

Chi-square test on Islamic Economic Research

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Abstract: In Sharia economic research, categorical variables may be found. If the researcher wants to analyze these variables, one of the appropriate analyzes is the chi-square test. The primary purpose of the chi-square test is to evaluate data on categorical variables, whether there is a relationship between rows and columns. Furthermore, the chi-square test analysis can also be used to evaluate differences between study groups at a certain degree of error. This article tries to explain in detail the purpose of the chi-square test, the hypothesis of the chi-square test by Karl Person, the types of data that can be used in the test, the assumptions that must be met and how to do the test on the categorical variables of Islamic economics research. the chi-square test is a simple way to test whether two variables are related without giving essential information about the relationship. An example of the chi-square analysis study on the Islamic economics research above which concluded that there was no relationship between the employment status of students at the Waqf campus and the acquisition of the Grade Point Average (GPA).

Key words: Chi-square test, Islamic economic research, Categorical variable data

Abstrak: Dalam penelitian ekonomi syariah dapat ditemukan variabel-variabel kategorikal. Jika peneliti ingin menganalisis variabel-variabel tersebut, salah satu analisis yang tepat adalah uji chi-square. Tujuan utama dari uji chi-kuadrat adalah untuk mengevaluasi data pada variabel kategori, apakah ada hubungan antara baris dan kolom. Selain itu, analisis uji chi-kuadrat juga dapat digunakan untuk mengevaluasi perbedaan antar kelompok studi pada tingkat kesalahan tertentu. Artikel ini mencoba menjelaskan secara rinci tujuan dari uji chi-square, hipotesis uji chi-square oleh Karl Person, jenis data yang dapat digunakan dalam pengujian, asumsi yang harus dipenuhi dan bagaimana cara melakukannya. uji variabel kategori penelitian ekonomi Islam. uji chi-kuadrat adalah cara sederhana untuk menguji apakah dua variabel terkait tanpa memberikan informasi penting tentang hubungan tersebut. Contoh kajian analisis chi-square pada penelitian ekonomi Islam di atas yang menyimpulkan bahwa tidak ada hubungan antara status kepegawaian mahasiswa di kampus Wakaf dengan perolehan Indeks Prestasi Kumulatif (IPK).

Kata Kunci: Uji Chi-Square, Penelitian Ekonomi Islam, Data Variabel Kategori

Introduction

Karl Person in (Rakesh Rana, 2015) discovered the logic of hypothesis testing in 1857-1936. He argues that the chi-square distribution of persons and the chi-square test have contributed significantly to modern statistical theory. Statisticians can use test methods that do not depend on the normal distribution to interpret research findings (Whatley, 2022). In the example of the chi-square distribution analysis, the analysis can be aimed at research themes on politics, medicine, economics, psychology, religion and so on. Since the 1900s, many researchers have analyzed the chi-square distribution of published Philosophical articles on these themes (K, 1900).

The chi-square test is a non-parametric test that has two purposes. First, test the hypothesis (hypothesis) whether or not there is a relationship between two or more variables. In other languages, it can be interpreted as examining the independence between two variables. Second, the chi-square test is intended to test how likely the distribution of observed variable data is according to the specified significance level. In categorical data, exemplified include student status, working or not working; man or woman; living in a hut or not; etc. This categorical data is not intended to identify parametric or continuous data, such as prices in rupiah, quantity in nominal terms or other similar data.

An example of a case is testing student learning motivation on the Waqf campus. Ninety-three samples of students with working and not working or other statuses were taken. The following categorical variable is the acquisition of high and low (below average) Grade Point Averages (GPA). Furthermore, the researchers assigned categories to each student, working status with category one and not working or others with category 0; GPA above 3.5 with category 2, GPA between 3.0 - 3.49 with category 1, and below 3.0 with category 0. The data can be seen in Table 1 of the Chi-square statistical calculation in the discussion and findings chapter.

