Survey Programmer

A Project Report Submitted
In Partial Fulfillment of the Requirements
for the Degree of

MASTER OF COMPUTER APPLICATION

by
Anubhav Tyagi
(1900290149021)

Under the Supervision of

Dr. Sangeeta Arora
KIET Group of Institutions, Ghaziabad

to the
FACULTY OF MCA

DR. APJ ABDUL KALAM TECHNICAL UNIVERSITY
(Formerly Uttar Pradesh Technical University) LUCKNOW

August 2021

NSMX

Training Certificate

NS Matrix Services Pvt. Ltd.

Tel : +91-11-45513300
E-mail : info@nsmatrix.com
Web : www.nsmatrix.com

TO WHOMSOEVER IT MAY CONCERN

Date: 29th June, 2021

This is to certify that the project named "SURVEY PROGRAMMING" prepared by "ANUBHAV TYAGI", sixth semester student of MCA of "Krishna Institute of Engineering & Technology, Ghaziabad", is hereby accepted and approved as a credible work. He is working in position of intern in NS Matrix Services Pvt. Ltd. since 10-Mar-21.

This Letter is only for the reference of Krishna Institute of Engineering & Technology, Ghaziabad. This Project is confidential and cannot disclosed by ANUBHAV TYAGI and Krishna Institute of Engineering & Technology, Ghaziabad to any third party unless disclosed by us.

Sincerely,

Authorized Signatory

952, Aggarwal Metro Heights, Netaji Subhash Place, Pitampura, New Delhi - 110034, India

CERTIFICATE

Certified that **Anubhav Tyagi (1900290149021)** have carried out the project work name "**Survey Programmer**" for Master of Computer Application from Dr. A.P.J. Abdul Kalam Technical University (AKTU) (formerly UPTU), Technical University, Lucknow under the supervision of **Dr. Sangeeta Arora**. The project report embodies original work, and studies are carried out by the student himself/herself and the contents of the project report do not form the basis for the award of any other degree to the candidate or to anybody else from this or any other University/Institution.

Dr. Sangeeta Arora   **External Examiner**

Associate Professor

Department of Computer Applications

KIET Group of Institutions, Ghaziabad

Dr. Ajay Kumar Srivastava

Professor & Head

Department of Computer Applications

KIET Group of Institutions, Ghaziabad

Date:

Survey Programmer

Anubhav Tyagi

ABSTRACT

Every client needs to know about consumer behavior as you are. So, to find the best ways to get to the data that will deliver the most meaningful insights for businesses, decipher programming specializes in cross platform survey programming, data reporting and visualization. Utilizing its robust market research survey and reporting platform, decipher programming integrates state-of-the-art technology with traditional research techniques. Programming with Decipher is all about uncovering opportunities in whatever territory is explored with clients. Decipher programming isn't interested in just data, but also about what that data represents for each client. The programming focuses on technology and research systems that bring data to life, and in doing so, helps reveal how even seemingly small discoveries can yield meaningful insights.

ACKNOWLEDGEMENT

TABLE OF CONTENT

LIST OF FIGURES

CHAPTER 1

INTRODUCTION

MARKET RESEARCH

In this chapter we will give an introduction about security locks and protection on computer system. Here we also give an overview of how the data and file are encrypted and decrypted in system.

1.1 MARKET RESEARCH INTRODUCTION

Marketing research is "the process or set of processes that links the consumers, customers, and end users to the marketer through information — information used to identify and define marketing opportunities and problems; generate, refine, and evaluate marketing actions; monitor marketing performance; and improve understanding of marketing as a process. Marketing research specifies the information required to address these issues, designs the method for collecting information, manages and implements the data collection process, analyzes the results, and communicates the findings and their implications.

It is the systematic gathering, recording, and analysis of qualitative and quantitative data about issues relating to marketing products and services. The goal of marketing research is to identify and assess how changing elements of the marketing mix impacts customer behavior.

1.2 SECURITY AND ITS SIGNIFICANCE

Market research is any organized effort to gather information about target markets

or customers. It is a very important component of business strategy. The term is commonly interchanged with **marketing research** however, expert practitioners may wish to draw a distinction, in that *marketing* research is concerned specifically about marketing processes, while *market* research is concerned specifically with markets.

Market research is a key factor in maintaining competitiveness over competitors. Market research provides important information to identify and analyze the market need, market size and competition.

Market research, which includes social and opinion research, is the systematic gathering and interpretation of information about individuals or organizations using statistical and analytical methods and techniques of the applied social sciences to gain insight or support decision making.

Market segmentation is the division of the market or population into subgroups with similar motivations. It is widely used for segmenting on geographic differences, personality differences, demographic differences, technographic differences, use of product differences.

1.3 IMPLEMENTATION OF MARKET RESEARCH

SWOT ANALYSIS

SWOT is a written analysis of the **Strengths, Weaknesses, Opportunities and Threats** to a business entity. Not only should a SWOT be used in the creation stage of the company but could also be used throughout the life of

the company. A SWOT may also be written up for the competition to understand how to develop the marketing and product mixes.

Another factor that can be measured is marketing effectiveness. This includes

- Customer analysis
- Choice modeling
- Competitor analysis
- Risk analysis
- Product research
- Advertising the research
- Marketing mix modeling
- Simulated Test Marketing\

1.4 TECHNICAL BACKGROUND

1.4.1 CLASSICAL MARKET TECHNIQUES

It is important to test marketing material for films to see how an audience will receive it. There are several market researches practices that may be used:

(1) concept testing, which evaluates reactions to a film idea and is rare

(2) Positioning studios, which analyze a script for marketing opportunities

(3) Focus groups, which probe viewers' opinions about a film in small groups prior to release

(4) Test screenings, which involve the previewing of films prior to theatrical release

(5) Tracking studies, which gauge (often by telephone polling) an audience's awareness of a film on a weekly basis prior to and during theatrical release

(6) Advertising testing, which measures responses to marketing materials such as trailers and television advertisements and finally

(7) Exit surveys, that measure audience reactions after seeing the film in the cinema.

MONOALPHABETIC CIPHER: From the marketer's point of view, an efficient price is

a price that is very close to the maximum that customers are prepared to pay. In economic terms, it is a price that shifts most of the consumer economic surplus to the producer. A good pricing strategy would be the one which could balance between the price floor (the price below which the organization ends up in losses) and the price ceiling (the price be which the organization experiences a no-demand situation).

PRICING: The price/quality relationship refers to the perception by most consumers that a relatively high price is a sign of good quality. The belief in this relationship is most important with complex products that are hard to test, and experiential products that cannot be tested until used (such as most services). The greater the uncertainty surrounding a product, the more consumers depend on the price/quality hypothesis and the greater premium they are prepared to pay. The classic example is the pricing of Twinkies, a snack cake which was viewed as low quality after the price was lowered. Excessive reliance on the price/quality relationship by consumers may lead to an increase in prices on all products and services, even those of low quality, which causes the price/quality relationship to no longer apply.

1.4.2 THE MARKET STANDARD (DES)

Market trends are the upward or downward movement of a market, during a period of time. Determining the market size may be more difficult if one is starting with a new innovation. In this case, you will have to derive the figures from the number of potential customers, or customer segments.

Market segmentation is the division of the market or population into subgroups with similar motivations. It is widely used for segmenting on geographic differences, personality differences, demographic differences, technographic differences, use of product differences, psychographic differences and gender differences. For B2B segmentation firmographics is commonly used.

1.4.3 THE ADVANCED MARKET STANDARD (AES)

The task of marketing research (MR) is to provide management with relevant, accurate, reliable, valid, and current information. Competitive marketing environment and the ever-increasing costs attributed to poor decision making require that marketing research provide sound information. Sound decisions are not based on gut feeling, intuition, or even pure judgment.

Marketing managers make numerous strategic and tactical decisions in the process of identifying and satisfying customer needs. They make decisions about potential opportunities, target market selection, market segmentation, planning and implementing marketing programs, marketing performance, and control.

CHAPTER 2

LITERATURE REVIEW

2.1 IQOLA PROJECT APPROACH

The International Quality of Life Assessment (IQOLA) Project is a 4-year project to translate and adapt the widely used MOS SF-36 Health Survey Questionnaire in up to 15 countries and validate, norm, and document the new translations as required for their use in international studies of health outcomes. In addition to the eight-scale SF-36 health profile, the project will also validate psychometrically based physical and mental health summary scores, as well as health utility indexes incorporating SF-36 scales for use in cost-utility studies.[2]

This article briefly summarizes methods used in the empirical validation of translations of the SF-36 Health Survey. In addition, information about the IQOLA Project norming protocol and 13 general population norming samples analysed in this supplement is provided.[1]

2.2 THEORETICAL COMPARISON OF TESTING METHODS

Testing methods are notoriously difficult to compare because most testing lacks a theoretical foundation. For example, it certainly seems reasonable to test until every statement of a program has been executed. It would be stupid not to do so, since a never-executed statement could harbor an arbitrarily bad bug. But having achieved statement

coverage, what does the tester know? It is easy to show that statement coverage can be achieved by many different test sets, some of which expose bugs while others do not. How then can the worth of statement testing be assessed? So long as the relationship between a method's basis (in the example, covering statements) and properties of the software (here, the occurrence of bugs) remains imprecise, meaningful comparisons between methods, indeed comparison between two applications of the same method, cannot be made.[4]

2.3 COMPARING SUBJECTIVE VIDEO QUALITY TESTING METHODOLOGIES

The double stimulus continuous quality scale (DSCQS) method of performing subjective tests is widely accepted as an accurate test method with little sensitivity to context effects. Context effects occur when subjective ratings are influenced by the severity and ordering of impairments within the test session. With DSCQS, context effects are minimized since viewers are shown pairs of video sequences (the reference sequence and the impaired sequence) in a randomized order. Viewers are shown each pair twice.[3]

After the second showing, viewers are asked to rate the quality of each sequence in the pair. The difference between these two scores is then used to quantify changes in quality. The resulting scores are not significantly impacted by memory-based biases from previously viewed video sequences. Since standard double stimulus methods like DSCQS1 provide only a single quality score for a given video sequence, where a typical video sequence might be 10 seconds long, questions have been raised as to the applicability of these testing methods for evaluating the performance of objective real-time video quality monitoring systems.[5]

By contrast, single stimulus continuous quality evaluation (SSCQE) allows viewers to dynamically rate the quality of an arbitrarily long video sequence using a slider mechanism with an associated quality scale. This relatively new method provides a means for increasing the sampling rate of the subjective quality ratings. Having subjective scores at a

higher sampling rate would be useful for tracking rapid changes in quality and thus would be more useful for evaluating real-time quality monitoring systems.[7]

2.4 THE ART OF TESTING LESS WITHOUT SACRIFICING QUALITY

Testing is a key element of software development processes for the management and assessment of product quality. In most development environments, the software engineers are responsible for ensuring the functional correctness of code. However, for large complex software products, there is an additional need to check that changes do not negatively impact other parts of the software and they comply with system constraints such as backward compatibility, performance, security etc. Ensuring these system constraints may require complex verification infrastructure and test procedures. [6]

Although such tests are time consuming and expensive and rarely find defects they act as an insurance process to ensure the software is compliant. However, long lasting tests increasingly conflict with strategic aims to shorten release cycles. To decrease production costs and to improve development agility, we created a generic test selection strategy called THEO that accelerates test processes without sacrificing product quality.[8]

THEO is based on a cost model, which dynamically skips tests when the expected cost of running the test exceeds the expected cost of removing it. We replayed past development periods of three major Microsoft products resulting in a reduction of 50% of test executions, saving millions of dollars per year, while maintaining product quality.[9]

2.5 SOFTWARE TESTING AND QUALITY ASSURANCE: THEORY AND PRACTICE

People seek quality in every man-made artifact. Certainly, the concept of quality did not originate with software systems. Rather, the quality concept is likely to be as old as human endeavor to mass produce artifacts and objects of large size. In the past couple of decades

a quality revolution, has been spreading fast throughout the world with the explosion of the Internet. Global competition, outsourcing, off-shoring, and increasing customer expectations have brought the concept of quality to the forefront. Developing quality products on tighter schedules is critical for a company to be successful in the new global economy. Traditionally, efforts to improve quality have centered around the end of the product development cycle by emphasizing the detection and correction of defects. On the contrary, the new approach to enhancing quality encompasses all phases of a product development process—from a requirements analysis to the final delivery of the product to the customer. Every step in the development process must be performed to the highest possible standard.[10]

