International Journal of Advanced Engineering Research and Science (IJAERS)
Peer-Reviewed Journal
ISSN: 2349-6495(P) | 2456-1908(O)
Vol-9, Issue-7; July, 2022
Journal Home Page Available: https://ijaers.com/
Article DOI: https://dx.doi.org/10.22161/ijaers.97.22

Contingent Valuation Method in a Pandemic Period: Diagnosis for the Search of New Directions

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Received: 20 Jun 2022,

Received in revised form: 12 Jul 2022,

Accepted: 18 July 2022,

Available online: 25 July 2022

***Keywords*—Covid-19, Conservation units, Existence Value.**

***Abstract*—** *The work during the COVID-19 pandemic challenged researchers and managers when trying to contain the spread of the disease among the population. Much social isolation and quarantine restrictions were imposed. The objective of this research is to verify how the research was carried out using the Contingent Valuation method since there is a need to talk to the respondents personally about their visit to an environmental or patrimonial asset, to unveil what difficulties were encountered and how to go around them. The method used for this investigation was the integrative literature review in the analysis of articles and dissertations available on the Capes portal, SciELO and Google Scholar. The years of the search were from 2020 to 2021. There was a cost reduction to apply the method, greater agility of the research, value of willingness to pay less assertive and difficulties in construct analysis, among others.*

I. INTRODUCTION

Covid-19 is a highly contagious disease caused by the severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2). In 2020, due to the outbreak, it was characterized by the World Health Organization (WHO) as a pandemic. The infected population directly competes with exposure to the virus. Vulnerable groups such as the elderly, and patients with obesity, diabetes, and heart disease are most affected. With this, people's mental health in times of confinement and fear of the risk of ill make them very vulnerable.

In addition, there was a need for actions to contain social mobility, such as isolation and quarantine. "Social distancing involves measures that aim to reduce interactions in a community, which may include infected people, not yet identified and, therefore, not isolated" (AQUINO et al., 2020, p. 2).

Some measures adopted for social isolation were the closing of schools and workplaces, the suspension of some types of commerce, the conclusion of parks and conservation units and the cancellation of events to avoid the accumulation of people. The extreme case of social distancing is community containment or lockdown, which refers to a "strict intervention applied to an entire community, city or region by prohibiting people from leaving their homes" (WILDER- SMITH; FREEDMAN, 2020, p. 5) – except for the purchase of essential supplies or going to emergency services – with the aim of drastically reducing social contact.

Quarantine is the restriction of movement of people who are presumed to have been exposed to a contagious disease, but who are not sick, either because they have not been infected, because they are still in the incubation period, or even because, in COVID-19, remained asymptomatic and were not identified. It can be applied at

the individual or group level, keeping exposed people in their homes, institutions or other specially designated places (WILDER-SMITH; FREEDMAN, 2020).

In times of pandemic leisure was reduced. If there was social isolation or quarantine, it was almost nil. The environmental valuation method restricted to demand functions requires field research with questionnaires in person, to individuals who attended or were attending a conservation unit such as parks and squares. Therefore, research in this area was very difficult or almost impossible in the form of the original method, making the National Oceanic and Atmospheric Administration - NOAA panel precarious (KENETH ARROW et al., 1993).

Among the demand function methods that currently exist we have: Travel Cost, Hedonic Pricing and Contingent Valuation. In this research, the technique chosen for analysis is the Contingent Valuation - MVC. It is desired to know what changes occurred in the application of the method to the works presented after the beginning of the pandemic, since changes were needed in the way of approaching the respondents and presentation of the hypothetical scenario. Were there profound changes in the preparation of the questionnaires? Have biases become more present? Have there been significant changes in the value of Dispositions to Pay-DAP's or Dispositions to Accept Offsets -DAA for environmental and property assets?

1.1 The Contingent Valuation Method

The Contingent Valuation method -MVC makes it possible to determine a monetary value directed to the environmental attractions that are not available with a determined value—based on the consumer's well-being, inferred through the individual tastes of each interviewee. This method also makes it possible to stimulate people's awareness, as they are encouraged at the interview to think about the heritage and/or environmental asset that is presented to them and the existing problems. Taking the reflection on the existence of value in something that they did not imagine existing (VASCONCELOS, 2014).

