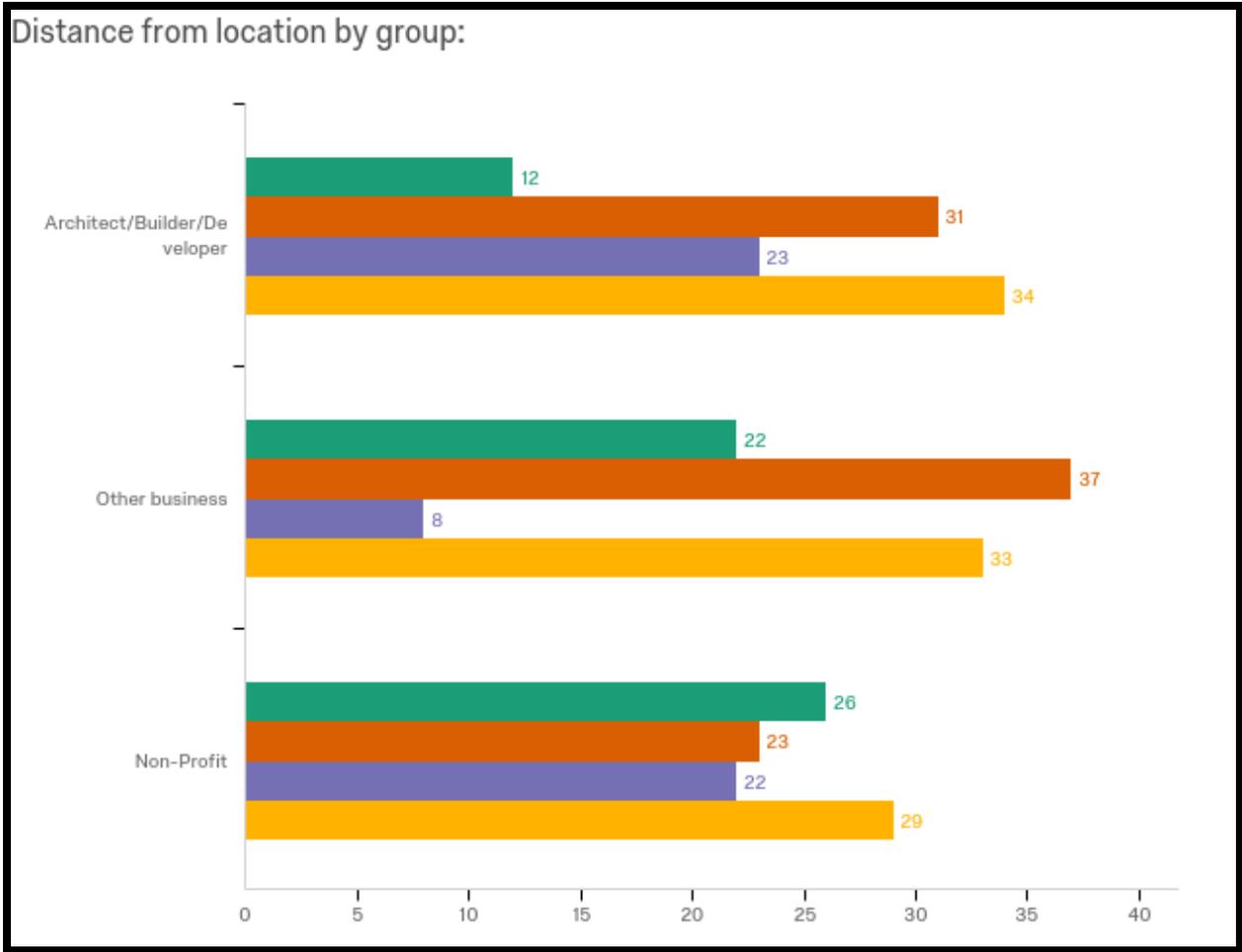
In all cases, there is significant evidence that price information regarding transactions on an ES exchange should be fully transparent.

**DISTANCE OF PROJECT LOCATION**

Respondents indicated their preferred project distance from their location in terms of buying ES on an exchange, seen in Figure 8, again followed by the breakdown by groups in Figure 9.



**Figure 8: Combined group information showing preferred project distance from their location.**



**Figure 9: Distance from location by group.**

The chi square analysis yields 16.9 on 6 degrees of freedom with a probability of 0.010, and looking at all groups versus a “normal” standard distribution yields 9.569 with a p-value of .023.

#### LEVEL OF VERIFICATION

Survey participants were asked to choose what level of verification they would like to see in terms of project monitoring. As part of the background information provided to them before taking the survey, they were asked to consider that the “more verification they desire, the higher

the resulting price will be.” The results of all groups can be seen in Figure 10, followed by the breakout summary in Figure 11.

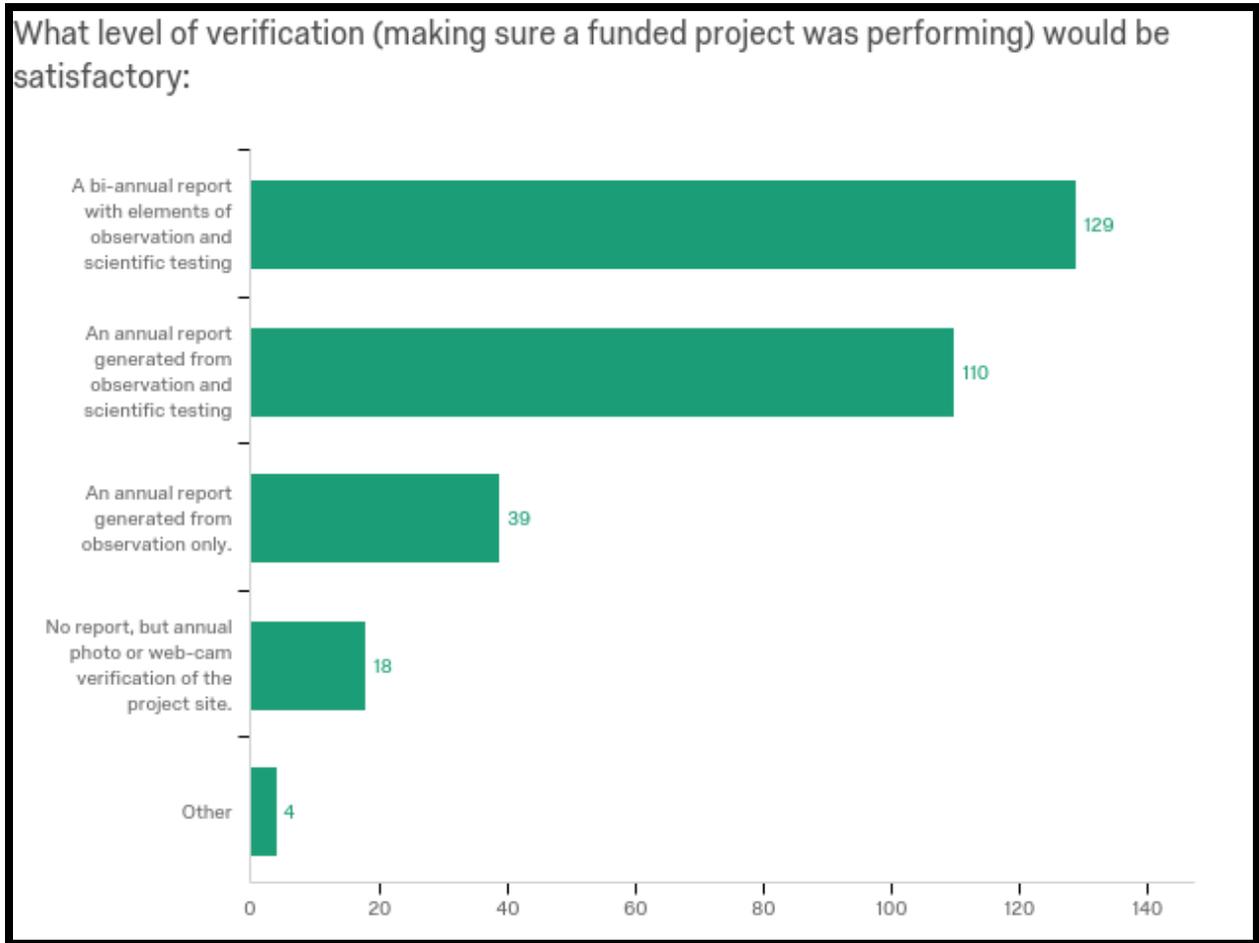
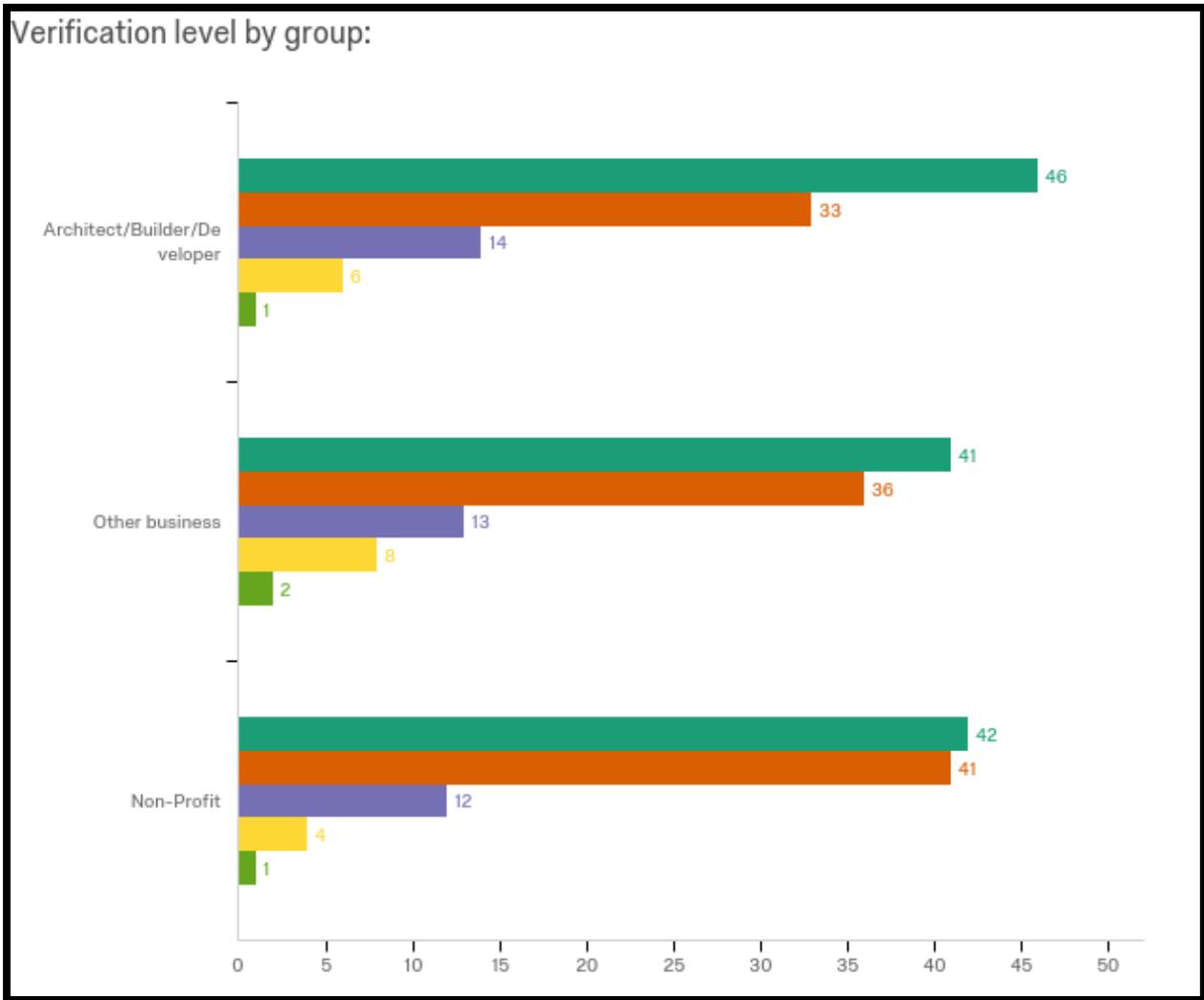
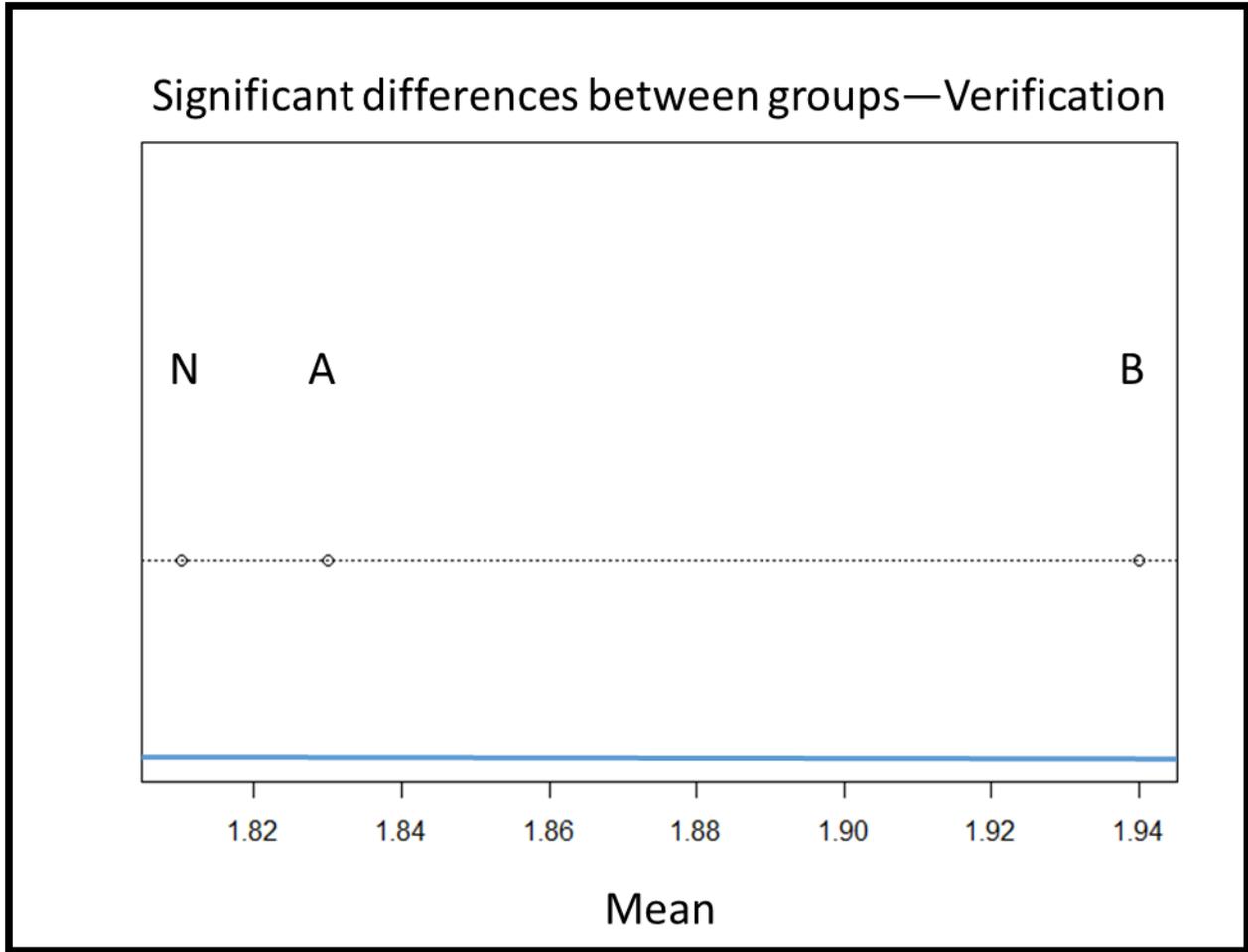