2.6 ACHIEVING SOFTWARE QUALITY WITH TESTING COVERAGE MEASURES

Coverage testing helps the tester create a thorough set of tests and gives a measure of test completeness. The concepts of coverage testing are well-described in the literature. However, there are few tools that actually implement these concepts for standard programming languages, and their realistic use on large-scale projects is rare. In this article, we describe the uses of a dataflow coverage-testing tool for C programs-called ATAC for Automatic Test Analysis for C/sup 3/-in measuring, controlling, and understanding the testing process.[12]

We present case studies of two real-world software projects using ATAC. The first study involves 12 program versions developed by a university/industry fault-tolerant software project for a critical automatic-flight-control system. The second study involves a Bellcore project of 33 program modules. These studies indicate that coverage analysis of programs during testing not only gives a clear measure of testing quality but also reveals important aspects of software structure. Understanding the structure of a program, as revealed in coverage testing, can be a significant component in confident assessment of overall software quality.[11]

2.7 IMPROVING MEASUREMENT QUALITY AND EFFICIENCY WITH ADAPTIVE TESTING

Approaches to adaptive (tailored) testing based on item response theory are described and research results summarized. Through appropriate combinations of item pool design and use of different test termination criteria, adaptive tests can be designed to improve both measurement quality and measurement efficiency, resulting in measurements of equal precision at all trait levels to improve measurement efficiency for test batteries using item pools designed for conventional test administration; and to improve the accuracy and efficiency of testing for classification (e.g., mastery testing).[14] Research results show that tests based on item response theory (IRT) can achieve measurements of equal precision at all trait levels, given an adequately designed item pool; these results contrast with those of conventional tests which require a trade-off of bandwidth for fidelity/precision of measurements. Data also show reductions in bias, inaccuracy, and root mean square error of ability estimates. Improvements in test fidelity observed in simulation studies are supported by live-testing data, which showed adaptive tests requiring half the number of items as that of conventional tests to achieve equal levels of reliability, and almost one-third the number to achieve equal levels of validity. [15] When used with item pools from conventional tests, both simulation and live-testing results show reductions in test battery length from conventional tests, with no reductions in the quality of measurements. Adaptive tests designed for dichotomous classification also represent improvements over conventional tests designed for the same purpose. Simulation studies show reductions in test length and improvements in classification accuracy for adaptive vs. conventional tests; live-testing studies in which adaptive tests were compared with "optimal" conventional tests support these findings. Thus, the research data show that IRT-based adaptive testing takes advantage of the capabilities of IRT to improve the quality and/or efficiency of measurement for each examinee.[13]

CHAPTER 3

SURVEY PROGRAMMER

3.1 DESCRIPTION

The Survey Programmer is responsible for programming and testing all aspects of online surveys. This individual will work closely with our client service teams to consult on survey design elements and ensure that client projects are completed on time and budget. This position is client facing and requires providing excellent customer service while managing our clients' custom quantitative market research projects. The position requires an organized, detail-oriented individual who is able to manage multiple team members/projects, all while meeting demanding deadlines.

3.2 RESPONSIBILITIES

You will be part of a global team responsible for successfully managing survey projects from start to finish. Responsibilities of a Survey Programmer include:

· Reviewing survey questionnaires for quality, compliance, and best practices

· Accurately assessing the time required to program a questionnaire.

· Accurately assessing the likely survey length based on the questionnaire from the client and suggesting effective ways of reducing overall length and survey fatigue.

· Programming surveys into survey platforms like Decipher (Preferred), Confirm IT, Qualtrics, Nebo etc.

· Testing surveys to ensure all programming instructions, logic, flow have been

implemented.

· Downloading, Checking and Formatting Interim and Final data for review and delivery in different formats.

· Working with third-party programming platforms on technical set-up, review, and testing.

· Teaching, training, and mentoring new hires on programming and other technical skills.

3.3 Benefits of survey programming

- Productivity: By applying survey logic tactics, you can create a number of surveys in a matter of minutes. It reduces the time you need to create questions. Just like by applying logic in software programming, you can achieve more with less code, in survey programming you can collect more data with relatively less number of questions. One can use the question library, copy questions from the same survey or a different survey to reuse the question set.
- Efficiency: The purpose behind using a survey software is to design, distribute and analyze data smartly. Such software comes with rich features that reduce the time to do market research. It reduces the effort drastically as compared to traditional means of data collection. With survey programming, you can collect more information about your target audience with less number of questions.
- Conciseness: If you use a survey creation software efficiently, the survey questionnaire will be very concise. This also improves the experience of respondents as they have to answer a lesser number of questions. There are many methods to make the questionnaire concise using survey building software. With survey logic and programming, it becomes possible to present the same question based on the respondent's answer. Thus, the survey creator doesn't have to create different questions for different scenarios.
- Simplicity: Concise surveys are simple yet powerful. Because of the way they collect data, generating insights from data analytics gets very simple. With survey programming

software, you can manage the market research campaign with minimum human intervention. For instance, you can schedule the distribution of invitation email at a specific time. Also, you can create a question list in your preferred language and launch a survey based on the respondent's language.

3.4 How can market researchers use survey programming?

Survey programming can be applied in a number of ways to increase the effectiveness of the survey. Market researches should make the most of the below features available in the survey creation tool.

1. **Skip Logic:** Skip logic moves respondents to a different question or page on the basis of their selection of an option in the current question. This feature can take respondents to a different question in the survey or skip some questions. You can define custom rules to create a path for each respondent based on their responses. For instance, a hotel can ask customers if they enjoyed their meals or not. In this case, the first question would be if he/she had meals or not.

   Based on the answer, the respondent can be presented a question on the restaurant or the hotel.

2. **Compound/Delayed Branching**: With simple branching or skip logic, you cannot program a survey based on responses to multiple questions. Also, the logic is executed immediately with simple branching. With compound branching, you can set multiple criteria on a single question. With delayed branching, you can use responses of previous questions to decide which question should be presented.

3. **Quota Control**: Suppose you want only 1000 responses for a specific question, then you can set the limit of the number of responses with quota control. Once you reach the limit, no further responses will be accepted.

4. **Dynamic text/comments:** When you want respondents to give descriptive comments on the selection of particular answer option, you can configure question to have dynamic text/comments. The respondents will be displayed a text box only if they select an option that is configured.

5. **Extraction:** Many times, it is required to drill down further to get more insights. Extraction programming can help to display question options out of options selected in the current question. This enables you to present the selected options of a multi-select question as answer options of the next question.

6. **Show/Hide Questions:** Sometimes it is required to hide a question based on an option selected. The only condition is that there must be a page break between these questions. For instance, respondents from different countries can be asked different questions.

7. **Show/Hide Options**: You can program the survey to show or hide answer options in either a matrix, single-choice, or select-many questions based on predefined criteria. These criteria could be answers to previous questions or custom variables assigned beforehand.

8. **Scoring:** Surveys can be used to calculate scores in real-time. You can conduct online tests and compute scores. Further, it can be configured to display the total or section-wise score to the test taker immediately after the test. Or they can be sent scores in a separate email.

9. **Python Logic:** If in any case, the above logic mechanism doesn't satisfy the business requirements, custom python logic can also be applied to the questions. You can insert logic through python code either before the page loads or after the respondent hits the submit button.

CHAPTER 4

BUSSINESS RESEARCH

Market research is broader in scope and examines all aspects of a business environment. It asks questions about competitors, market structure, government regulations, economic trends, technological advances, and numerous other factors that make up the business environment (see environmental scanning). Sometimes the term refers more particularly to the financial analysis of companies, industries, or sectors. In this case, financial analysts usually carry out the research and provide the results to investment advisors and potential investors.

PRODUCT RESEARCH - This looks at what products can be produced with available technology, and what new product innovations near-future technology can develop (see new product development).

ADVERTISING RESEARCH – This is a specialized form of marketing research conducted to improve the efficacy of advertising. Copy testing, also known as "pre-testing," is a form of customized research that predicts in-market performance of an ad before it airs, by analyzing audience levels of attention, brand linkage, motivation, entertainment.

4.1 PROBLEM DESCRIPTION

Business to business (B2B) research is inevitably more complicated than consumer research. The researchers need to know what type of multi-faceted approach will answer the objectives, since seldom is it possible to find the answers using just one method. Finding the right respondents is crucial in B2B research since they are often busy, and may not want to participate. Encouraging them to "open up" is yet another skill required of the B2B researcher. Last, but not least, most

business research leads to strategic decisions and this means that the business researcher must have expertise in developing strategies that are strongly rooted in the research findings and acceptable to the client.

There are four key factors that make B2B market research special and different from consumer markets:

1) The decision-making unit is far more complex in B2B markets than in consumer markets

2) B2B products and their applications are more complex than consumer products

3) B2B marketers address a much smaller number of customers who are very much larger in their consumption of products than is the case in consumer markets.

4) Personal relationships are of critical importance in B2B markets.

4.2 SPECIFICATION OF MARKET TECHNIQUES

Marketing research does not only occur in huge corporations with many employees and a large budget. Marketing information can be derived by observing the environment of their location and the competitions location. Small scale surveys and focus groups are low cost ways to gather information from potential and existing customers. Most secondary data (statistics, demographics, etc.) is available to the public in libraries or on the internet and can be easily accessed by a small business owner.

Below are some steps that could be done by SME (Small Medium Enterprise) to analyse the market:

1. Provide secondary and or primary data (if necessary);
2. Analyse Macro & Micro Economic data (e.g. Supply & Demand, GDP, Price change, Economic growth, Sales by sector/industries, interest rate, number of investment/ divestment, I/O, CPI, Social Analysis etc.)

3. Implement the marketing mix concept, which is consist of: Place, Price, Product, Promotion, People, Process, Physical Evidence and also Political & social situation to analyse global market situation);

4. Analyse market trends, growth, market size, market share, market competition (e.g. SWOT analysis, B/C Analysis, channel mapping identities of key channels, drivers of customers loyalty and satisfaction, brand perception, satisfaction levels, current competitor-channel relationship analysis, etc.), etc.

5. Determine market segment, market target, market forecast and market position.

6. Formulating market strategy & also investigating the possibility of partnership/ collaboration (e.g. Profiling & SWOT analysis of potential partners, evaluating business partnership.

4.2.1.1 MARKET RESEARCH

The primary online sale providers in B2C E-Commerce, worldwide, includes the USA based Amazon.com Inc. which remains the E-Commerce revenues, global leader. The growth leaders in the world top ten are two online companies from China, both of which conducted Initial Public Offering (IPO) this year; Alibaba Group Holding Ltd. and JD Inc. Another company from the top ten is Canova N.V., a recently formed E-Commerce subsidiary of the French Group Casino, with various store retailers developing and expanding their E-Commerce facilities worldwide. It is a further indication of how consumers are increasingly being attracted to the opportunities of online researching and expanding their awareness of what is available to them.

Service providers; for example, those related to finance, foreign market trade and investment promote a variety of information and research opportunities to online users. In addition, they provide comprehensive and competitive strategies with market research tools, designed to promote worldwide business opportunities for entrepreneurs and established providers. General access, to accurate and supported

market research facilities, is a critical aspect of business development and success today. The Marketing Research Association was founded in 1957 and is recognized as one of the leading and prominent associations in the opinion and marketing research profession. It serves the purpose of providing insights and intelligence that helps businesses make decisions regarding the provision of products and services to consumers and industries.

4.2.1.2 HILL CIPHER

The vendors are the third-party sample sources which help us achieving the target numbers of the project, when our sample is exhausted. Alike we are the sample providers, we have many other companies who provide their sample/panelists for a project. They follow the same process, which we follow with our client i.e. costing of the project, providing the end pages, implementation of links, testing feedback and then fieldwork management.

Every company has its own policies of panelist management and their own way of capturing the panelist ids through their end pages. End pages would be generic or unique depending upon their policy. It entirely is the process through which both vendor and we capture the panelists in the correct form. The first and foremost step is to implement the provided end pages in PM Tool for the study number.

4.2.1.3 RESEARCH AND MARKET SECTORS

This organization knowledge of market conditions and competition is gained by researching relevant sectors, which provide advantages for entry into new and established industries. It enables effective strategies to be implemented; the assessment of global environments in the service sectors, as well as foreign market trade and investment barriers! Research, is utilized for promoting export opportunities and inward investment, helping determine how to execute competitive strategies, focus on objective policies and strengthen global opportunities. It is a medium that influences, administrates and enforces

agreements, preferences, leveling trading environments and competitiveness in the international marketplace.

The retail industry aspect of online market research, is being transformed worldwide by M-Commerce with its mobile audience, rapidly increasing as the volume and varieties of products purchased on the mobile medium, increase.