Public goods motivate popular assessment methods in an inferential way, that is, representative samples of people answer a hypothetical question about willingness to pay for protective measures against an endangered species, or better air or water quality. Adding individual responses gives us a parameter of the willingness to pay for the entire economically active population - EAP. MVC is more attractive to researchers because it provides a democratic opportunity for people to be consulted on matters that may interest them. This method also reveals the respondents' sense of responsibility for the current value of a species and why not say its intrinsic value (LINO, 2021).

The method is applied through a personal interview in which the willingness to pay (DAP) or to receive (DAR) is declared for improvement or adjustments in the environmental good, the object of research. There are criticisms of this method both because the answers are based on responses according to individual preferences, and not on observation of behavior, and because it draws a hypothetical scenario, where answers may appear without coherence. The most common biases characterized by Castro and Nogueira (2019) are strategic, hypothetical, information, protest and interview.

Contingent Valuation can be done with different approaches: Free Bid or open form, asking how much the individual is willing to pay; Auction Games, creating a negotiation with the interviewee with several bids; payment cards, in which the interviewee is placed with several cards with different values and he must choose only one; or referendum with follow-up, asking if the individual is willing to pay a certain amount for the protection and conservation of the heritage asset (CASTRO and NOGUEIRA 2019).

Usually, the moment of application of the questionnaire is carried out in person, asking individuals about the good to be valued through a questionnaire divided into at least three blocks: one for socioeconomic data, one about the good to be valued and one for the DAP or DAR.

It is observed that over the years of experience in the use of MVC (more than 50 years) several formats were tested regarding the way of approaching the research participants. Table 1 shows the options already tested by researchers regarding application style.

Table 1- Mode of application of MVC- advantages and disadvantages

APPLICATION MODE	BENEFITS	DISADVANTAGES	FIRST AUTHORS
1-In person – The questionnaire is applied one by one and the time is set for this interview.	The interviewer controls the order of questions and may use audiovisual aids. Choose the	They are expensive, need training, may be influenced by the interviewer, may present a social desirability bias; difficulty supervising interviewers.	Mitchell and Carson (1989) and NOAA Panel Guidelines

	interviewee, clarify doubts.		(1993).
2-Phone – Researcher uses an intentional phone listing	Lower cost; centralized supervision; control over the order of questions; shortens distances; you can type the answers into a computer; Quick return.	They are not face to face; families can move; The name of the person who will answer is unknown. Difficulty presenting visuals; Explaining complex question the presence of social desirability bias.	Salant and Dillman, (1994); Schuman (1996)
3-Use of Mail - the researcher sends the printed questionnaire by mail	Longer response time: costs may be lower; interviewer effects are avoided, facilitates the use of visual aids.	Few return the answers; has no control over the order of the question; increases the numbers of unanswered items; misleading demographic characteristics; missing or wrong addresses. They are more expensive than emails.	Salant and Dillman (1994)
4-E-mail- The researcher sends the questionnaire directly to the respondent with intentional listing	Longer response time; Predominant technology; less costly; Faster completion time.	Delayed or non-existent return; has no control over the order of the question; increases the number of unanswered items; demographic differences in answering the questionnaires. Misleading demographics. Sample coverage; many people don't have email; various survey input formats; administrative cost. (if applicable); Difficult anonymity; longer answers;	Dillman (2000)
5-Web Base - Respondent goes to the designated website and completes the survey.	Question control; data available immediately; control of the respondent's time; facilitates investigation at the time of research - among other sites; Casual sample.	It does not represent the entire population; access problems; education level and income may be higher; the respondent does not know how many questions and can give up before reaching the end;	Dillman (2000) and Couper (2000)
6-Central research unit - A group is given an oral presentation on a topic. Group discussion follows. Your answer option is voted on the computer.	Use of audiovisual resources; detailed explanations; in-depth discussion of the subject; interpretation of body language by experts; less costly;	Artificial environment; recruitment of people, non-probabilistic method.	Adamowicz et al. (1997)
7- Whatsapp, Instagram or Facebook – The survey is sent to different groups by the researcher or groups of friends	Faster dissemination. Prompt answer. Control of issues. Use of photo and video panels	Only those who have a Smartphone or cell phone with devices such as iPhones and iPads will respond. Groups of like-minded friends can behave similarly; education level and income may be higher; Part of the sample may be left out, quantity prevails but not quality.	Jesus and Castro (2019). Brynjolfsson, Collis and Eggers (2019).

Source: Prepared by the authors based on: Castro and Nogueira (2019); Brynjolfsson, Collis and Eggers (2019).