Figure 10: Desired level of project verification, all groups.



**Figure 11: Desired level of verification, by group.**

Westfall adjusted Tukey contrasts between groups reveal no significant difference in the desired level of verification, with all contrasts yielding p-values over 0.50. The plot of the results of the Westfall test can be seen in Figure 12.



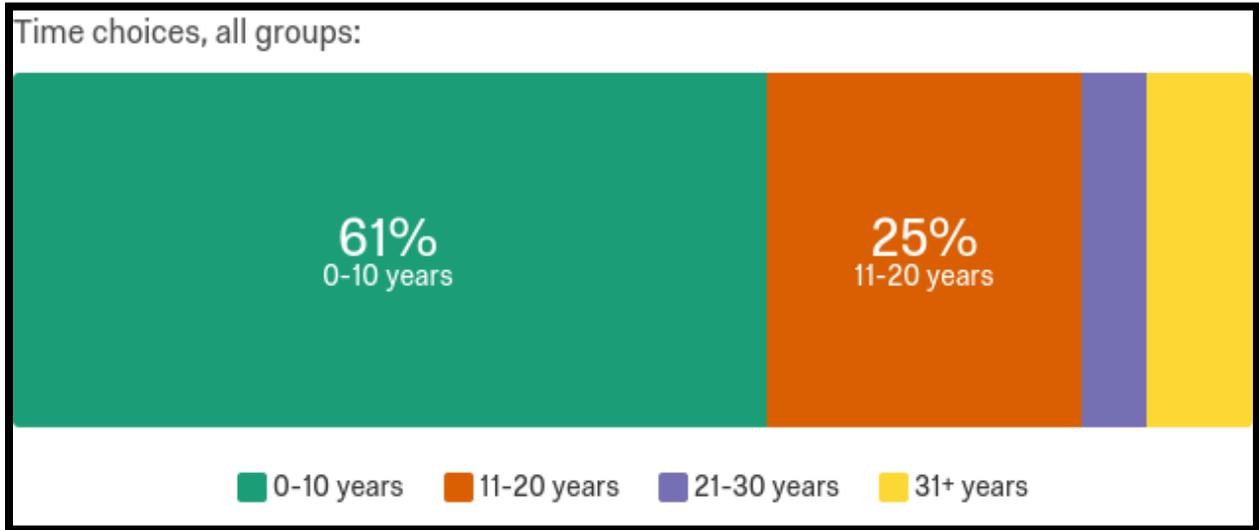
**Figure 12: Analysis of variance between groups' desired level of verification.**

“A” = Architect, “B” = business, “N” = NGO's

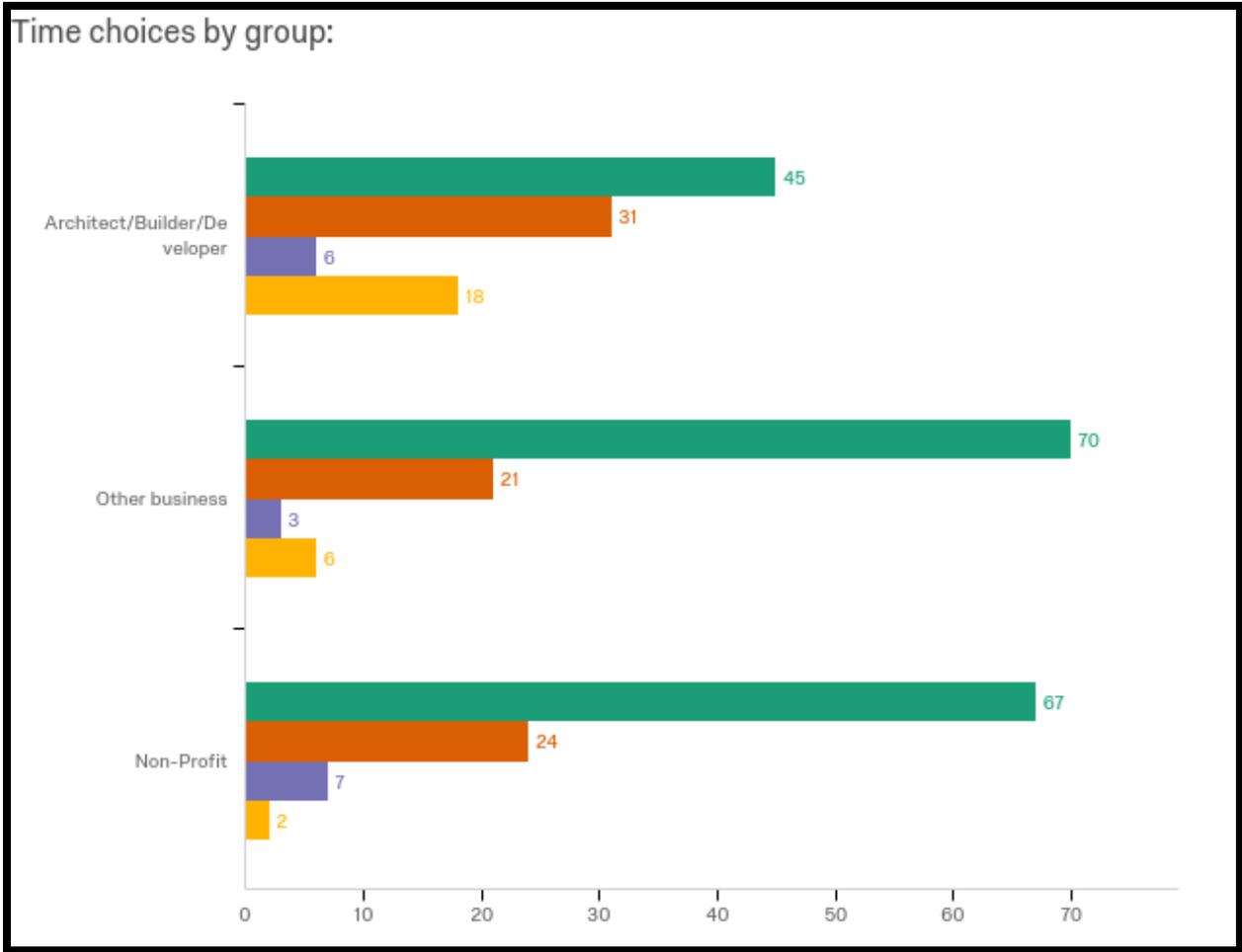
Again, knowing that there is no exact numerical measure between the choices of level of verification in the survey question, chi square was also performed, and results of chi square yields 3.20 on 8 degrees of freedom with a probability of .921. Looking at the highest two levels of verification against the rest, they are selected 239 times yielding a p-value < .001, a 79.67% probability and a 95% confidence interval of 0.7466 – 0.8407. It is interesting to note that all groups had identical ranking of choices, all in order from most to least, first to last.