4.2.1.4 INFLUENCE FROM THE INTERNET

The availability of research by way of the Internet has influenced a vast number of consumers using this media; for gaining knowledge relating to virtually every type of available product and service. It has been added to by the growth factor of emerging global markets, such as China, Indonesia and Russia, which is significantly exceeding that of the established and more advanced B2C E-Commerce markets. Various statistics show that the increasing demands of consumers are reflected not only in the wide and varied range of general Internet researching applications, but in online shopping research penetration.

This is stimulated by product-enhancing websites, graphics, and content designed to attract casual "surfing" shoppers, researching for their particular needs, competitive prices and quality. According to the Small Business Administration (SBA), a successful business is significantly contributed to by gaining knowledge about customers, competitors, and the associated industry. Market research creates not only this understanding, but is the process of data analysis regarding which products and services are in demand.

The convenience and easy accessibility of the Internet has created a global B2C E-commerce research facility, for a vast online shopping network that has motivated retail markets in developed countries. In 2010, between $400 billion and $600 billion in revenue was generated by this medium also, it is anticipated that in 2015, this online market will generate revenue between $700 billion and $950 billion. The influence of market research, irrespective of what form it takes, is an extremely powerful incentive for any type of consumer and their providers!

4.2.1.5 RESEARCH AND SOCIAL MEDIA APPLICATIONS

This application is a highly effective vehicle for market research, which combined with E-commerce, is now regarded as a separate, extremely profitable field of global business. While many B2B business models are being updated, the various advantages and benefits offered by Social Media platforms are being integrated within them.

Business intelligence organization have compiled a comprehensive report related to global online retail sales, defining continued growth patterns and trends in the industry. Headed "Global B2C E-Commerce and Online Payment Market 2014" the report perceives a decrease in overall growth rates in North America and Western Europe, as the expected growth in the online market sales, is absorbed into the emerging markets. It is forecast that the Asia-Pacific region will see the fastest growth in the B2C E-Commerce market and replace North America.

4.2.1.5.1 INTERNATIONAL PLAN

It is important to test marketing material for films to see how an audience will receive it. There are several market research practices that may be used:

(1) Concept testing, which evaluates reactions to a film idea and is fairly rare;

(2) Positioning studios, which analyze a script for marketing opportunities;

(3) Focus groups, which probe viewers' opinions about a film in small groups prior to release;

(4) test screenings, which involve the previewing of films prior to theatrical release;

(5) Tracking studies, which gauge (often by telephone polling) an audience's awareness of a film on a weekly basis prior to and during theatrical release;

(6) Advertising testing, which measures responses to marketing materials such as trailers and television advertisements; and finally

(7) Exit surveys that measure audience reactions after seeing the film in the cinema.

4.3 TESTING AND COMPARATIVE ANALYSIS

Market research is a way of getting an overview of consumers' wants, needs and beliefs. It can also involve discovering how they act. The research can be used to determine how a product could be marketed. Peter Drucker believed market research to be the quintessence of marketing.

There are two major types of market research. Primary Research sub-divided into Quantitative and Qualitative research and Secondary research.

Through Market information one can know the prices of different commodities in the market, as well as the supply and demand situation. Market researchers have a wider role than previously recognized by helping their clients to understand social, technical, and even legal aspects of markets.

CHAPTER 5

TOOLS

MARKET Algorithm is developed in HTML/Python programming language. The packages and methods that are used in this algorithm are described below-

5.1 PACKAGES

Decipher Tool is the in-house technical tool. It was created with a thought of programming although with the time passed by, more options were added to make decipher Tool as widely used tool for users.

What makes decipher Tool unique from other technical tools is the user-friendly User Interface. It gives users, the whole variety to explore every bit of this tool to the core. Having all the qualities of a programming tool, decipher Tool has been on the top list of users when it comes to sending invites to respondents, as it has been the only tool from where, any user could send invites. Running on HTML language, Decipher Tool brings so many variations to the programming world with its brilliant UI (User Interface) for daily work.

Decipher Tool ® software platform offers advanced survey creating, a vast library of machine-learning algorithms, text analysis, open-source extensibility, integration with big data and seamless deployment into applications. Its ease of use; flexibility and scalability make decipher TOOL accessible to users with all skill levels and outfits projects of all sizes and complexity to help you and your organization find new opportunities, improve efficiency and minimize risk.

Decipher Tool is the most comprehensive, yet easy to use, professional survey and creating solution. Run a just-in-time quick poll, undertake a large-scale multi-country, multi-language study or anything in-between to capture your customers' feelings and ensure their voice comes through in your data insights without being limited to prefabricated templates.

5.2 METHODS

- [ ] Link Setup

- [ ] Testing

- [ ] Sending sample

- [ ] Monitoring

- [ ] Vendor setup

- [ ] Final ids

5.3 PREMIUM PRICING

Premium Pricing (also called prestige pricing) is the strategy of consistently pricing at, or near, the high end of the possible price range to help attract status-conscious consumers. The high pricing of premium product is used to enhance and reinforce a product's luxury image. Examples of companies which partake in premium pricing in the marketplace include. As well as brand, product attributes such as eco-labelling and provenance (e.g. 'certified organic' and 'product of Australia') may add value for consumers and attract premium pricing. A component of such premiums may reflect the increased cost of production. People will buy a premium priced product because:

They believe the high price is an indication of good quality;

They believe it to be a sign of self-worth - "They are worth it;" it authenticates the buyer's success and status; it is a signal to others that the owner is a member of an exclusive group;

They require flawless performance in this application - The cost of product malfunction is too high to buy anything but the best - example: heart pacemaker.

5.4 CREATING SURVEY IN DECIPHER TOOL (<u>MY WORK</u>):

This section outlines the basics of building surveys within the Survey Editor. Here, we'll learn everything we need to know to build a simple survey in decipher TOOL, from navigating the project options in the Portal, to understanding the various elements necessary for survey creation.

5.4.1 OVERVIEW OF THE PORTAL

Before we can start building our survey, we'll need to familiarize ourselves with the layout of the PM TOOL project system. This lesson provides a general introduction to the Portal, the central hub of the DECIPHER TOOL Platform where we can create, manage, review, and collaborate on projects.
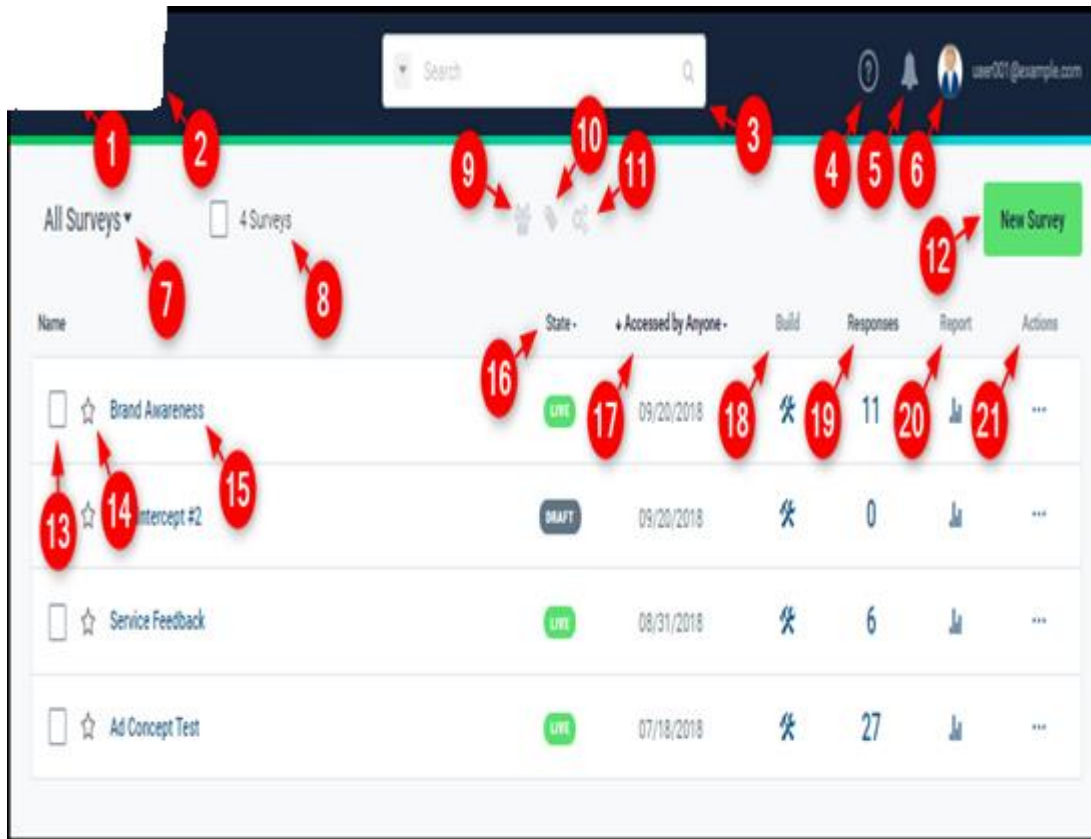
Fig. 5.1 **OVERVIEW OF THE PORTAL**

1. PRODUCT PAGES: Click the caret to view links to other FV products.

2. **COMPANY:** Click your company name or logo / icon to access your Company Page, where you can configure the settings and user permissions for your company.

3. **SEARCH:** Using the powerful search capabilities, you can find your projects based on project name, descriptions, tags, users and even search for specific contents, like a file name or even question text. Click the caret to see advanced search options.

4. **HELP LINKS:** Click to access your survey support resources.

5. **NOTIFICATIONS:** Click to view PM TOOL news flashes and other notifications. The bell icon will light up to let you know when there's new system updates or release news.

6. **USER PROFILE:** Click your profile picture or username to access your user profile and other options for your account.

7. **ALL SURVEYS:** Click to view or apply your saved survey views and searches. If you find an interesting view using search or sorting, you can save it to this menu to recall that view on demand. Learn more: Saved Searches

8**. SURVEY TOTAL:** Displays a count of all surveys created within your company. Check the box next to the count to add tags or apply specific actions to the selected surveys.

9. **USER ACTIONS:** When available, click to add or remove users from the selected survey(s).

10. **TAGS:** When available, click to add new tags to the selected survey(s).

11. **SURVEY ACTIONS:** When available, click to perform favoriting or archiving for multiple projects at once.

12. **NEW SURVEY:** Click to create a new survey

13. **SELECT SURVEY:** Check the box next to any survey to select it for the next action.

14. **MARK AS FAVORITE:** Click the star next to any survey to add it to your favorites list.

 You can view favorited surveys using the saved views in the "All Surveys" menu.

15. **SURVEY NAME:** Click the name for any survey to navigate to its Project Overview page. The Project Overview page displays project performance stats, including key data from the Response Summary and campaign information. Additionally, it allows you access to the project's user and group controls, as well as any shared files or saved reports. Learn more: The Project Overview Page

16**. STATE:** The current state of each survey. Click to filter surveys by one or more specific states.

17. **SORT BY:** Sorts all displayed surveys by the selected criteria. Click to sort surveys by survey path, directory, or when the survey was last accessed or edited. You can also sort surveys based on respondent activity and decide whether to show newer or older events first.

18. **BUILD:** Click the "Build" icon to edit the survey within the Survey Editor.

19. **RESPONSES:** Displays the current response count for the survey. Can be real or simulated data. Click the "Responses" icon to access the Response Summary page.

20. **REPORT:** Click the "Report" icon to view the survey data in Crosstabs.

21. **ACTIONS:** Click the "..." icon to view the Survey Actions menu.

5.4.2 CREATING A NEW PROJECT:

When creating a new project, you can either start from scratch or by importing a questionnaire into the Survey Editor. In this lesson, we'll look at accessing the Survey Editor and starting a new project using both methods.

SURVEY EDITOR WORKSPACE

- The Survey Editor workspace is split into three distinct sections:
- The question tree displays all of the survey's elements in a linear order.
- The stage allows users to update question text and answer options.
- The options panel allows users to manage some of the more advanced settings for questions and answer options.