The objective of this research is to evaluate the work carried out with the use of social networks such as whatsapp, Instagram or Facebook that are contained in item 7 of table 1 and their influence on DAP or DAA, as well as verify the changes that occurred in the presentation of the scenario and the presence of possible biases. In Brazil, the published work of Jesus and Castro (2019) was carried out in 2018 in a course conclusion work - TCC on the conservation unit of the Natural Heritage Reserve - RPPN Vale das Araras in Cavalcante - GO. Jesus was a student of the Economic Sciences Course at the State University of Goiás. With difficulties in traveling to the research site, because the city is 460 km away from his residential city, Anápolis/GO, he decided to apply the questionnaires using a new tool, Whatsapp, innovating the way to apply the questionnaire and the way to present the MVC search scenario.

The innovation took place because the method was costly and she, the daughter of low-income parents, could not afford such a high expense "The research was carried out using the electronic media of the Google Forms platform, an innovative method of application that made it possible to RPPN users in distant locations answer the questionnaire" Jesus e Castro (2019, p.17). However, the authors did not know whether the survey results could be biased, since they did not have other data from surveys in protected areas such as RPPN to compare results. The Scenario was sent with a film to the respondents.

Brynjolfsson, Collis and Eggers (2019) in the US performed online choice experiments to measure consumer surplus. The technique was also MVC. They illustrated this technique through several empirical examples that quantified ratings of popular digital goods and categories. Examples included discrete-choice, incentive-compatible experiments in which online and lab participants received cash if and only if they waived the goods for periods. For example, the user needed compensation of around $48 to give up Facebook for 1 month. Overall analyzes revealed that digital goods created large welfare gains that are not reflected in conventional measures such as Gross Domestic Product.

II. RESEARCH METHOD

The study is an integrative literature review. Bibliographic research was used in works such as a dissertation, and articles published in annals and scientific journals.

As a search strategy for the selection of studies, the Scientific Electronic Library Online (SciELO) and Web Of Science databases were consulted, as they cover the most articles in the valuation area. Later, Google school was used to expand the regional database. The search in the cited sources had as indexing terms "Contingent Valuation", "Contingent Valuation", "existence value", "existence value", "willingness to pay", "willingness to pay". The search was done by combining these terms or using them in isolation.

For the review, the period between 2020 and 2021 was considered a critical period for the spread of the Pandemic, a short period for analysis, but necessary to verify the performance of the researchers. Initially, publications were pre-selected by titles, which should contain the full term and references to at least the outcomes of interest as the first criterion, followed by reading the available abstracts and then reading the full text of the studies.

The electronic search in databases resulted in the initial identification of 304 works throughout the Web, Brazilian and foreign works, after the first refinement, works performed in assets outside Brazil were excluded. Of the results published in Brazil (figure 1), 27 were selected, whose titles or abstracts mentioned studies on willingness to pay (DAP) or willingness to accept compensation (DAA). In the second refinement, five works were selected to carry out the study because they were applied using social networks and 22 studies were excluded.

Of the analyzed works, three are articles, a dissertation, and a course conclusion work. As for the type of assets, two are parks, a waterfall complex, an arboretum and a historical heritage site.

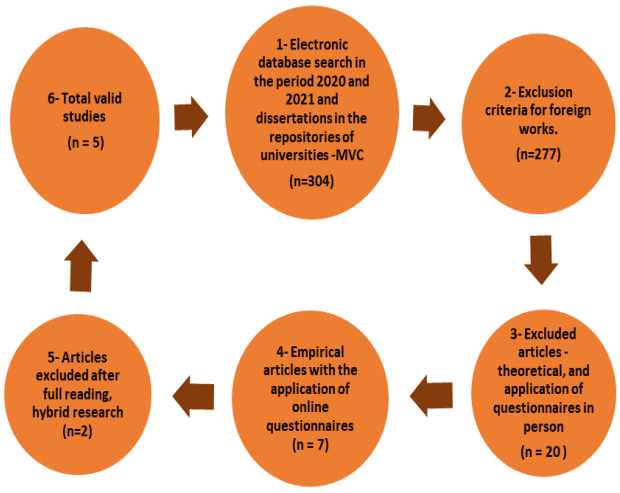

Fig.1: Protocol for searching scientific papers, organization portals and exclusion criteria

Source: Own elaboration

The published works should use the MVC and the questionnaire applied only through social networks. The researcher could not apply the questionnaire personally in

the data collection process. The research focused only on works that took place in Brazil.