## TIME

Respondents were asked to choose their preferred time commitment, per transaction, when entering into a PES contract. Figures show all groups, then choices broken out by group (Figure 13, 14).

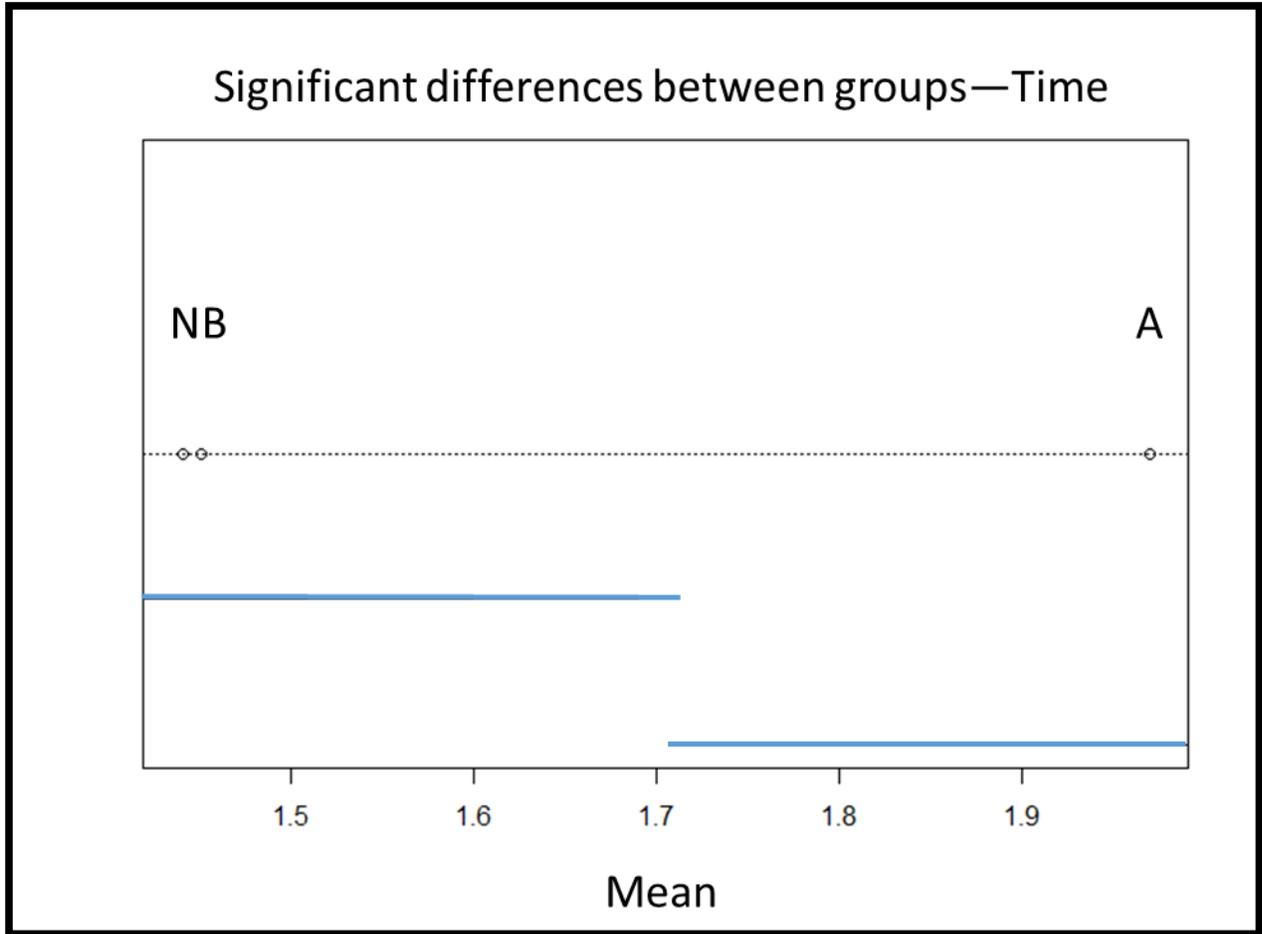


**Figure 13: Time choices expressed by all groups in percentage terms (out of 300).**



**Figure 14: Time choices (Figure 13), broken out by group.**

Comparing expressed time preference by group, we see that there is no significant difference between the other businesses and the non-profits, but both of those are significantly different from the construction group, as evidenced in Figure 15, where means connected by a blue line are not significantly different.



**Figure 15: Analysis of variance between groups’ preferred time commitment, per transaction.**

“A” = Construction, “B” = Other businesses, “N” = NGOs

To examine the other businesses and the non-profits combined, binomial testing was done to see if there is significant preference between choices 1 (0-10 years) and 2 (11-20 years). There was a significant preference established by the result, with a p-value <.001, a 75.27% probability, and a 95% confidence interval of 0.6835 to 0.8136. The data indicates the construction group is skewed toward the longer durations.

## WHO SHOULD BE THE CLEARING HOUSE

Respondents indicated who they would like to be the clearinghouse for transactions by ranking the choices from 1-4, and the tally can be seen in Figure 16.

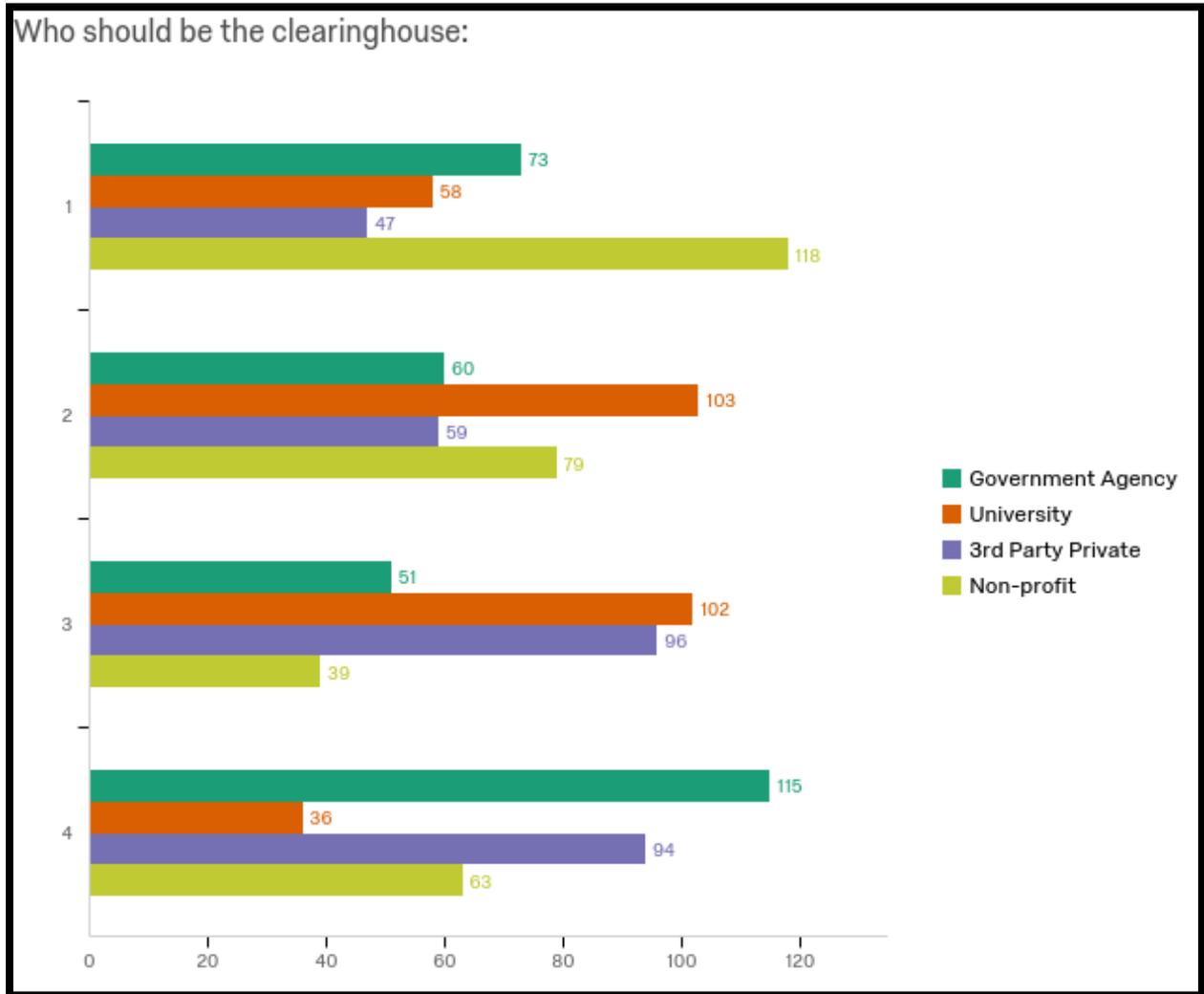


Figure 16: Choice counts for clearinghouse options, with the y-axis showing rankings, 1-4 best to worst.

In terms of a simple majority, the non-profit option was preferred, and the government agency option seemed to garner votes at both extremes of the spectrum. To better understand the results holistically, a Borda weighting matrix was used, with point values assigned to each vote.

First place votes were worth 4, second place 3, etc., and the votes for each place were multiplied and added to compare the totality of the results as seen in Table 4.

CHOICE	1 <sup>st</sup> pl. @ 4pts	2 <sup>nd</sup> pl. @ 3pts	3 <sup>rd</sup> pl. @ 2pts	4 <sup>th</sup> pl. @ 1pt	TOTALS
Non-profit	472	237	78	63	<b>850</b>
University	232	309	204	36	<b>781</b>
Government	292	180	102	115	<b>689</b>
3 <sup>rd</sup> Party Private	188	177	192	94	<b>651</b>

**Table 4: Results of the preferred clearinghouse question with Borda count frequency weighted rank.**

In addition to Borda, a Narahu count was used to cross validate (point values 1, 1/2, 1/3, 1/4) the above table, and the results were the same in terms of ranking but with tighter spreads.