5.4.3 BASIC QUESTION TYPES

Certain question types like single- or multi-choice are considered survey staples, and the Survey Editor includes customizable templates for these and most other common question types. In this lesson, we'll learn how to program the following basic question types from a questionnaire:

SINGLE SELECT:

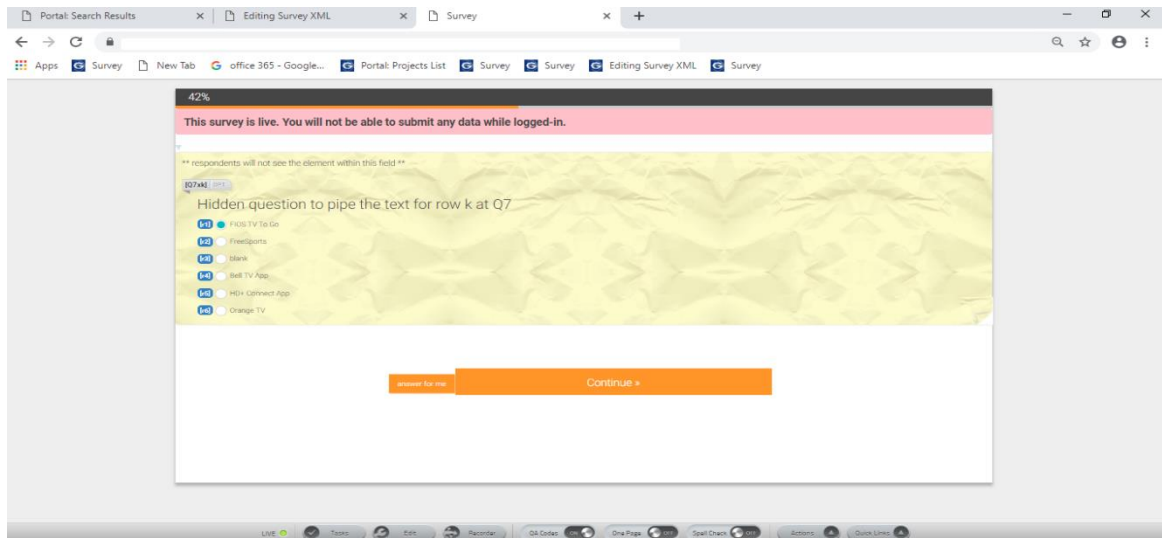Allows respondents to select one answer in a list of options.
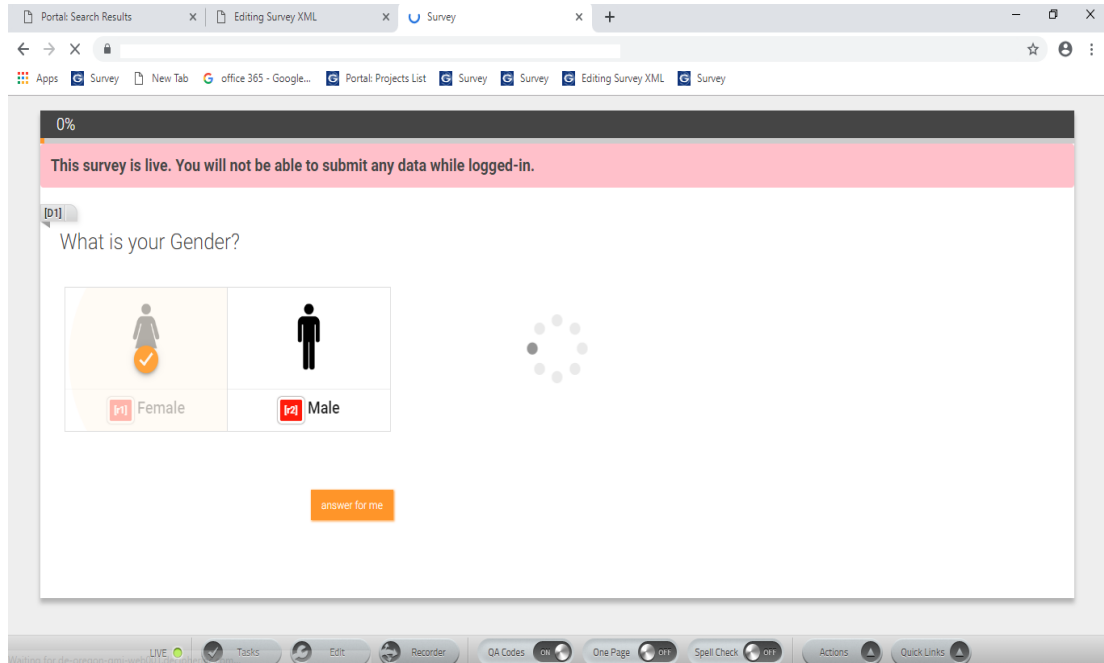
Fig. 5.2 **SINGLE SELECT**

SINGLE SELECT GRID:

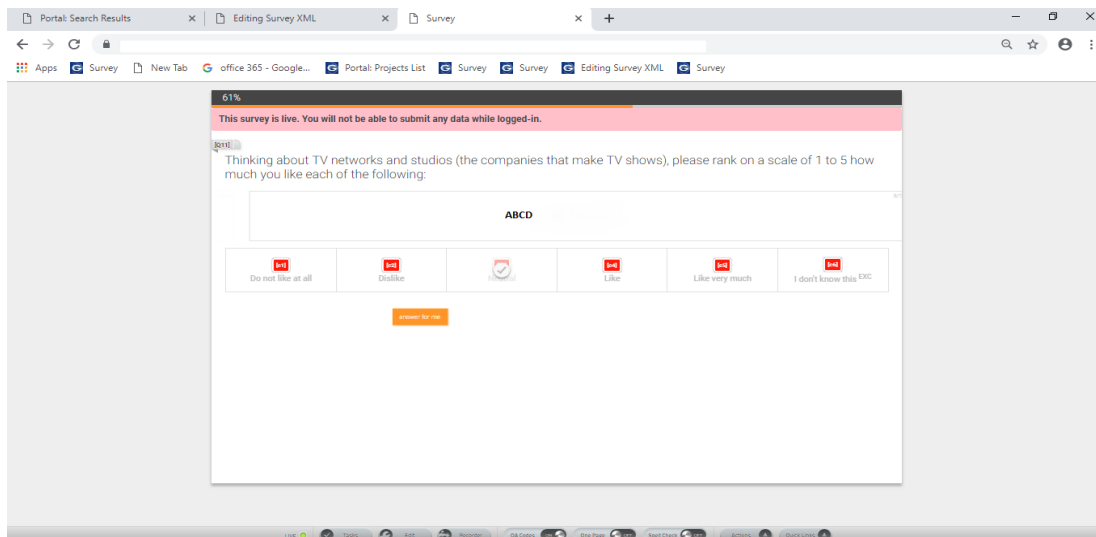Allows respondents to select one answer in a 2-dimensional grid layout.
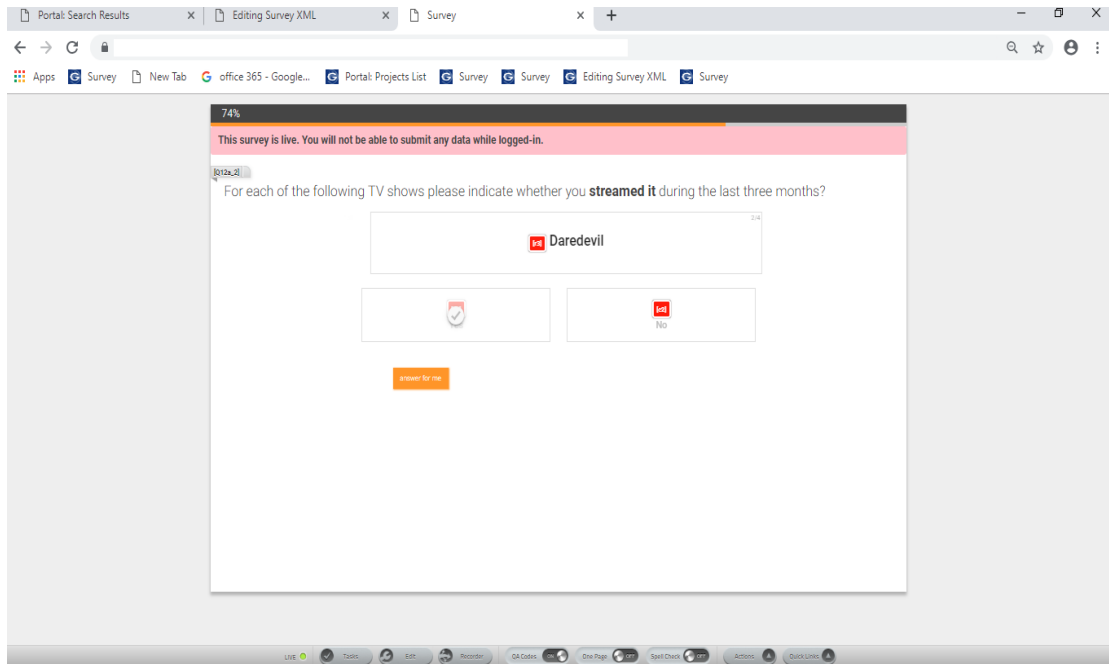
Fig. 5.3 **SINGLE SELECT GRID**

MULTI-SELECT:

Allows respondents to select multiple answers from a list of options.
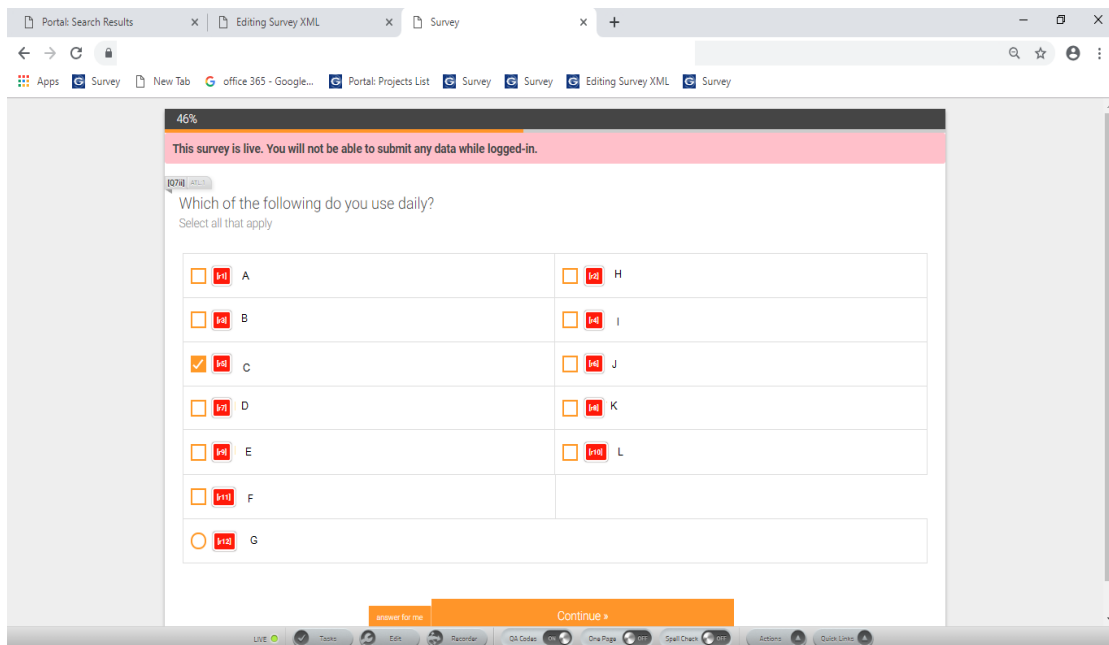
Fig. 5.4 **MULTI-SELECT**

MULTI-SELECT GRID:

Allows respondents to select multiple answers in a 2-dimensional grid layout.

Fig. 5.5 **MULTI-SELECT GRID**

DROPDOWN MENU:

Allows respondents to select one answer from a drop-down menu of options.

Please tell us whether or not you have done the following tasks in the given timeframe.

Please select one for each selection

	In the past 24 hours	In the past week	In the past month
Eaten Breakfast	No ▼	No ▼	Yes ▼
Eaten Lunch	No ▼	Yes ▼	Yes ▼
Eaten Dinner	Select one... ▼	Select one... ▼	Select one... ▼

(Fig. 5.6)

NUMBER:

Allows respondents to enter a numeric response in an open-ended answer field.