For data analysis, five criteria were established for evaluation, the ones that most influence research results on MVC, biases, the hypothetical market, sample size, DAP value, construct validity and the questionnaire applied.

III. RESULTS AND DISCUSSIONS

The total number of works selected for analysis was only five that met all the requirements of the research, to be carried out in the years 2020 and 2021, and the application of the questionnaire could not be in person. Of the papers discarded from the analysis, seven (7) were theoretical, an advance for research on MVC in Brazil because according to (CASTRO, 2015) until 2014 only 30 papers were published (in 19 years) an average of 1.6 articles per year and this average rose to 3.5 in both years.

Of the empirical works until 2019, 96 were published, an average of 4 works per year. The average rose in two years to 10 jobs. In the period of the Covid-19 pandemic, researchers dedicated themselves to studying and writing more about the method.

Table 2 presents the published works that conducted interviews using social networks and electronic forms. The researchers used the google forms platform. The dissemination took place on internet pages and with dissemination tools, called “ad managers for boosting”, on social networks. With these tools it is possible to choose the places where your search will appear for those accessing social networks in the selected perimeter.

Table 2 - Works selected for analysis with application of a distance interview in the period of Pandemic by Covid-19 - 2020-2021

Year	Active	Sample	Application mode	DAP	University	Author
2020	APA – UnB Arboretum	308	Social networks - Facebook, Instagram, Whatsapp, email	8,29	UnB	ALVARES
2020	Wall of professions Aldo Locatelli	250	Social network - Whatsapp e e-mail	9,62	UFRGS	FERNANDES; BEM e WAISMANN
2021	Valparaiso de Goiás Ecological Park	60	Social Networks - Electronic form WhatsApp	9,67 e 9,42	UEG e IFG	SILVA e CASTRO
2021	Willingness to pay to enter the Cachoeiras-AM complex	194	Electronic form Social media	12,43	UFAM	YUNES NETO; RIVAS; ALMEIDA e LIMONT
2021	Serra Dourada State Park -GO	125	Electronic form Social networks- Whatsapp, Instagram, Facebook	21,84	UEG	LINO

Source: own elaboration

The hypothetical market is created so that the respondent knows or remembers what the environmental or patrimonial asset to be valued is about. In the interview model, it becomes an awareness conversation about the support to be valued. In the analyzed works, all produced informative text, placed photographs (50%), flyer (20%), informative short films (20%).

For the questionnaire applied by google forms there is no response time control. The respondent may respond very quickly without being aware of their role and the importance of what is being valued. Different from the face-to-face application, each questionnaire is stipulated a minimum interview time.

Another striking difference between the two methods is that respondents can claim to know the environmental or heritage asset and have never entered the conservation or heritage unit, nor belong to the place to be valued. Ignorance implies arrogating non-real value to oneself.

To circumvent possible biases, the authors were concerned with anchoring biases, payment vehicle and protest bias, and hypothetical bias; therefore, they resorted to literature and creating informative texts to avoid responses. Texts can create emotions and information that are notably inconsistent with the reality of the interviewee.

They also wrote texts recalling the natural attractions of the environmental asset and thus mitigating mental accounting bias. Protest bias was circumvented by offering the zero option to score and asking the reason for the value. Several alternatives were offered for the payment vehicle bias, including pix, over the internet, payment slips, and additions to water or electricity bills. Two works were not concerned with possible biases.

In the elaboration of the questionnaires, the concern with not tiring the interviewee was visible. The works presented an average of 15 questions, a minimum of 10 and a maximum of 20. When the interview is carried out in person, it contains up to 40 questions (on average 20 questions). The blocks of questions were kept, socioeconomic, attitudinal or behavioral, environmental or heritage awareness. The blocks that received the most cuts were attitudinal and awareness of the asset to be valued. Regarding the type of questions, multiple choices prevailed (80%) and binary questions (yes or no) 20%.

The sample size also influences the research, the method requires large samples for more excellent coverage of responses, especially if it involves econometric tests. This size is proportional to the population. Of the selected works, 40% present calculation formulas, 40% describe how the sample arrived and 20% do not comment on the value of the sample.

All research using MVC is directed toward calculating the most real DAP/DAA value possible. For this they chose the open-ended type (free bids) and bidding games (auction games). In 50% of the works, both types were used. In this regard, the results presented a new format between bidding games and payment cards since when creating a range of values there was no negotiation, the individual observed the values in a table for choice. It's also not a payment card because the values weren't sorted, so we have a hybrid way of perceiving the DAP.