## RETURN ON INVESTMENT

Following are the results from the question asking respondents what they wanted from their participation in an ES exchange: respondents could check all that apply. Figure 17 is a summary of all groups' responses, and Figure 18 is the same data broken out by group; available choices appear in the same order in both figures.

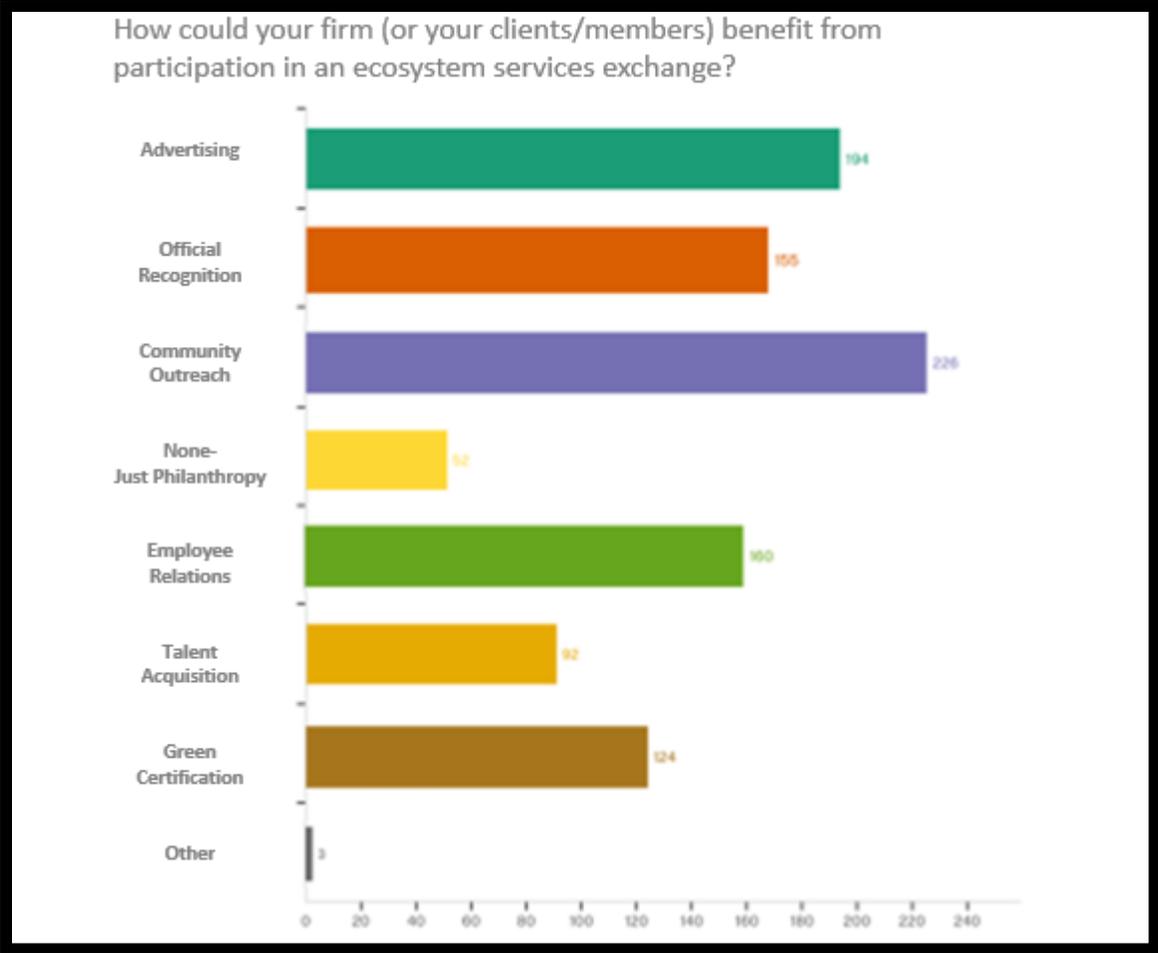


Figure 17: Expressed ROI when all groups were asked to check “all that apply.”

How, by group:

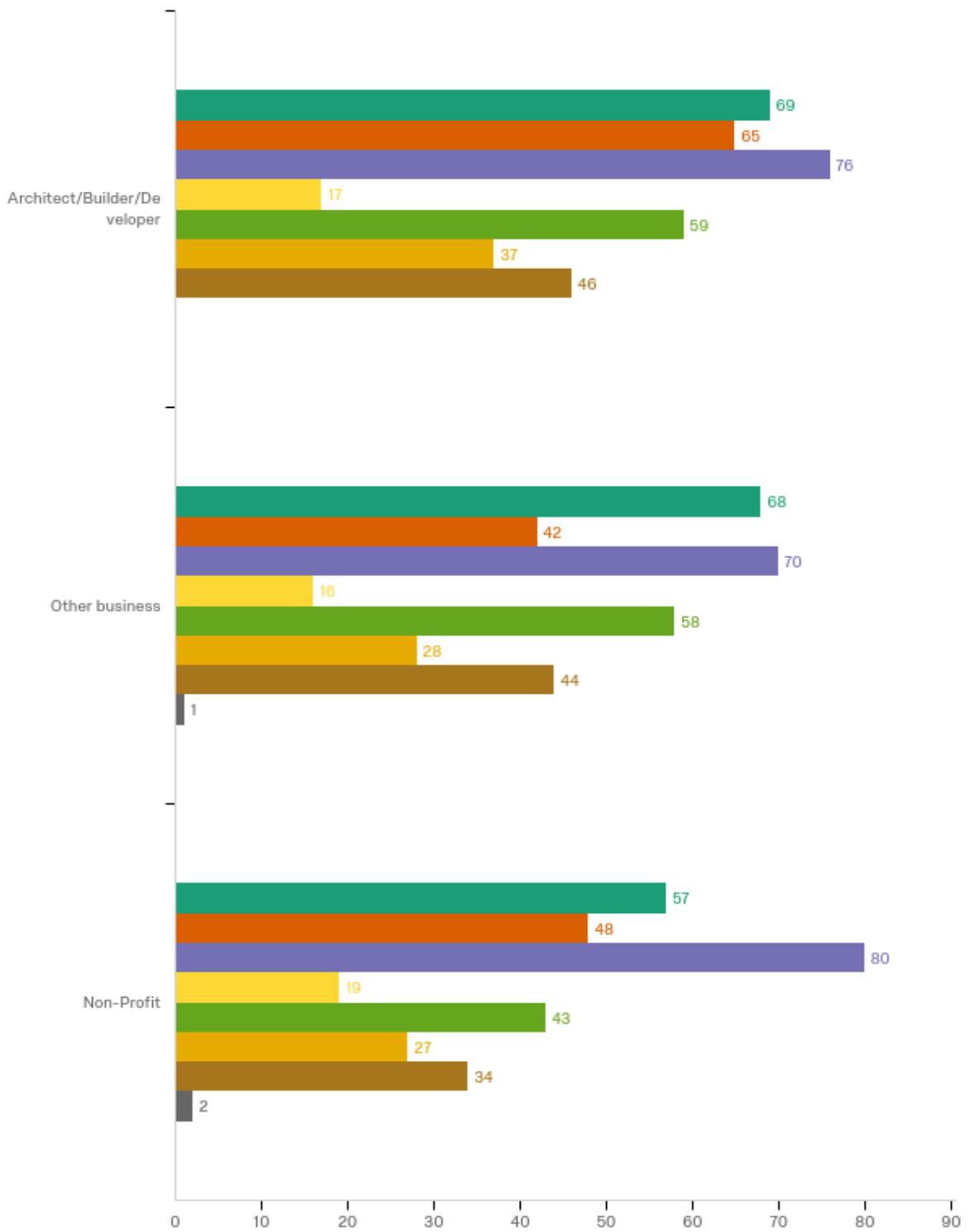


Figure 18: Choice counts of desired ROI by group, same categorical order as figure 17.

Because the question allowed respondents to check all that apply, in effect, it gave them more than one vote—invalidating chi-squared analysis. Therefore, for each group, each possible selection was examined in terms of frequency of response, with a binomial test against  $p = .50$ . Bonferroni adjusted ( $\alpha/3$ ) confidence intervals (95%) were then calculated to see if different groups have overlapping likelihood, thereby indicating significant similarity or difference (Tables 5, 6, 7, 8). The choice counts were also used to rank the categories within individual groups, and all groups share the top two ranked ROI categories and the last two, with the middle rankings not being so clear.

#### Community Outreach

Who	Choice Count	95% Con. Int.	P-value	Rank (in group)
Construction	76	0.6431 – 0.8544	<.001	1
Other Business	70	0.5786 – 0.8042	<.001	1
Non-profit	80	0.6876 – 0.8864	<.001	1

**Table 5: Bonferroni adjusted confidence intervals, P-values, and rank.**

#### Advertising

Who	Choice Count	95% Con. Int.	P-value	Rank (in group)
Construction	69	0.5680 – 0.7956	<.001	2
Other Business	68	0.5575 – 0.7870	<.001	2
Non-profit	57	0.4456 – 0.6883	.193	2

**Table 6: Bonferroni adjusted confidence intervals, P-values, and rank.**

None (just for the philanthropy)

Who	Choice Count	95% Con. Int.	P-value	Rank (in group)
Construction	17	0.0906 - 0.2782	<.001	7
Other Business	16	0.0831 - 0.2665	<.001	7
Non-profit	19	0.1059 - 0.30	<.001	7

**Table 7: Bonferroni adjusted confidence intervals, P-values, and rank.**

Talent Acquisition

Who	Choice Count	95% Con. Int.	P-value	Rank (in group)
Construction	37	0.2571 – 0.4941	.012	6
Other Business	28	0.1788 – 0.4002	<.001	6
Non-profit	27	0.1704 – 0.3895	<.001	6