Please rank each brand's ability to reflect the following characteristics:

Duplicated answers; please select each number only once.
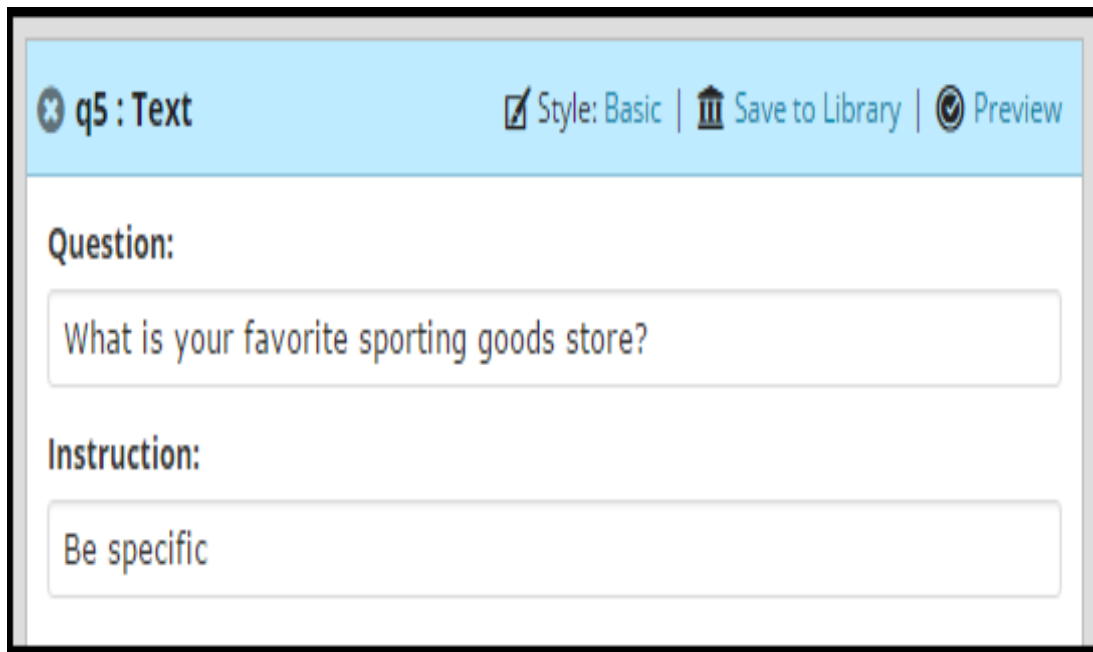
Use the numbers 1 - 3 where 1 is the best and 3 is the least.

	Value	Customer Service	Quality
Brand 1	1	2	3
Brand 2	3	3	2
Brand 3	2	1	3

Fig. 5.7 **NUMBER**

TEXT:

Allows respondents to enter a text response in an open-ended answer field.

Fig. 5.8 **TEXT**

ESSAY:

Allows respondents to enter a text response in a larger open-ended answer field than the traditional Text question type.

Fig. 5.9 **ESSAY**

DESCRIPTIVE CONTENT:

Displays text and/or multimedia elements to respondents without requiring interaction.

Fig. 5.10 **DESCRIPTIVE CONTENT**

DYNAMIC QUESTION TYPES:

Along with the basic question types covered above, the Survey Editor includes templates for a variety of dynamic question types which provide enhanced usability, respondent engagement, and data quality. In this lesson, we'll learn how to program the following dynamic question types from a questionnaire-

BUTTON SELECT:

Allows respondents to select one answer in a list of options.

Fig. 5.11 **BUTTON SELECT**

RATING SCALE:

Allows respondents to select one answer in a 2-dimensional grid layout.

Fig. 5.12 **RATING SCALE**

SLIDER:

Allows respondents to select multiple answers from a list of options.

Fig. 5.13 **SLIDER**

STAR RATING:

Allows respondents to select multiple answers in a 2-dimensional grid layout.
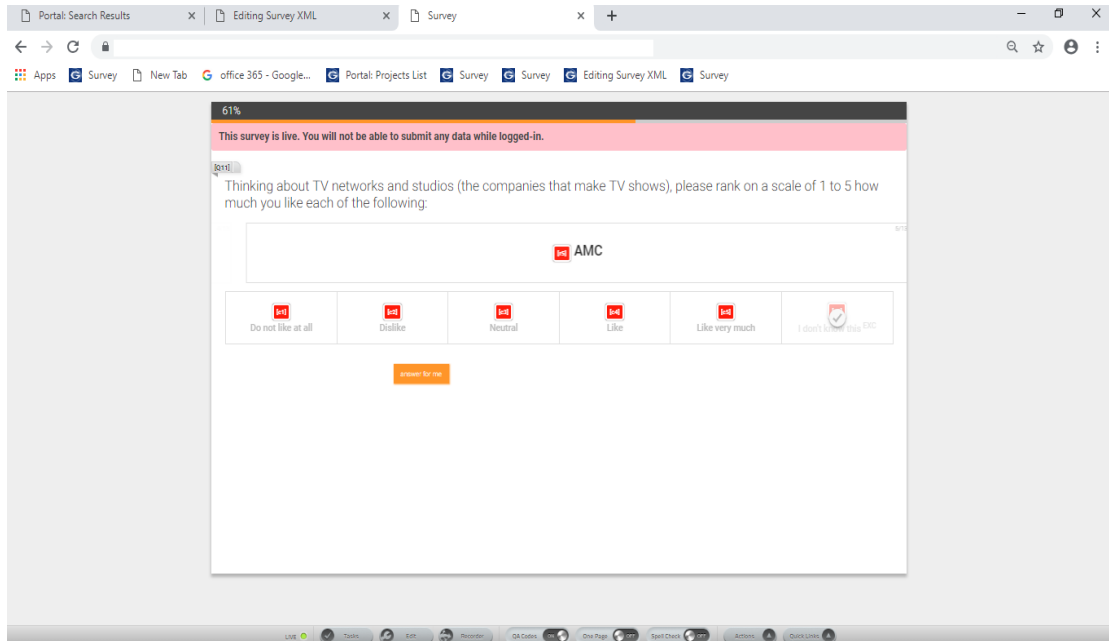
Fig. 5.14 **STAR RATING**

RANK SORT:

Allows respondents to select multiple answers from a drop-down menu of options.

CARD RATING:

Allows respondents to rate multiple response cards displayed one at a time.

NOTE: Although dynamic questions use basic question types as their foundations, the data may not be directly comparable. When employing dynamic questions, be sure to develop standards and maintain consistency in how they are customized; this ensures the relative values of data can be interpreted without concern that the question format is biasing results in some way.

ELEMENT LIBRARY

The Element Library allows users to store commonly used elements for future use in their current survey or other projects, making it easy to reuse things like demographic questions, screener

questions, or even brand lists. The following items are storable in the Element Library:

Entire questions/elements

Multiple questions (can be used to create survey templates)

Answer options

5.4.4 ADDING & MANAGING IMAGES

The Image Manager allows users to add images to a survey and easily update any existing images. In this lesson, we'll learn how to add images to our survey through the Image Manager. We'll also learn how to resize images for viewing on different devices and how to add protections to avoid un-permitted distribution or use of our images.
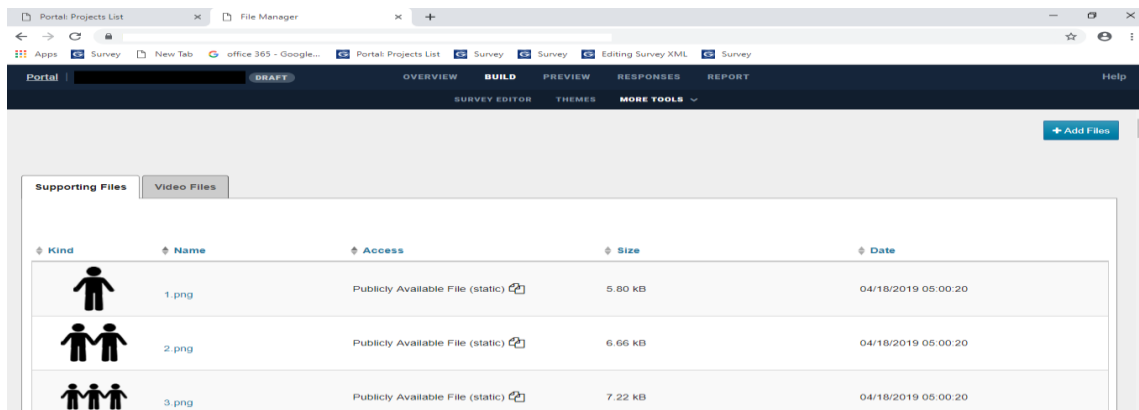
Fig. 5.15 **ADDING & MANAGING IMAGES**

5.4.5 STYLE EDITOR:

It is also possible to configure the display settings for most basic and interactive elements within the Survey Editor. In this lesson, we'll learn how to adjust the configurations for both a basic and dynamic question in our test survey.

Fig. 5.16 **STYLE EDITOR**

5.4.6 DATA VERIFIERS

A data verifier is an attribute which can be used on a text, essay or number element to restrict responses to a format. These built-in "verify" attributes are accessible in the Survey Editor and can be applied to answer options or to a question as a whole. If applied at the question level, the responses for each input will be checked against the regular expressions and must match to be accepted.
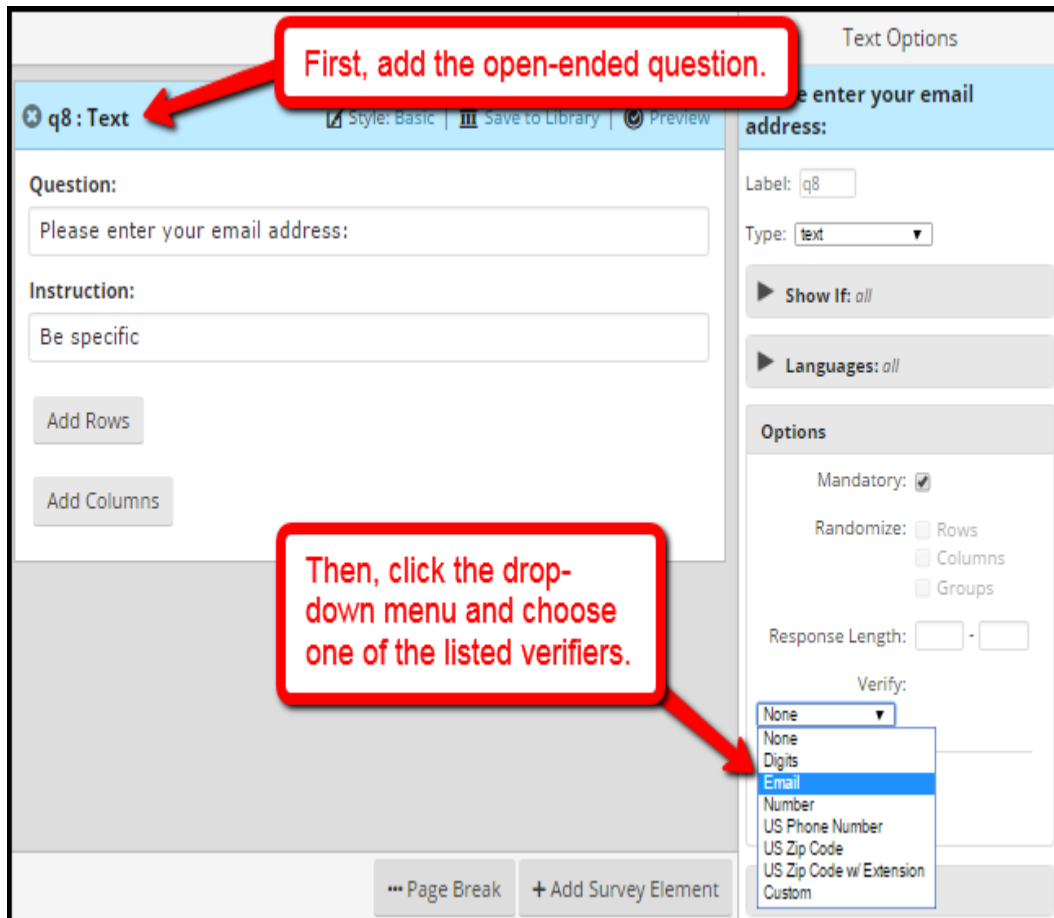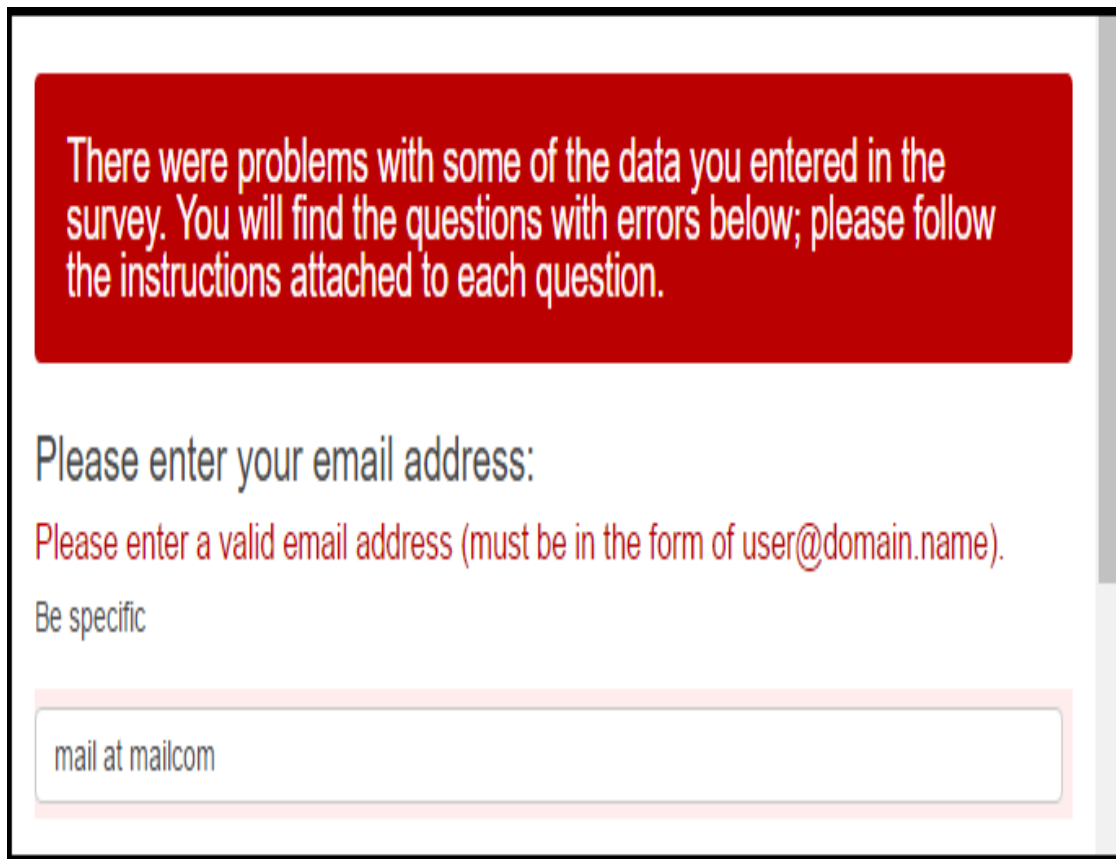
Fig. 5.17 **DATA VERIFIERS**