So one wonders, did this new format for obtaining the DAP become more assertive or added problems to a method so contested by several authors such as Amiran and Hagen (2010), Hausman (2012), Haab et al., (2013) and Castro and Nogueira (2019).

The average values imputed for DAP are very close to those found in the ParqueEstadual dos Pirineus (GO) carried out by Barros (2020) with an average DAP of 8.65, ParqueEcológico do Rio Cocó achieved by Farias et al. (2018) with mean DBH 11.53, Cachoeiras da Serrinha in Mariana/MG researched Camargo (2014) and mean DBH 9.66 and Memorial Darcy Ribeiro assigned by Carvalho Junior et al. (2016) with an average DBH of 4.07. Therefore, only through the DAP value can we say nothing. And making comparisons of DAP values is also not recommended since they are different realities, different times, and a diverse respondent audience.

After estimating DBH, it is natural that its consistency is tested by statistical means. After all, this procedure guarantees the certainty that the result obtained in research is consistent or accurate (LARSON; FARBER, 2010). If it is not compatible, other statistical procedures are triggered to adjust it. In the case of MVC, the concern is in the dependence relationship between the variables in the DBH estimation and, mainly, in the model used. Of the analyzed studies, 40% used inferential statistics and data validity tests. The other 60% used only descriptive statistics, which does not allow for construct analysis. A construct must be scientifically proven. "In turn, this 'proof' cannot be 'singular': other scientists, repeating the same procedures, need to arrive at the same 'truth'". (MORESI, 2003, p. 13). Here, two reasons may have generated this discomfort not knowing econometrics to create a desirable demand curve to estimate DAP or not knowing the google forms program enough to remove the data already tabulated in a spreadsheet to be transferred to other programs such as Excel, Evius , R, Stata to be used in multiple regression and data validation in statistical tests.

Dillman and Bowker (2001) discuss web search errors and among these errors are coverage, measurement and non-response. Coverage error is displayed when the sample is not representative of the population. Measurement error is related to inaccurate answers that result from poorly written questions, and non-response error is those who did not have the opportunity to respond to the questionnaire because they did not get a chance.

In the five studies analyzed, these errors may have occurred mainly for those who did not dedicate themselves to deeply exploring the sample size (60%). Measurement errors can be mitigated by applying a pilot questionnaire. In the analyzed works, 60% carried out the pilot test because the pilot was carried out before the pandemic period, and 40% did not. These works ran the risk of misunderstanding the issues.

Non-response errors may have occurred in 80% of the jobs, because only one was applied at the site of the environmental asset. The interviewer approached the person in the park, asked for their cell phone number, sent the questionnaire, so as not to have counted on the

individual, and received the answer on google forms. The other works were sent randomly on the web, so the respondents could be involved or not with the research site, those who did not have the opportunity to access the questionnaire did not respond. There may also have been a hardware or software incompatibility and the respondent has given up responding.

Other positive points for this type of application are the reduction of costs, speed and agility of the answers. The training of the applicators, and daily, passages for displacement burden the method a lot. With google forms this is not a problem to be worked around. As for agility and speed, there is also a reduction in tabulation errors and tables and graphs, because the program immediately sends everything ready at the end of the search.

IV. CONCLUSION

Scientific research that addresses the Contingent Valuation method requires a lot of time, and careful analysis of the asset to be valued, in addition to the cost of research with displacement and long trips, training for the application of interviews, expenses with printed material.

The potential efficiency and cost associated with conducting web surveys and the delicate moment of the Covid-19 pandemic (2020 and 2021 mainly) made face-to-face surveys impossible in many regions and this led to the implementation of surveys using Whatsapp, modifying the established by the panel of the National Oceanic and Atmospheric Administration-NOAA that advocates the use of face-to-face interviews.

This new format of interviews can bring problems to obtaining a less assertive DAP and thus harm environmental and heritage assets if this value is used to provide public policies or legal demands. Most of the works presented do not present construct analysis, so these works can hardly be replicated for testing and validity of the MVC.

A new format of perceiving DAP/DAR was applied. Recent surveys are needed to identify the best way, that is, conducting the survey in person on the same assets and comparing responses. There may indeed be a diversification in terms of values because they will be new individuals in new socio and economic moments. Still, the values may be very close and if this occurs, this furthermethodological adjustment will bring gains to the method, mainly with lower costs and more agility in the responses. Allowing more research to be carried out. The question remains, can small changes bring big problems? This will be answered in the future with further analysis and further work.

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