**Table 8: Bonferroni adjusted confidence intervals, P-values, and rank.**

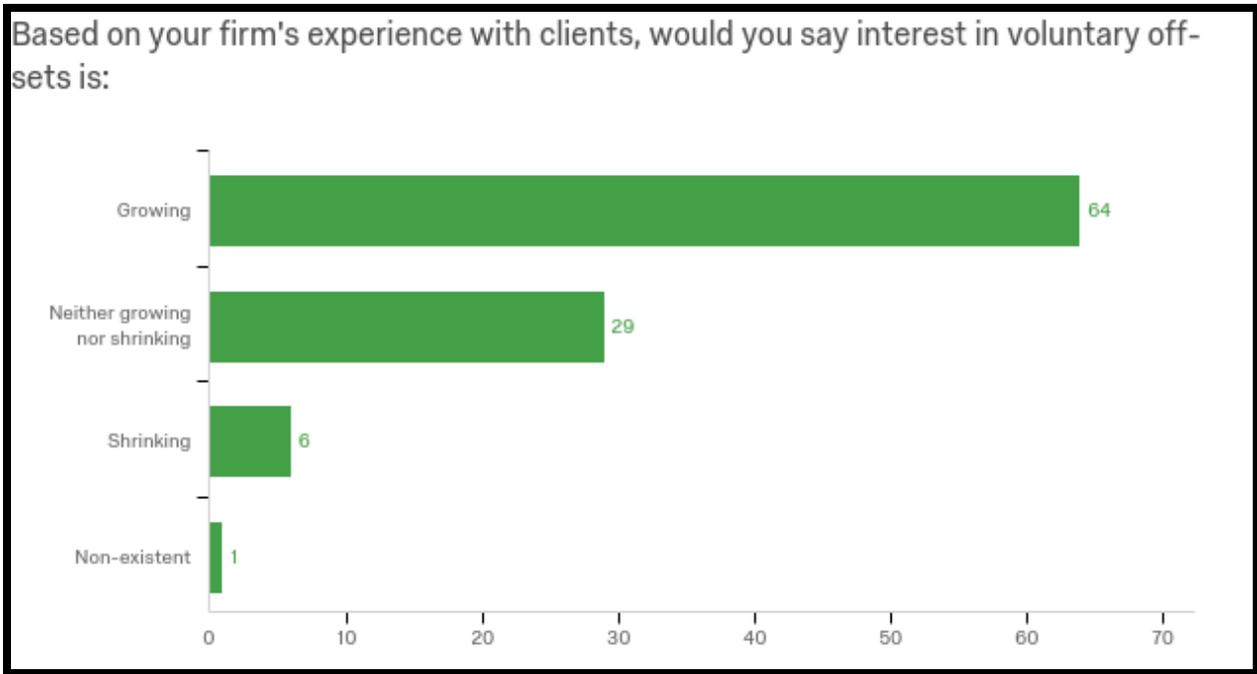
In all four cases, for the top and bottom two rankings, there is no significant difference between groups in terms of how they expressed the importance of these deliverables.

## INDIVIDUAL GROUP QUESTIONS

In addition to the questions fielded by all groups, each group was asked a few questions tailored to them. This section will analyze questions from each group; results are discussed in the following section.

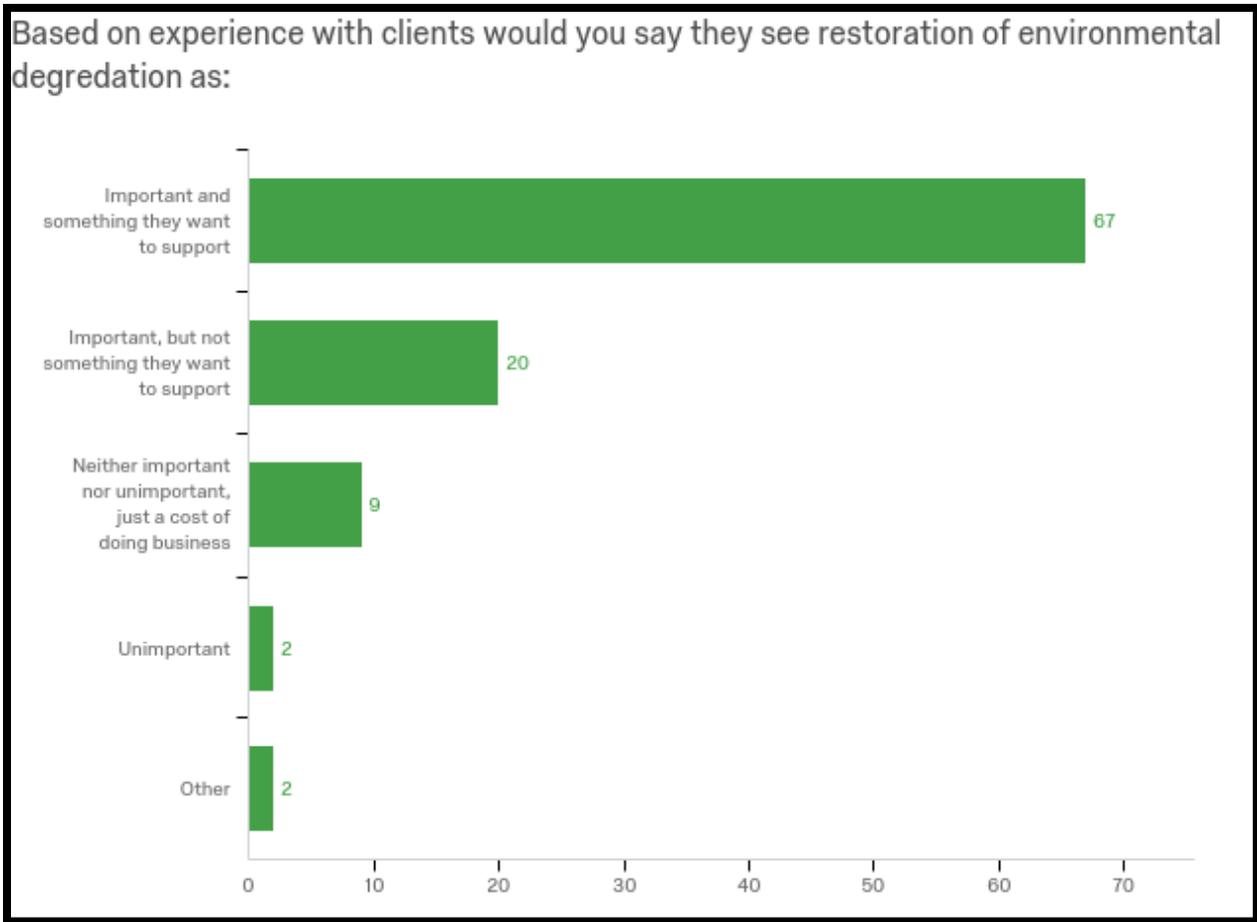
## ARCHITECTS

The construction group was asked their opinions about their perception of *their clients'* views, which can be seen in Figures 19 and 20.



**Figure 19: Architect group asked about direction of their client's views.**

The "Growing" category compared against all other categories combined yields a significant result, with a p-value of .007 and a 95% confidence interval of .538 to .734.

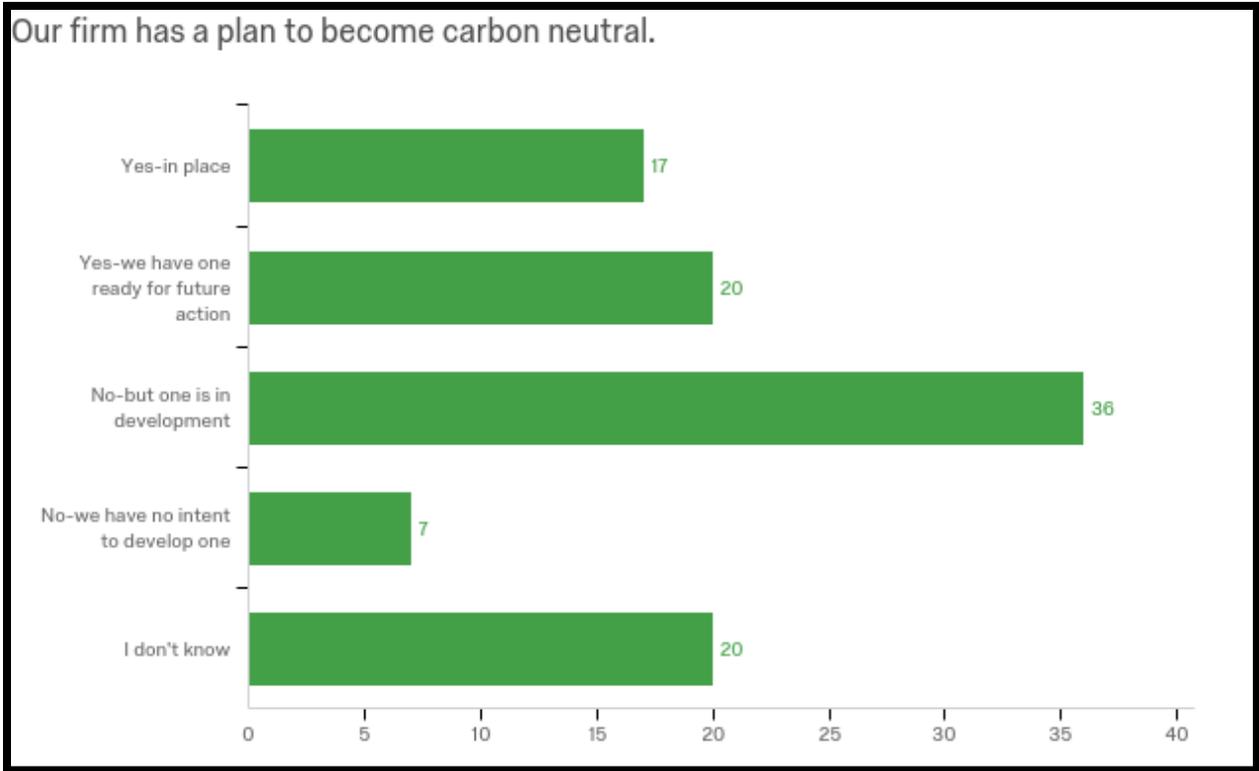


**Figure 20: Architect group’s understanding of clients’ view of restoration.**

The response “Important and something they want to support” was significantly more popular than the other choices combined, with a p-value < .001 and a 95% confidence interval of .569 to .761.

#### OTHER BUSINESSES

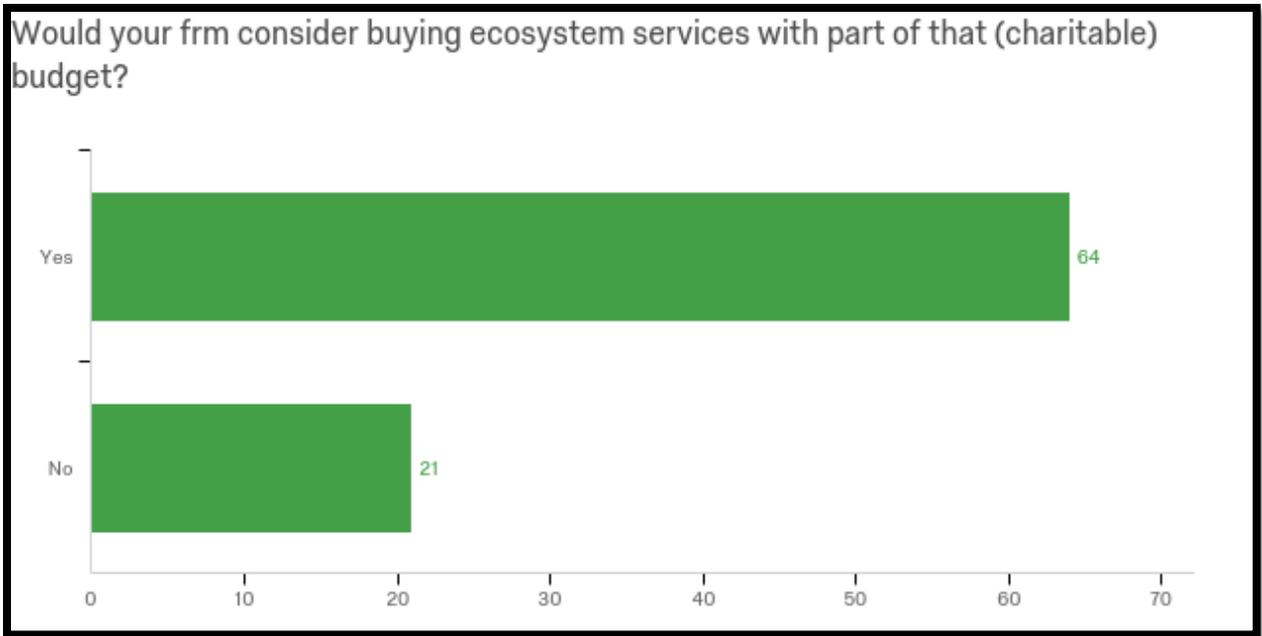
Businesses were asked about their plans for carbon neutrality and their willingness to devote some of their charitable donations budget to buying ecosystem services (Figures 21 and 22).