E.G: EMAIL VALIDATION:

Fig. 5.18 **EMAIL VALIDATION**

5.4.7 ADDING LOGIC

Applying logic conditions to a survey can greatly improve the quality of the data collected. In this lesson, we will learn how to add logic conditions to survey questions and about how these additions can lead to us gathering more accurate data.

ADDING LOGIC BASED ON QUESTION TYPE:

1-DIMENSIONAL QUESTIONS

In a 1-dimensional question, the question has rows, columns or choices.

After selecting "+condition" from the "Show If" drop down menu in options, the "Set up Logic Conditions" pop up window will appear. Select the question you want to use for the logic from the drop-down menu, select "is" or "is NOT" from the drop down menu, then select the answer choices that will define the logic. Select "Save," or "Save As" if you wish to name the condition for later use in the survey editor.

Example: Logic based on a single-select element (1-dimensional question)
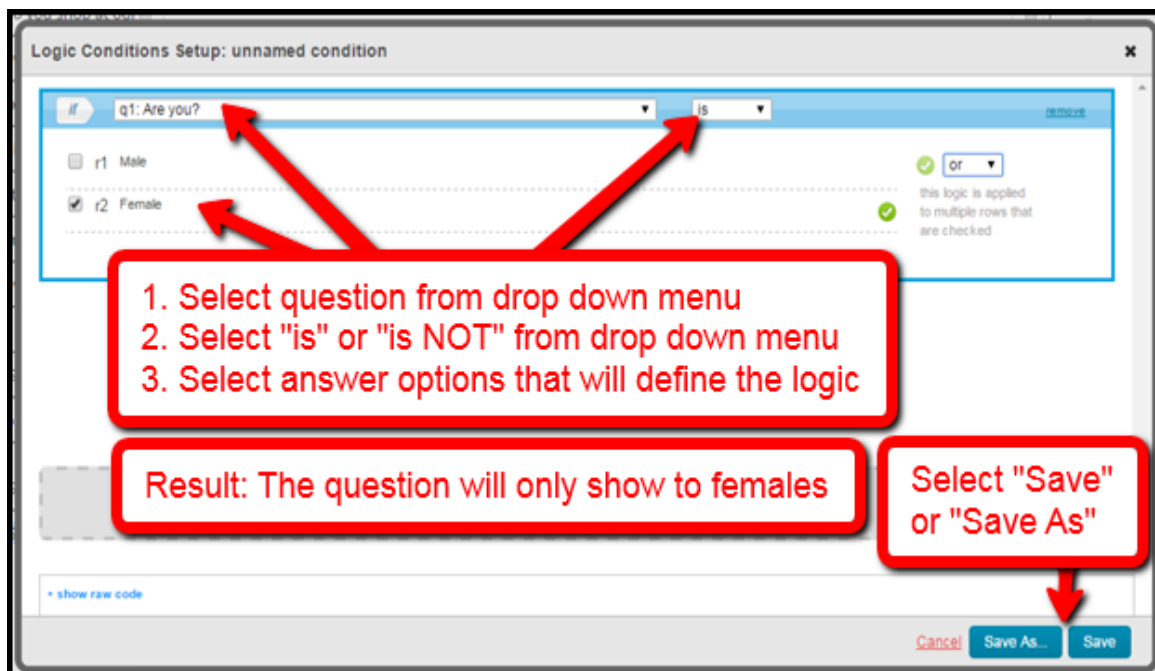
Fig. 5.19 **1-DIMENSIONAL QUESTIONS**

Example: Logic based on a multi-select element (1-dimensional question)
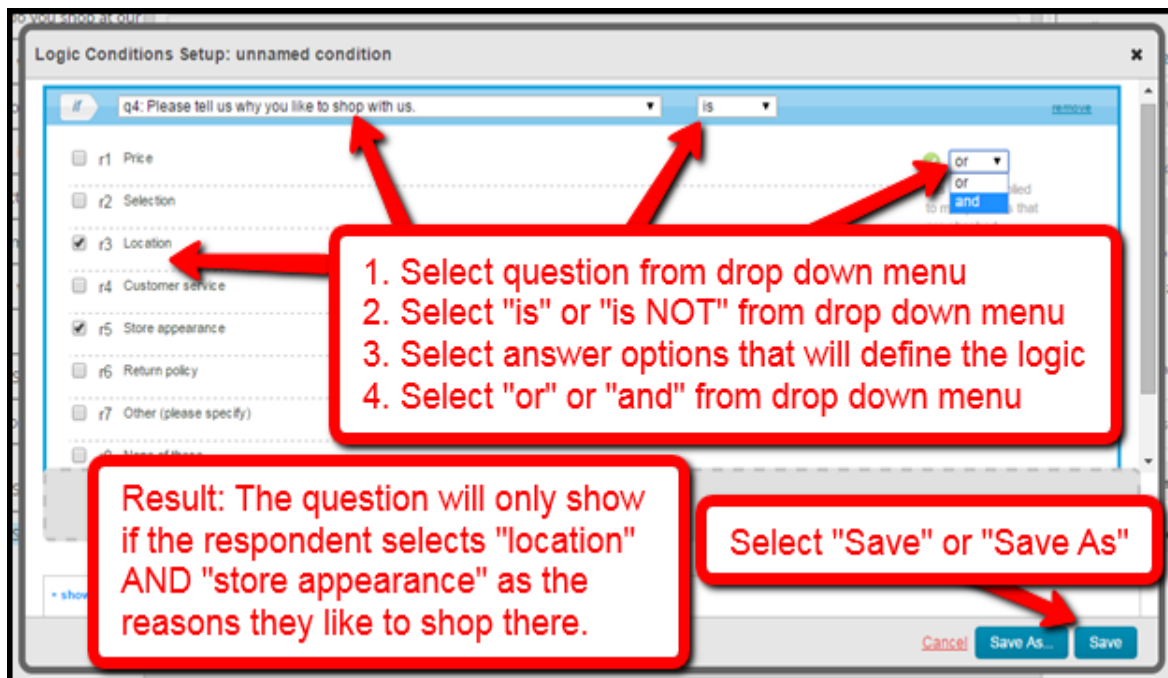
Fig. 5.20 **1-DIMENSIONAL QUESTIONS**

2-DIMENSIONAL QUESTIONS

In a 2-dimensional question, the question has rows and columns, rows and choices, or columns and choices.

In this example we are going to add logic that only shows the question to respondents that prefer to shop for books and tools online.

Fig. 5.21 **2-DIMENSIONAL QUESTIONS**

After selecting "+condition" from the "Show If" drop down menu in options, the "Set up Logic Conditions" pop up window will appear. Select the question you want to use for the logic from the drop-down menu, select "is" or "is NOT" from the drop-down menu, then select the row or column answer choice from the drop-down menu. If the question is "grouped by" rows, the row choices will appear in the drop-down menu, and if the question is "grouped by" columns, the column choices will appear in the drop-down menu.

Fig. 5.22 **2-DIMENSIONAL QUESTIONS**

Once the row is selected the answer choices for the columns will appear. Select the column(s) that will define the logic. In this example we want to add more logic, so we will need to select the "+add more logic" icon. Alternatively, you may select "Save," or "Save As" if you wish to name the condition for later use in the survey editor, if your logic is complete at this point.
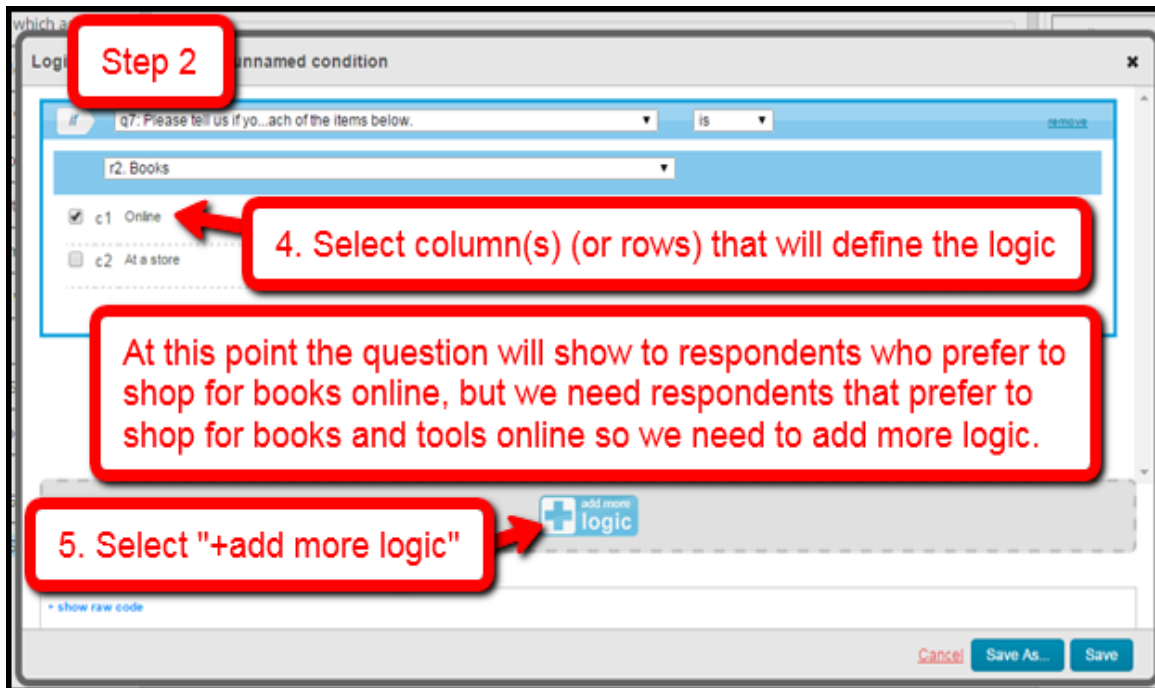