**Figure 21: Businesses’ stated plans for carbon neutrality.**

When the responses about their organization’s plans to be carbon neutral are examined, the data is overwhelming. Of the 100 respondents, 20 did not know, leaving 80. Of the 80 who did know, 91.25% have a plan or are working on one, and only 8.75% have no intention to develop one.

Of the 100 businesses polled, 85 of them stated that they currently make charitable donations. Those that do were asked if they would devote some of that budget to ecosystem services.

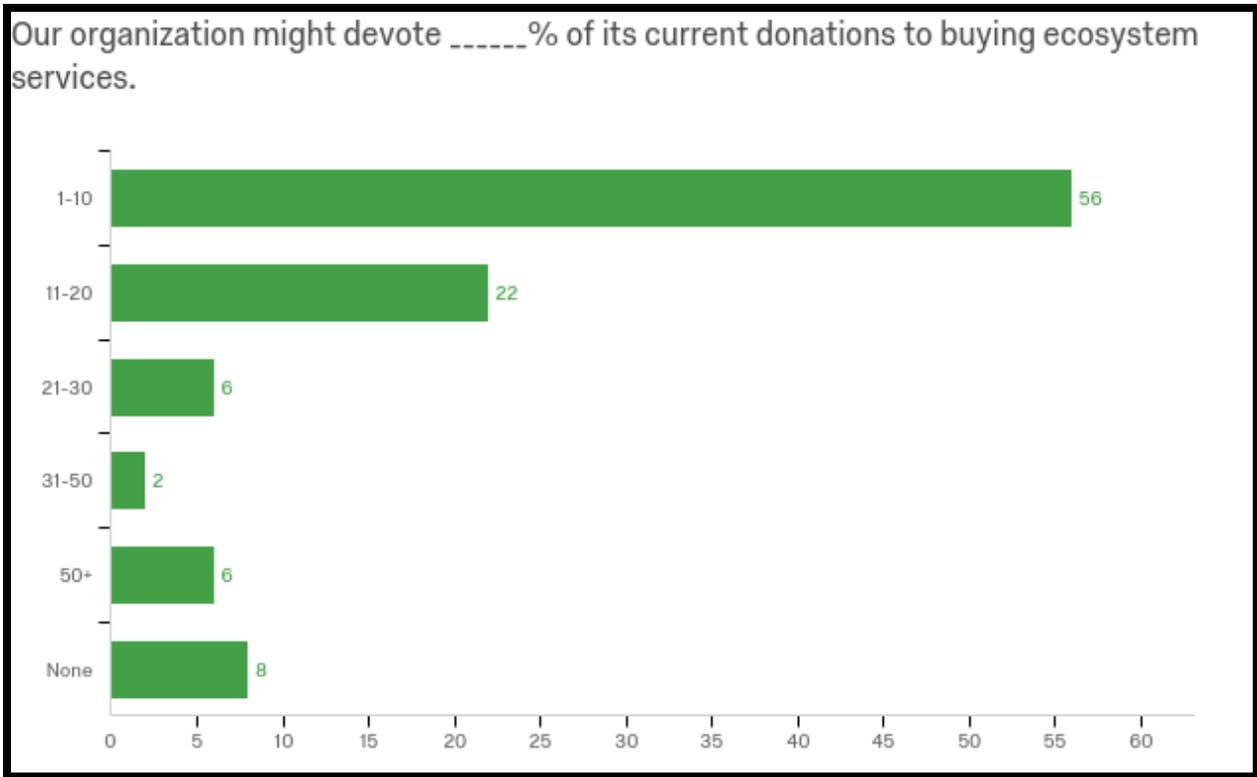


**Figure 22: Businesses' willingness to devote some of their donations toward ecosystem services.**

Of the 85 businesses that currently have a charitable donations program, 64 of them would consider funneling some of that money toward ecosystem services. This is a binomial p-value  $< .001$ . Of the 15 respondents who do not have a charitable program, four of them (26.67%) said they would consider starting one to buy ecosystem services.

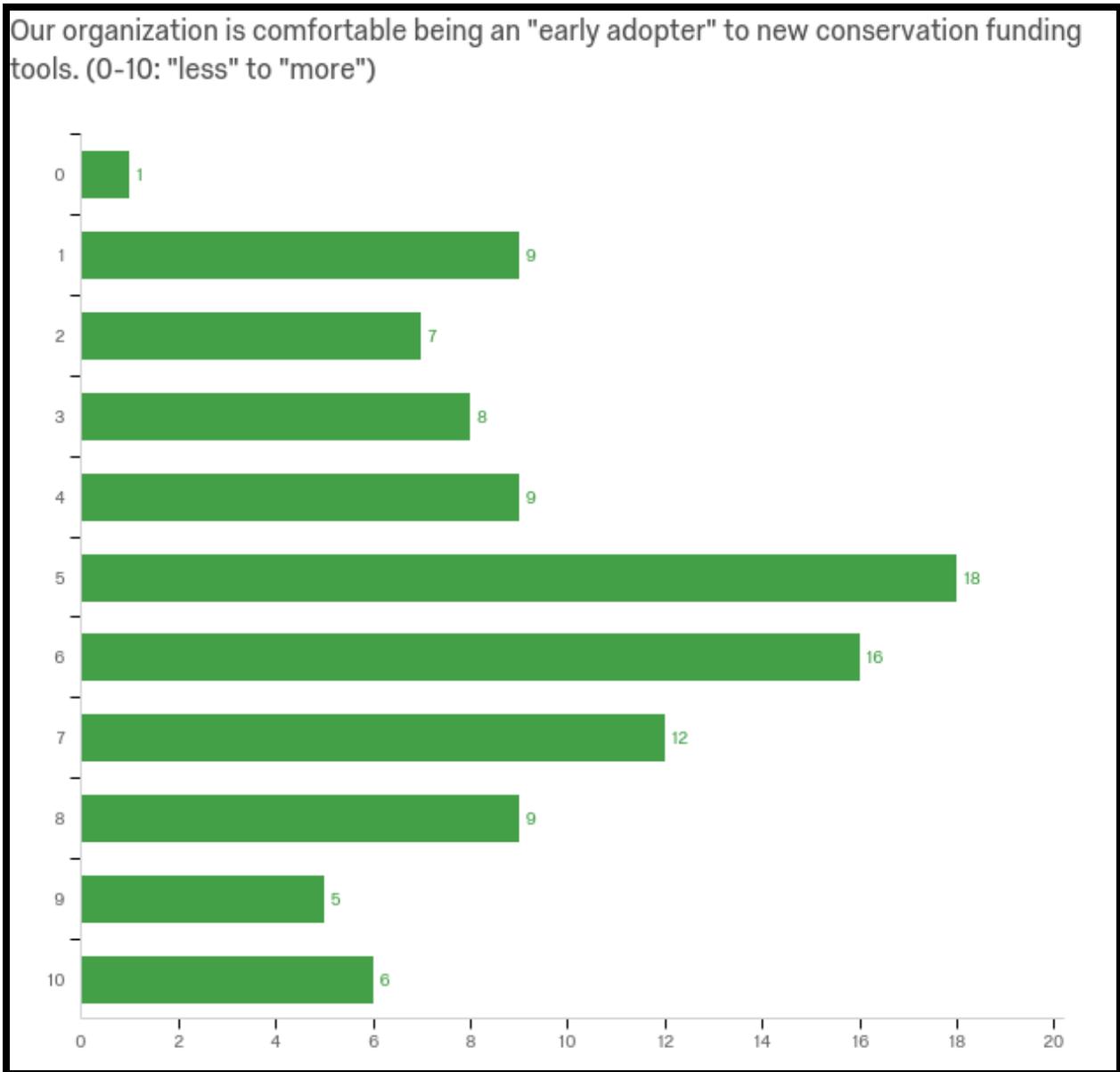
## NGOS

NGOs were asked about their willingness to devote part of their budget to payment for ecosystem services and how comfortable they are being early adaptors to new tools.



**Figure 23: Most NGOs are willing to commit 0-10% of their budget to buying ecosystem services.**

As seen in Figure 22, most NGOs (56%) are willing to devote 0-10% of their donations budget to the purchase of ecosystem services, and 8% said they would not buy them in this way.



**Figure 24: NGOs expressed their willingness to be “early adaptors” to new tools for conservation finance.**

When data from Figure 23 is checked for significant difference from normality, the Shapiro-Wilk test indicates *it is not significantly different from a normal distribution* with a p-value of 0.651.

## DISCUSSION

This section discusses the results of the research and offers some ideas on how to operationalize these observations. It is important to remember that in a voluntary arrangement, buyers are not compelled to act; they must be attracted. To successfully attract those buyers, they must be offered the types of returns they want. Milton Friedman argued that the role of business is to generate profit for stakeholders, not to engage in philanthropic activities (Friedman, 2002). Along these lines, if participation in a voluntary ES exchange can help those efforts, it certainly can have a place in the business model. To make this an attractive proposition, participation needs to offer a return on investment that goes beyond the traditional dollars and cents measure but rather offers organizations a clear path toward leveraging participation into market share. Work has been done in this regard in terms of Marketing ROI (MROI)(Farris, Hanssens, Lenskold, & Reibstein, 2015).

A large component of the ES debate has revolved around their valuation (Fanny, Nicolas, Sander, Erik, & Marc, 2015; Felipe-Lucia, Comín, & Escalera-Reyes, 2015; Whitham, Shi, & Riordan, 2015). While helpful in a theoretical sense—as an aid to understanding the importance of ES in an economic model—these numbers may have less utility in a practical setting. When it comes to the actual exchange of money for ES, there are two important numbers: what someone is willing to pay and at what price an owner of land with ES potential is willing to sell. Another debate has formed regarding the valuation of natural resources that revolves around issues of social justice and the monetization of these assets. One of these arguments contends that PES arrangements may result in unfair treatment of some of the PES actors (Leimona et al., 2015). This argument ignores a simple fact about market mechanisms—they are only a conduit to connect interested parties; they make no value judgements so should not be expected to act as an

intermediary of social justice. If these projects are evaluated based on their possible outcomes, they offer a comparative advantage to the status quo. These designs are being evaluated and experimented with to allow natural capital to be counted in decision-making processes, not to diminish them or allow for their monopolization.