Fig. 5.23 **2-DIMENSIONAL QUESTIONS**

After we select the "+add more logic" icon a summary of the logic we've created will appear, along with a new box with the same options we had in step 1. Select the question you want to use for the logic from the drop-down menu, select "is" or "is NOT" from the drop-down menu, then select the row or column answer choice from the drop-down menu.
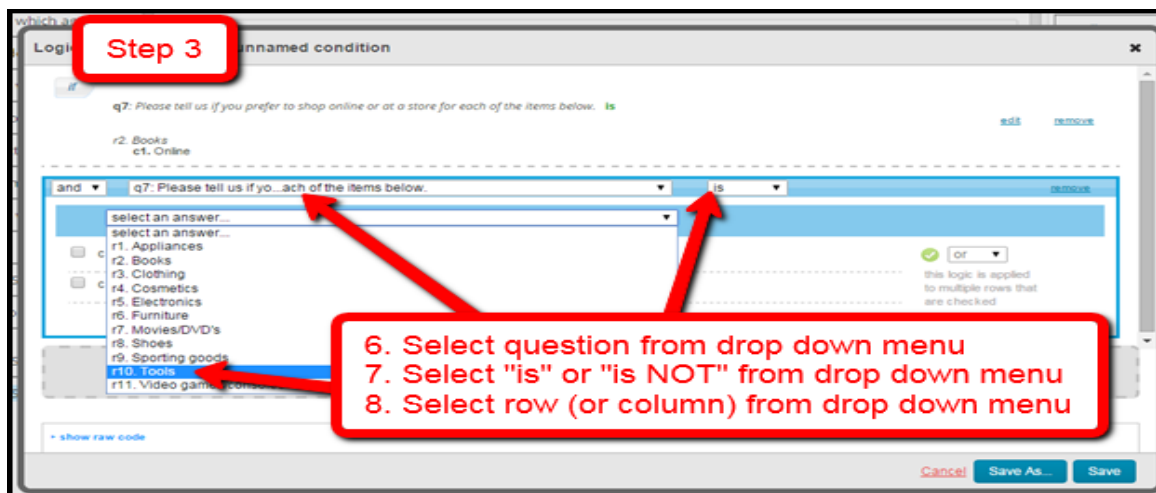
Fig. 5.24 **2-DIMENSIONAL QUESTIONS**

Once the row is selected the answer choices for the columns will appear. Select the column(s) that will define the logic. Then select "and" or "or" from the drop-down menu. We want respondents that prefer to shop for books <u>and</u> tools online, so we will select "and."
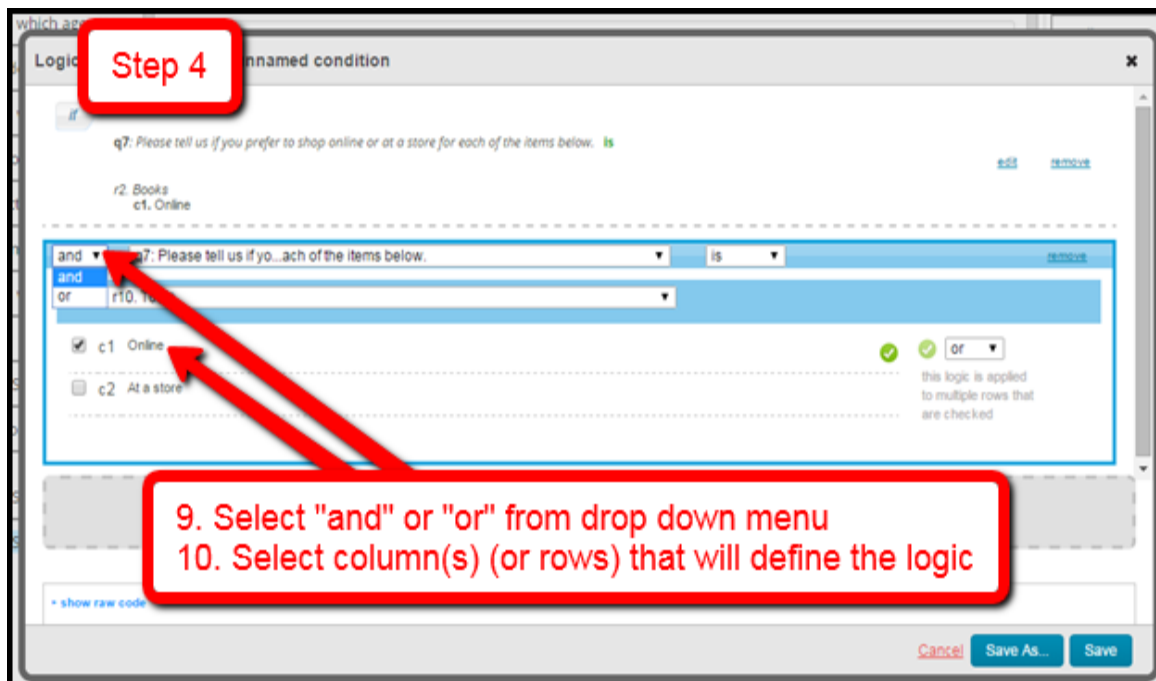
Fig. 5.25 **2-DIMENSIONAL QUESTIONS**

Once your logic is complete, review it one last time to confirm it is correct, then select "Save," or "Save As" if you wish to name the condition for later use in the survey editor.
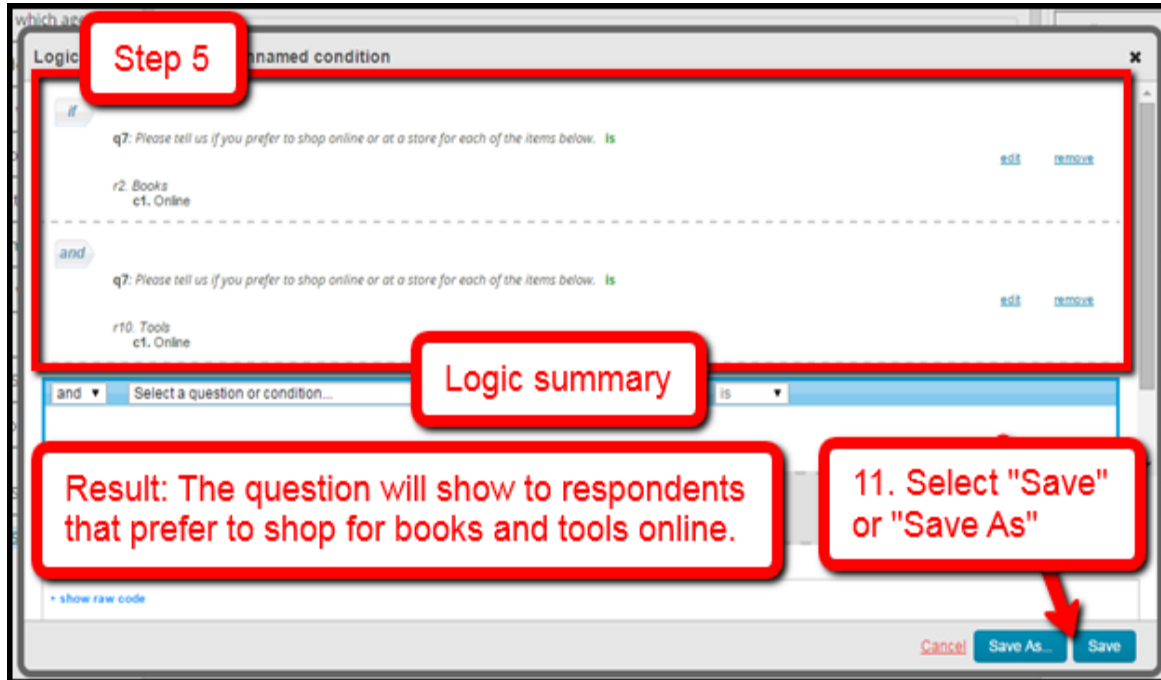

Fig. 5.26 **2-DIMENSIONAL QUESTIONS**

5.4.8 ELEMENTS:

BLOCK ELEMENT:

In this lesson, we will learn how to add the block element to a survey. We will also learn how the block element can be used to group questions together, display a section of survey elements in random order, or restrict several questions by the same logic.

Note: A block will not show to respondents taking the survey.

LOOP ELEMENT:

The loop element allows users to ask the same question(s) of a respondent multiple times, typically for each applicable value of a variable. In this lesson, we'll learn about adding the loop element to a survey to save ourselves time on programming questions and implementing complex piping.

SKIP ELEMENT:

The skip element can be used to route respondents from one survey question to a targeted question later on in the survey. In this lesson, we'll learn how to add a skip element to our survey.

AUTOFILL ELEMENT:

The autofill element is a hidden element that can be used to create hidden segments for auto-punching or advanced piping. In this lesson, we'll learn about the autofill element and attempt to program three different types of autofill into our survey.

QUOTA ELEMENT:

In this lesson, we'll take an in-depth look at the quota element. The quota element manages flow through a survey by restricting the number of respondents allowed through it. We'll also take a look at the three different quota types available in the Survey Editor:

QUESTION ANSWERS ("QUICK QUOTAS"):

Add quota cells based on responses from selected 1-dimensional survey questions.

LOGIC CONDITIONS:

Add quota cells based on new or existing survey logic conditions.

RANDOMLY ASSIGN QUOTAS (+QUOTAS):

Add quota cells that respondents will be randomly assigned to.

5.4.9 SAMPLE SOURCES

A sample source is simply the method by which a respondent gets to and from a survey. Common sample sources include purchased panel sample, private panel sample, direct email sends, and intercepts from websites. The sample source also defines any variables that should be gathered, stored, and/or passed back through the survey exit pages or URL.

In this lesson, we'll learn how to add sample sources to our survey, and how to set up a pre-programmed sample source which includes the URL variables and exit links configured for individual panel vendors. We'll also explore creating custom sample sources in which the variables and exit pages are added manually.

5.4.10 THEME EDITOR OVERVIEW:

In this lesson, we'll learn how to customize the appearance of our survey by adding a logo and applying a theme. We'll also learn how to use these tools to make our project more engaging for respondents.

5.4.11 UPLOAD SYSTEM FILES:

Moving on, it's time to familiarize ourselves with the PM TOOLsystem files. In this lesson, we'll be introduced to the PM TOOLfile manager, the different directories within a project, and some of the supporting files in a PM TOOLsurvey.

5.5 DATA VALIDATAION AND PREPRATION:

5.5.1 PM TOOL – WHAT IS IT?

PM Tool was first launched in 1968. Since it was acquired by NSMX in 2011, it's officially known as NSMX PM TOOL.
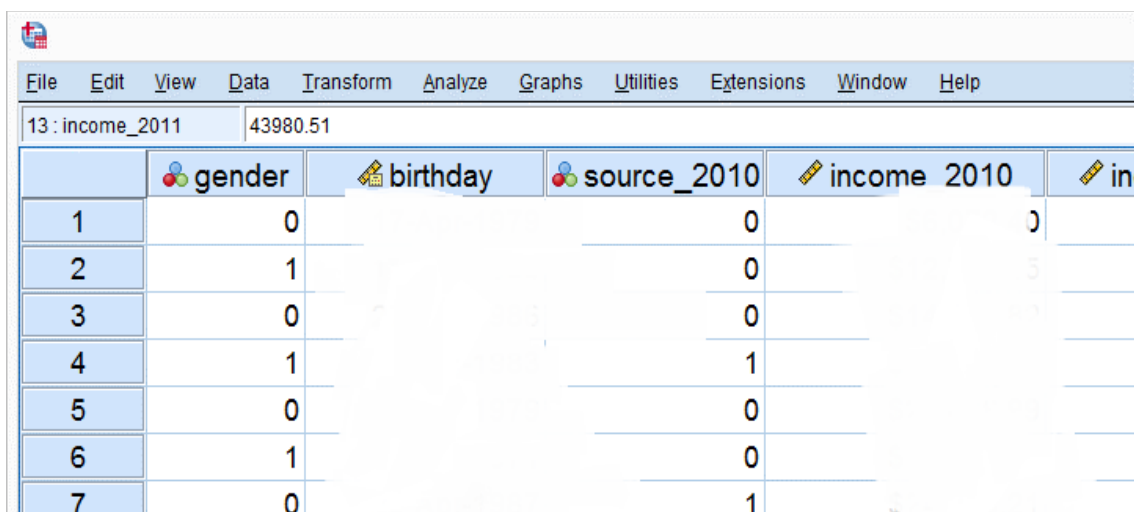
5.5.2 PM TOOL - QUICK OVERVIEW MAIN FEATURES

PM Tool is software for editing and analyzing all sorts of data. These data may come from basically any source: scientific research, a customer database, Google Analytics or even the server log files of a website. PM TOOL can open all file formats that are commonly used for structured data such as

- Spreadsheets from MS Excel or Open Office;

- Plain text files (.txt or .csv);

- Relational (SQL) databases;

5.5.3 PM TOOL DATA VIEW

After opening data, PM Tool displays them in a spreadsheet-like fashion as shown in the screenshot below from freelancers. Sav.
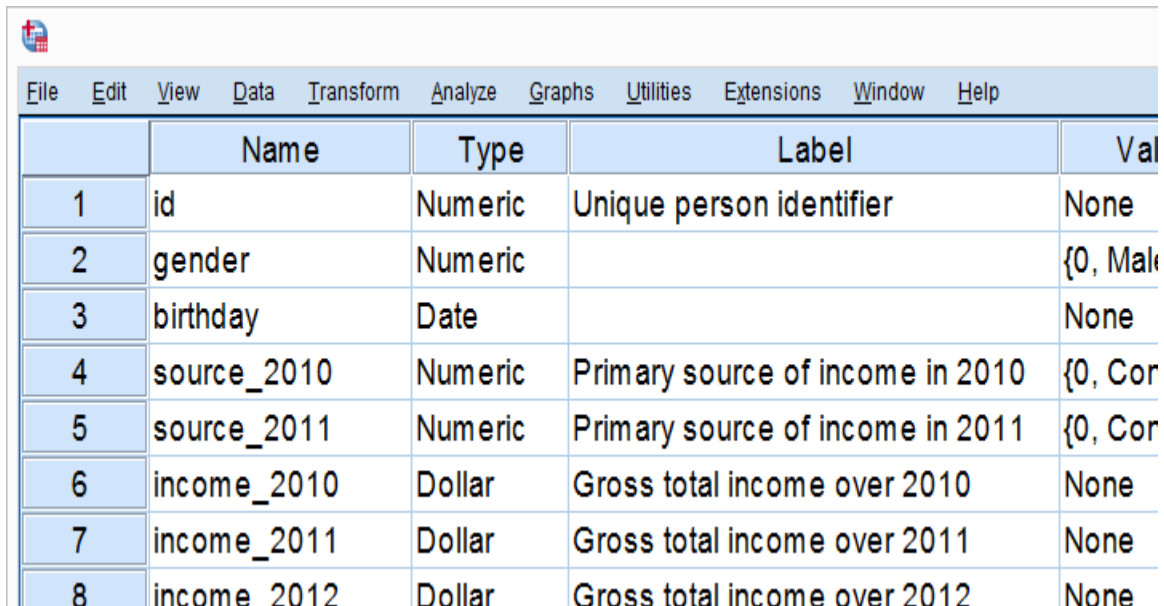
Fig. 5.27 **PM TOOL DATA VIEW**

This sheet -called data view- always displays our data values. For instance, our first record seems to contain a male respondent from 1979 and so on. A more detailed explanation on the exact meaning of our variables and data values is found in a second sheet shown below.

5.5.4 PM TOOL VARIABLE VIEW

File Edit View Data Transform Analyze Graphs Utilities Extensions Window Help

	Name	Type	Label	Val
1	id	Numeric	Unique person identifier	None
2	gender	Numeric		{0, Male
3	birthday	Date		None
4	source_2010	Numeric	Primary source of income in 2010	{0, Cor
5	source_2011	Numeric	Primary source of income in 2011	{0, Cor
6	income_2010	Dollar	Gross total income over 2010	None
7	income_2011	Dollar	Gross total income over 2011	None
8	income_2012	Dollar	Gross total income over 2012	None

Fig. 5.28 **PM TOOL VARIABLE VIEW**

An PM Tool data file always has a second sheet called variable view. It shows the metadata associated with the data. Metadata is information about the meaning of variables and data values. This is generally known as the "codebook" but in PM Tool it's called the dictionary.

For non-PM Tool users, the look and feel of PM Tool Data Editor window probably come closest to an Excel workbook containing two different but strongly related sheets.

5.5.5 DATA ANALYSIS

Right, so PM Tool can open all sorts of data and display them -and their metadata- in two sheets in its Data Editor window. So how to analyses your data in PM Tool? For instance, if our data contain a variable holding respondents' incomes over 2010, we can compute the average income by navigating to Descriptive Statistics as shown below.
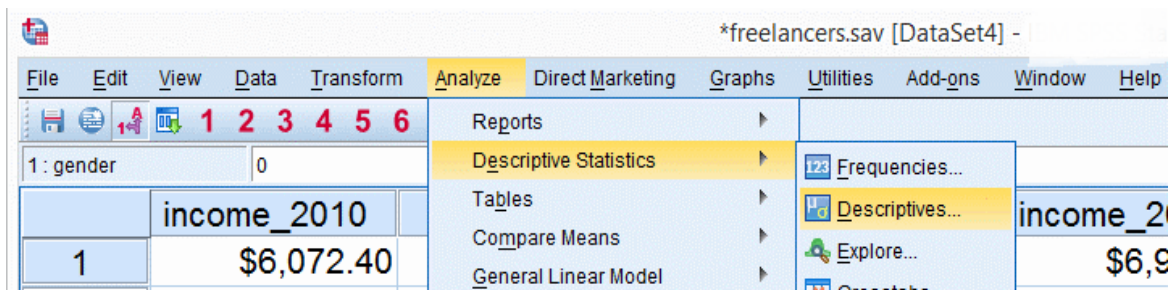

Fig. 5.29 **DATA ANALYSIS**

Doing so opens a dialog box in which we select one or many variables and one or several statistics we'd like to inspect.
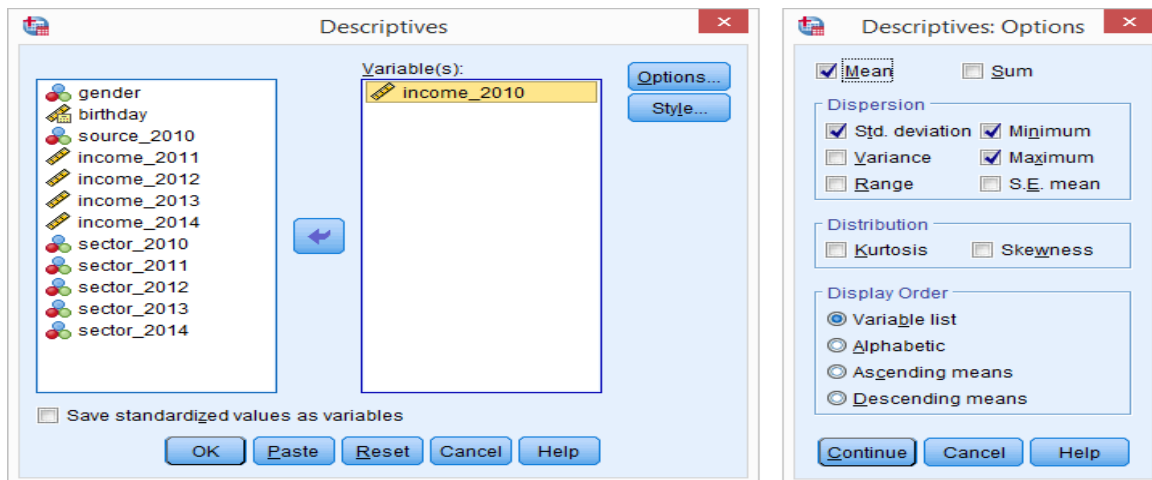
Fig. 5.30 **DATA ANALYSIS**

5.5.6 PM TOOL Output Window

After clicking Ok , a new window opens: PM Tool output viewer window. It holds a nice table with all statistics on all variables we chose. The screenshot below shows what it looks like.
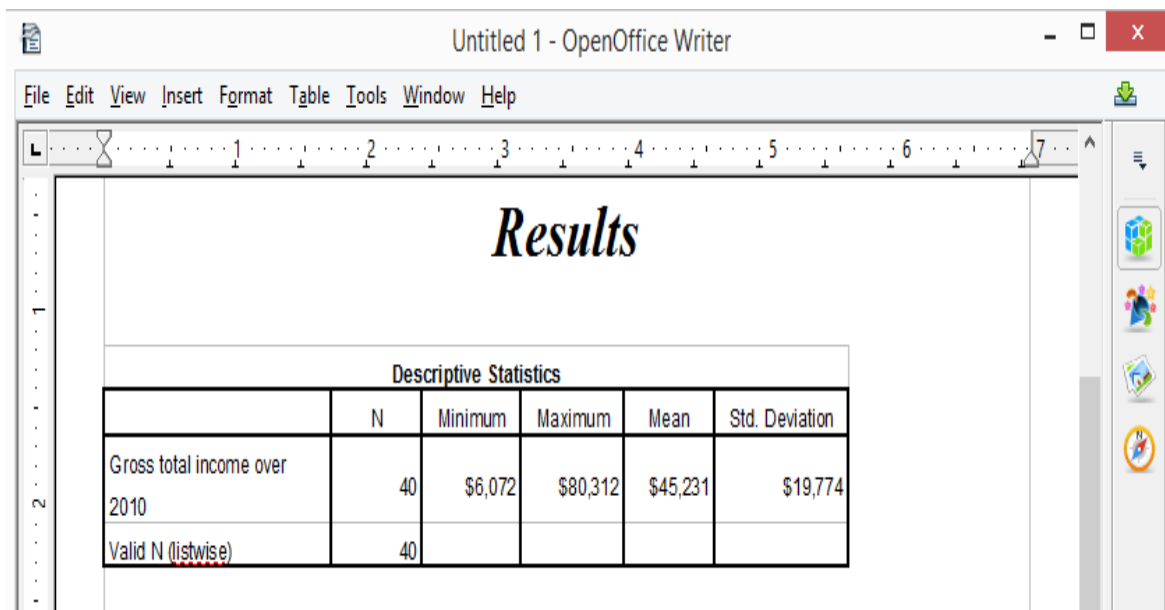
As we see, the Output Viewer window has a different layout and structure than the Data Editor window we saw earlier. Creating output in PM Tool does not change our data in any way; unlike Excel, PM Tool uses different windows for data and research outcomes.

For non-PM Tool users, the look and feel of PM Tool Output Viewer window probably comes closest to a PowerPoint slide holding items such as blocks of text, tables and charts.

5.5.7 PM TOOL REPORTING

PM Tool Output items, typically tables and charts, are easily copy-pasted into other programs. For instance, many PM TOOL users use a word processor such as MS Word, OpenOffice or Googled for reporting. Tables are usually copied in rich text format, which means they'll retain their styling such as fonts and borders. The screenshot below illustrates the result.

Fig. 5.32 **PM TOOL REPORTING**

REFERENCES

1. Gandek, B., Ware Jr, J. E., Aaronson, N. K., Alonso, J., Apolone, G., Bjorner, J., ... & Sullivan, M. (1998). Tests of data quality, scaling assumptions, and reliability of the SF-36 in eleven countries: results from the IQOLA Project. *Journal of clinical epidemiology*.

2. Keller, Susan D., et al. "Testing the equivalence of translations of widely used response choice labels: results from the IQOLA project." *Journal of clinical epidemiology*.

3. Pinson, Margaret H., and Stephen Wolf. "Comparing subjective video quality testing methodologies." *Visual Communications and Image Processing 2003*. Vol. 5150. International Society for Optics and Photonics, 2003.

4. Hamlet, R. (1989, November). Theoretical comparison of testing methods. In *Proceedings of the ACM SIGSOFT'89 third symposium on Software testing, analysis, and verification*.

5. Pinson, Margaret H., and Stephen Wolf. "Comparing subjective video quality testing methodologies." In *Visual Communications and Image Processing 2003*, vol. 5150, pp. 573-582. International Society for Optics and Photonics, 2003.

6. Herzig, Kim, Michaela Greiler, Jacek Czerwonka, and Brendan Murphy. "The art of testing less without sacrificing quality." In *2015 IEEE/ACM 37th IEEE International Conference on Software Engineering*, vol. 1, pp. 483-493. IEEE, 2015.

7. Pinson, M.H. and Wolf, S., 2003, June. Comparing subjective video quality testing methodologies. In *Visual Communications and Image Processing 2003* (Vol. 5150, pp. 573-582). International Society for Optics and Photonics.

8. Herzig, K., Greiler, M., Czerwonka, J. and Murphy, B., 2015, May. The art of testing less without sacrificing quality. In *2015 IEEE/ACM 37th IEEE International Conference on Software Engineering* (Vol. 1, pp. 483-493). IEEE.

9. Herzig K, Greiler M, Czerwonka J, Murphy B. The art of testing less without sacrificing quality. In2015 IEEE/ACM 37th IEEE International Conference on Software Engineering 2015 May 16 (Vol. 1, pp. 483-493). IEEE.

10. Naik, Kshirasagar, and Priyadarshi Tripathy. *Software testing and quality assurance: theory and practice*. John Wiley & Sons, 2011.

11. Horgan, Joseph R., Saul London, and Michael R. Lyu. "Achieving software quality with testing coverage measures." *Computer* 27, no. 9 (1994).

12. Horgan, J.R., London, S. and Lyu, M.R., 1994. Achieving software quality with testing coverage measures. *Computer, 27*.

13. Weiss, D.J., 1982. Improving measurement quality and efficiency with adaptive testing. *Applied psychological measurement*.

14. Weiss DJ. Improving measurement quality and efficiency with adaptive testing. Applied psychological measurement. 1982 Sep.

15. Weiss, David J. "Improving measurement quality and efficiency with adaptive testing." *Applied psychological measurement* 6.