As the null hypothesis (organizations *will* participate) was not rejected, it indicates there is a willingness to participate in an ES marketplace. Interestingly, of the groups surveyed, the NGOs indicated the least interest in participating, showing no significantly greater chance than the flip of a coin. However, the NGOs also indicated that offering their members access to these markets would be very useful for fundraising efforts, indicating that their previous response may be more of an indication that they do not want to speak on behalf of the will of their membership but see value in the ability to offer access to a voluntary exchange.

How should this marketplace look to attract participants, and what do those participants want to gain from the arrangement? It seems clear that all groups strongly believe that price transparency should be in place. Even though there was a significant difference between the construction/NGOs and business groups all p-values were extreme. Making sure that prices are transparent not only aligns with the stated interests of the respondents, but also generally fosters a healthier marketplace. Price transparency tends to both legitimize a market and attract participants, both of which are positive impacts.

Desired project distance from an organization's location also yielded some interesting information. There was exactly a fifty-fifty split between the nearest two options and the farthest two options, with 32% indicating that distance does not matter. This presents an interesting challenge: how can a marketplace be set up to allow a small regional exchange access to the

buyer (to whom distance does not matter) who may be located across the country? Conversely, how can the buyer looking for geographic proximity find it?

Buyers care about verification, with all groups ranking, in order, the highest two levels of verification as their top choices. There was no significant difference between groups in this regard. This came even with the caveat that higher verification would mean higher prices. One of the challenges, then, is how to offer this high level of verification without making it too cost prohibitive. In addition, thinking in terms of the total picture, how can affordable verification be provided across distances to buyers who do not think project location is important?

The groups were also similar in their expression of the time commitment they find most attractive, with all groups ranking the shortest time first (61% chose 0-10 years) and the second shortest time after that (25% chose 11-20 years). The main reason that longer time frames made a showing was due to the participation of the construction group. This makes sense, as those involved in building something with a 50 or 100-year lifespan would be more interested in longer-term arrangements to offset them. In terms of the shorter-term options, there may be a disconnect here between buyers and sellers, as many environmental managers do not operate in these time scales. While not geologic in nature, the time scale of interest to the manager of environmental assets may be decades, presenting another challenge: how do we finance long term planning with money coming from shorter term thinking investors?

In terms of majority rules, the vote indicated that most people would like to see a non-profit act as the clearinghouse for these types of arrangements though a university would be an acceptable second. Not surprisingly, and again a common element among groups, is that the ranking of the role of the government was divisive. The government option got the second most first place votes, and the most last place votes. This very well may prove important if these

arrangements flourish and seek to expand their attractiveness via tax incentives or governmental recognition.

Return on investment is often discussed and maybe just as often defined differently depending on to whom you are talking. Understanding that these voluntary arrangements can offer ROI, though not the traditionally understood ROI, may be a key to their success. By asking buyers what they want, and structuring deals to provide that, ES exchanges will have a chance at success. Again, we see some commonality between groups with all groups ranking community outreach and advertising as their first and second choices with no significant difference between groups. Groups also ranked the lowest two choices in the same fashion, with “none, just for the philanthropy” being last among all groups—even the NGOs. This indicates that everyone is looking for something for their money, and they are interested in the same returns. Bos et al. (2015) discuss the need for more specialists who understand the relevant actors to orchestrate these arrangements. The data indicates that the different buyer groups are similar enough to court with similar inducements if we have those specialists in place to speak their language.

There is a point regarding one aspect of ROI that will probably come up as these markets mature: how buyers can use their participation in advertising. If a buyer wants to be able to say that they are carbon neutral, for example, are they saying that their processes at the end point are carbon neutral, or at their endpoint *and including their supply chain*. For example, if I generate CO2 during the process of assembling my product and voluntarily offset, should I be able to claim carbon neutrality regardless of how my component pieces are sourced? It would seem that if this were allowed, it could run into criticisms of greenwashing. The question then becomes, will the buyer offset their entire supply chain or only do business with those who are embracing

the same philosophy as them (in this case, carbon neutrality)? These points will need to be clearly defined to protect the integrity of any voluntary ecosystem services marketplace.

The responses to the questions directed at each group individually are useful for at least two reasons. First, they seem to corroborate the results from the question asking them if they would participate in a voluntary ecosystem services exchange. The fact that the architect group and the other business group communicate that interest in voluntary payment for ecosystem services is growing, and the tepid response from the NGOs, is in line with how they responded to the question that all groups answered. This further proves that we should fail to reject the null—that groups will be willing to participate in a voluntary ecosystem services exchange.

The second reason this is useful is that the responses give a sense of where voluntary ecosystem services are headed in terms of interest. Again, it seems that—based on architects’ dealings with clients and businesses’ planning efforts—these arrangements may have a viable future. In line with earlier responses, the NGOs were fairly non-committal, not embracing new tools as early adaptors and being willing to dedicate only 0-10% of their budget toward these deals. This does not preclude them from higher levels of interest and activity in the future; it simply implies that they are unlikely to lead the way.

## OPERATIONALIZING VOLUNTARY PES

After examining the results, and looking at the response groups, it is possible to make some suggestions as to how these voluntary ES exchanges be structured to give them a chance to grow and flourish. To meet the stated needs of the buyers, I suggest that an umbrella approach be used to address many of the challenges discussed above. A “market of markets” could serve as the umbrella, as the aggregator of other markets to meet the demands of the buyers.

This market may or may not engage in their own ES project management but would be chiefly concerned with acting as the clearinghouse for any other exchange desiring to participate. A requirement for participation would be the willing dissemination of price information, concerning both available projects and projects already funded. This would meet the buyer's need for price transparency and provide a central repository for this information. Academic literature supports the idea that transparency generates legitimacy, and our research indicates that the potential market participants want it, too (Austin & Gravelle, 2007; De Fine Licht, Naurin, Esaiasson, & Gilljam, 2014).

This approach also addresses the challenge of linking regional exchanges to a market of buyers that may be far away but to whom location does not matter. An east coast exchange dealing with local specialization, for example, could offer its projects on a national or international level and market to those shopping based on price or on niche specialization.

This arrangement can also take care of verification by having it occur in the region where the projects are happening, with the reporting of the verification going to the aggregating marketplace. To keep costs down, it may be possible for regional exchanges to link up with local universities. Universities could allow their students to perform fieldwork at project sites as part of their course work, which would allow students access to living laboratories in exchange for access to inexpensive verification from a vetted institution.

The time differential between projects and buyers' desires may also be addressed. Projects could possibly be broken out into time slices or possibly not even packaged with time in mind, simply allowing year 1 and year (1+x) to be counted the same, simply as a credit for sale. To meet the ROI interests of the buyers, this market of markets may have the advantage of being scalable. By fostering participation nationally, it would have the opportunity to capitalize on

branding efforts that could enable the buyers to use that brand in outreach, advertising, or other desirable uses.

Respondents clearly expressed that they would prefer to have a nonprofit in the driver's seat. However, looking at the Borda counts may be useful if a council or voting board is ever convened. Members could be representative of the ranked order, e.g. with 3 members coming from NGOs, 2 from academia, 1 from government, and 1 non-voting member from the private sector who casts a ballot only to break ties.

Funding this marketplace could be handled in many ways, such as a fee charged per transaction or as a percentage of transaction valuation. The market could charge a use fee for the brand or provide marketing materials to the buyers at a cost. While the options here are many, this is only to point out that there will be costs, but there are opportunities available to meet them. It is important to work through the funding options at inception, so the model can be financially sustainable.

Developing novel mechanisms in any field can have pitfalls and uncertainty, and markets for ecosystem services are no different. Particularly, the uncertain elements inherent in restoring dynamic ecosystems need to be considered. On the most basic level, buyers will probably want some contractual assurances that the seller will deliver as promised. On another level, even if a seller is complying contractually, market participants may want to have contingency plans in place to deal with the possibility of project failure due to random events. For example, biologic events—such as species blight—or catastrophic events—such as extreme weather events—may render a successful project a failure. Creative solutions need to be considered to account for these possibilities. This may involve the application of some type of insurance, or bonding, or the creation of a bailout fund capitalized by escrowing some small percentage of each transaction for

the common good. These ideas are starting points, not complete solutions—the intention is to illustrate concepts these discussions might encompass.

## UTILITY AND LIMITATIONS

The largest concern regarding conducting this survey is the sampling. The list of potential buyers is larger than the scope this study can accommodate. For example, governmental agencies may be both interested and have the means to participate in PES arrangements. Insurance companies, too, might be viable participants as they may see value in possible risk mitigation by financing ecological buffers of green infrastructure. While effort were made to include a cross-section of possible buyers via the three groups mentioned above, care should be taken when using this work to speak to the mindset of every potential buyer. The groups included in this study have shed light on some of the issues facing voluntary markets. The method by which these opinions were discovered may be adapted—and expanded—by those seeking to understand other potential buyers in this space.

## CONCLUSION

To engage capital, conservationists need to be creative in how they market what they are trying to sell. While they may not be able to offer ROI in a traditional sense, they are not precluded from being able to offer a marketable commodity to the investor. To be successful, developing an understanding of what their product is, and how to tailor their discourse appropriately to their audience, would be valuable.

This work has shown that there is a willingness to participate in voluntary PES arrangements and offered a glimpse into what these might look like. Using the methodology to

find the ideal group or groups to participate may have merit but runs the risk of being exclusionary: one of the main threads running through this work is that disparate groups displayed commonality. The data indicates that both for and not-for profit organizations have an interest in participating in a voluntary ecosystem service marketplace. To attract those participants, the marketplace should deliver what buyers are asking for: price transparency, flexibility in terms of time commitment and distance, high levels of verification, and ROI provided by an agreeable clearinghouse.

Understanding this, that the similarities of the buyers outweigh their differences, will enable architects of ES exchanges to build their platforms to be inclusive, to offer the adaptability of a non-traditional ROI that can attract groups to the marketplace, groups that *prima facie* would not be thought of as likely bedfellows. By embracing these similarities, markets can be created that are organically inclusive and, being so, may give these emerging platforms an opportunity to attract the most participants and help them to be successful.



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## APPENDIX: SURVEY

Following is the survey as translated into word, with highlighted text being survey logic.

As the survey was constructed and edited, questions were numbered, so do not appear sequentially in the word document. For clarification, the first section (Q33-19) was answered by all respondents. This was followed by the NGOs (Q7-28), then Businesses (Q20-27), then the Architect/Builder group (Q11-24). Survey begins here:

Q33 In your professional role do you participate in discussions, and/or make decisions, about the following? (select all that apply)

- Hiring (1)
- Overall budget (2)
- Your organization's view or products or policies and sustainability/environmental issues (7)
- Your organization's strategic plan (4)
- None of the above (6)

Condition: Your organization's view or... Is Not Selected. Skip To: End of Block.

Q14 Note on Privacy: Taking this survey is completely voluntary and in the capacity of your professional position.

Q30 An Ecosystem Services Exchange is a place where interested parties can "buy" ecosystem services by funding projects that allow nature to provide the services humans rely on from "sellers" who have land they are willing to restore or enhance. For this survey think of "buying" as buying an ecosystem service for a period of time. For example, you might "buy" the restoration of farmland to prairie on 50 acres for 50 years to sequester carbon.

Q6 I am affiliated with:

- Architect/Builder/Developer (1)
- Other business (2)
- Non-Profit (3)

Q34 We are located in (zip code):

Q35 My organization's activities mainly take place:

- Locally (1)
- Statewide (2)
- Nationwide (3)
- Internationally (4)

Q33 My organization has \_\_\_\_\_ employees:

- 1-10 (1)
- 11-50 (2)
- 51-250 (3)
- 250+ (4)

Q37 Ecosystem Services (ES) are the services that nature provides to support human life. These services include provisioning services (food production (e.g., wild fish stocks), water, wood and fiber), regulating (carbon sequestration, flood regulation, water purification), supporting (nutrient cycling, soil formation, habitat provision, primary production), and cultural services (recreational, spiritual, educational). Payment for ecosystem services (PES) refers to compensating landowners for altering land use practices to more sustainably allow nature to provide ES. Mitigation banking is the system by which interested parties can offset ecological disruption by buying “credits” that support restorative efforts offsite—these are typically purchased to help obtain necessary US Army Corps of Engineer permits. Verification is the process by which funded projects (via mitigation banks or voluntarily) are confirmed to have performed in a manner consistent with the contracted ecological restoration. As you respond to the questions, please assume that mitigation banking will require a higher level of verification than voluntary activities, and that the higher the level of verification, the higher the cost will be. Again, thank you for sharing your time and knowledge.

Q1 Would your organization (or its members/clients) participate in a voluntary ecosystem services exchange?

- Extremely likely (1)
- Moderately likely (2)
- Neither likely nor unlikely (3)
- Moderately unlikely (4)
- Extremely unlikely (5)

Q2 Who would your firm feel most comfortable with being the clearinghouse/verification provider in an ecosystem services transaction? (Rank 1-4, most to least)

- \_\_\_\_\_ Government Agency (1)
- \_\_\_\_\_ University (2)
- \_\_\_\_\_ 3rd Party Private (3)
- \_\_\_\_\_ Non-profit (4)

Q31 What level of verification (making sure a funded project was performing) would be satisfactory?

- A bi-annual report with elements of observation and scientific testing (1)
- An annual report generated from observation and scientific testing (2)
- An annual report generated from observation only. (3)
- No report, but annual photo or web-cam verification of the project site. (4)
- Other (5) \_\_\_\_\_

Q17 How close to your organization's activities would ecosystem services restoration projects need to be to be attractive to your clients?

- 1-10 miles (1)
- 20 miles or less (2)
- 40 miles or less (3)
- Distance doesn't matter (4)

Q3 What time frame (per transaction) would be most attractive in terms of a commitment to buying ecosystem services?

- 0-10 years (1)
- 11-20 years (2)
- 21-30 years (3)
- 31+ years (4)

Q4 How could your firm (or your clients/members) benefit from participation in an ecosystem services exchange? (check all that apply)

- Advertising (show goodwill/corporate responsibility/etc.) (1)
- Official recognition of participation (2)
- Community Outreach (3)
- None (just for the philanthropy) (4)
- Employee relations (5)
- Talent acquisition (i.e. enhance recruiting efforts) (6)
- Green certification (LEEDS/Green Globes/etc.) (7)
- Other (8) \_\_\_\_\_

Q32 What is your organization's position on the statement: Price information about funded projects should be readily available.

- Agrees (1)
- Does not matter (3)
- Disagrees (5)

Q5 When your organization is discussing ecosystem services, what words do you use?

Q19 What elements would need to be present for your firm to participate in a voluntary ecosystem services exchange?

Q36 Ecosystem Services (ES) are the services that nature provides to support human life. These services include provisioning services (food production (e.g., wild fish stocks), water, wood and fiber), regulating (carbon sequestration, flood regulation, water purification), supporting (nutrient cycling, soil formation, habitat provision, primary production), and cultural services (recreational, spiritual, educational). Payment for ecosystem services (PES) refers to compensating landowners for altering land use practices to more sustainably allow nature to provide ES. Mitigation banking is the system by which interested parties can offset ecological disruption by buying "credits" that support restorative efforts offsite—these are typically

purchased to help obtain necessary US Army Corps of Engineer permits. Verification is the process by which funded projects (via mitigation banks or voluntarily) are confirmed to have performed in a manner consistent with the contracted ecological restoration. As you respond to the questions, please assume that mitigation banking will require a higher level of verification than voluntary activities, and that the higher the level of verification, the higher the cost will be. Again, thank you for sharing your time and knowledge.

Q7 Voluntary participation in an ecosystem services exchange is something our members/donors would want to fund.

- Yes (1)
- Maybe (2)
- No (3)

Q8 Participation in an ecosystem services exchange would be \_\_\_\_\_ in our fund-raising/marketing efforts.

- Useful (1)
- Not useful (2)

Q9 Our organization is comfortable being an "early adopter" to new conservation funding tools. (0-10: "less" to "more")

- 0 (0)
- 1 (1)
- 2 (2)
- 3 (3)
- 4 (4)
- 5 (5)
- 6 (6)
- 7 (7)
- 8 (8)
- 9 (9)
- 10 (10)

Q10 Our organization could see ourselves funding projects aimed to help: (check all that apply)

- Coastal Wetlands (1)
- Wetlands (2)
- Rivers (3)
- Prairie (4)
- Woodland (5)
- Other (6) \_\_\_\_\_

Q28 Our organization might devote \_\_\_\_\_% of its current donations to buying ecosystem services.

- 1-10 (1)
- 11-20 (2)
- 21-30 (3)
- 31-50 (4)
- 50+ (5)
- None (6)

Q35 Ecosystem Services (ES) are the services that nature provides to support human life. These services include provisioning services (food production (e.g., wild fish stocks), water, wood and fiber), regulating (carbon sequestration, flood regulation, water purification), supporting (nutrient cycling, soil formation, habitat provision, primary production), and cultural services (recreational, spiritual, educational). Payment for ecosystem services (PES) refers to compensating landowners for altering land use practices to more sustainably allow nature to provide ES. Mitigation banking is the system by which interested parties can offset ecological disruption by buying “credits” that support restorative efforts offsite—these are typically purchased to help obtain necessary US Army Corps of Engineer permits. Verification is the process by which funded projects (via mitigation banks or voluntarily) are confirmed to have performed in a manner consistent with the contracted ecological restoration. As you respond to the questions, please assume that mitigation banking will require a higher level of verification than voluntary activities, and that the higher the level of verification, the higher the cost will be. Again, thank you for sharing your time and knowledge.

Q20 Participation in a voluntary ecosystem services exchange would support our firm's value proposition. (0-10: "no support" to "most support")

- 0 (0)
- 1 (1)
- 2 (2)
- 3 (3)
- 4 (4)
- 5 (5)
- 6 (6)
- 7 (7)
- 8 (8)
- 9 (9)
- 10 (10)

Q21 Participation in a voluntary ecosystem services exchange would support our firm's mission statement. (0-10: "no support" to "most support")

- 0 (0)
- 1 (1)
- 2 (2)
- 3 (3)
- 4 (4)
- 5 (5)
- 6 (6)
- 7 (7)
- 8 (8)
- 9 (9)
- 10 (10)

Q22 Participation in an ecosystem services exchange would be meaningful to our employees. 0-10: "would not" to "greatly")

- 0 (0)
- 1 (1)
- 2 (2)
- 3 (3)
- 4 (4)
- 5 (5)
- 6 (6)
- 7 (7)
- 8 (8)
- 9 (9)
- 10 (10)

Q23 Our firm a plan to become carbon neutral.

- Yes-in place (1)
- Yes-we have one ready for future action (2)
- No-but one is in development (3)
- No-we have no intent to develop one (4)
- I don't know (5)

Q25 Does your firm currently make charitable donations?

- Yes (1)
- No (2)

Display This Question:

If Does your firm currently make charitable donations? Yes Is Selected

Q26 Would your firm consider buying ecosystem services with part of that budget?

- Yes (1)
- No (2)

Display This Question:

If Does your firm currently make charitable donations? No Is Selected

Q27 Would your firm consider starting a charitable contribution program to buy ecosystem services?

- Yes (1)
- No (2)

Q34 Ecosystem Services (ES) are the services that nature provides to support human life. These services include provisioning services (food production (e.g., wild fish stocks), water, wood and fiber), regulating (carbon sequestration, flood regulation, water purification), supporting (nutrient cycling, soil formation, habitat provision, primary production), and cultural services (recreational, spiritual, educational). Payment for ecosystem services (PES) refers to compensating landowners for altering land use practices to more sustainably allow nature to provide ES. Mitigation banking is the system by which interested parties can offset ecological disruption by buying “credits” that support restorative efforts offsite—these are typically purchased to help obtain necessary US Army Corps of Engineer permits. Verification is the process by which funded projects (via mitigation banks or voluntarily) are confirmed to have performed in a manner consistent with the contracted ecological restoration. As you respond to the questions, please assume that mitigation banking will require a higher level of verification than voluntary activities, and that the higher the level of verification, the higher the cost will be. Again, thank you for sharing your time and knowledge.

Q11 Our firm, or our clients, would be interested in participating in a voluntary services exchange to obtain "green" certification (LEEDs, Green Globes, etc). (0-10: "low" to "high")

- 0 (0)
- 1 (1)
- 2 (2)
- 3 (3)
- 4 (4)
- 5 (5)
- 6 (6)
- 7 (7)
- 8 (8)
- 9 (9)
- 10 (10)

Q16 Being able to offer our clients access to an ecosystem services exchange would enhance our business.

- Strongly agree (1)
- Agree (2)
- Neither agree nor disagree (3)
- Disagree (4)
- Strongly disagree (5)

Q18 Based on your firm's experience with clients, would you say interest in voluntary off-sets is:

- Growing (1)
- Neither growing nor shrinking (2)
- Shrinking (3)
- Non-existent (4)

Q24 Based on experience with clients would you say they see restoration of environmental degradation as:

- Important and something they want to support (1)
- Important, but not something they want to support (2)
- Neither important nor unimportant, just a cost of doing business (3)
- Unimportant (4)
- Other (5) \_\_\_\_\_