Method

Assumptions underlying the chi-square test

Initial data collection on the assumption of a chi-square test was carried out randomly. The research population data are summarized in a table with predefined category values. The probability of data significance is higher in a large enough population sample. Conversely, a smaller sample increases the chance of accepting the null hypothesis (type II error). In the number of population data samples, the chi-square test does not establish a limit. In general, the variation in the data ranges from 20 to 50. Each variable in the chi-square test analysis must be exclusive. Each variable may only be counted once in a specific category. As for how to calculate the chi-square statistic can be done with the following formula:

$$x^2 = \sum \frac{(fo_i - fe_i)^2}{fe_i}$$

Based on the formula equation, it can be seen that X^2 is a symbol of chi-square analysis, where fo_i is the notation of the frequency of the observed variable and fe_i is the notation of the frequency of expectations (expectations). Furthermore, the equation of the correlation coefficient formula can be written as follows:

$$C = \sqrt{\frac{x^2}{N + x^2}}$$

The sample size is denoted by N , x^2 is the result of the analysis *chi-square* And C is the notation of the correlation coefficient. For example, on a waqf campus, researchers want to know the relationship between the status of Islamic economics faculty students and the acquisition of the Grade Point Average (GPA). Defined two categories of student status, namely working and not working or others. The three GPA categories are above 3.5, between 3.49 and 3.0, and below 3.0. Each category of student status is coded 0 and 1. The GPA category is coded 0, 1 and 2. The Zero Hypothesis and the alternatives are written as follows:

Ho : There is no relationship between student status and GPA

Ha : There is a relationship between student status and GPA.

Result and Discussion

Islamic economics in Indonesia is apparently in line with system of Pancasila economics. Principles in Pancasila have reflected the system Islamic economics, system of cooperation established by the founding fathers of this Republic, and in accordance to the mandate of 1945 Constitution. However, the lengthy practise of capitalism in Indonesia has left injustice and profound economic problems.

Basically, the system of Pancasila economics has not been completely developed that Indonesian economy underwent serious problems, massive inequality and impacted adversely to the country. This situation was not conducive, leaving other subsequent economic problems such as exchange rate, and reliance on loan with usury. This was due to injustice economic policies which were not proper to mandate of 1945 Constitution (Imama, 2008).

Wisdom based socio-economics i.e. Islamic ethics is a manifested implementation of Islamic sharia in economic field. This is because human deed should not distinct from the life ethics that they hold and believe in. Some experts e.g. Hankung perceived ethics as one aspects in establishing economic justice. This means economics cannot be separated from ethical matters (Dimiyati, 2007).

Indonesia, as a country involved in the world financial constellation, had suffered crises just like other countries in the world. It began with failure of West capitalism and collapse of the world financial industry. The second world crises occurred as a domino effect of the US financial crises. At present the financial menace comes again, with the exchange rate of IDR 15,000 per \$ US. This psychologic rate seems to resemble a situation prior to the fall down on New Order regime which caused Suharto's resignation (Hamid, 2009). This phenomenon hence made Islamic economic scholars, activists and Indonesian Religious Leaders (MUI) initiate Islamic economics as a new current of the Indonesian economic system. The importance of Islamic economics thoughts which become a new current in Indonesian economics made the inclusion of Islamic economics into politics of economy is therefore considered prominent.

Within this regards there are at least three kinds of typology expanded in the development pattern of Islamic economics

In terms of Islamic economics, Indonesia recently ranked third after Malaysia in ASEAN level. This condition is supported by various sharia financial industry comprises of sharia banking and non-banking (KNKB), micro financial institution, sharia pawn and sharia stock market. The significantly contribute to the development of sharia economics in Indonesia (Antonio, Sanrego, & Taufiq, 2012). Islamic Financial Services Board 2013 reported that sharia banking industry in Indonesia has been more profitable than that of Malaysia. It was figured out by return on equity and return on asset values of Indonesian sharia banking that overwhelmed Malaysia's position. In terms of the market share of sharia banking, on the other hand, GIFR positioned Indonesia (5%) as second rank after Malaysia (18%). This attainment gives positive preference for anticipating ASEAN Economic Community in Southeast Asia. Indonesia and Malaysia have become the main actors in sharia banking sector. Since 1983 Malaysia has started their sharia financial industry with market target of 25% in 2014. Indonesia started this financial industry in 1992, with present domestic market share around 5%. This implies that Indonesian Islamic economics actually has a remarkable potential to develop. One aspect that can be elaborated as financial instrument of Islamic economics is huge potensial of zakat and waqf endowments due to the fact that Indonesia has the most Muslims in the world. Economic inequality with regard to income distribution, poverty and asset redistribution can be overcome with utilizing zakat and waqf endowments. Zakat, as an obligation for Muslims to share welfare with others, enables to empower poor people so that they will be better off and they can run their business, and in turns they are expected to be zakat endowers (Bahri S, 2016).

Regarding wealth distribution, Islam teaches that welfare and assets ought not to be possessed by certain community but should be shared to all people on just and proportional basis (Aprianto, 2016). This turns down success claim of market economics. Market economic failure to render welfare for Indonesian

people has become a phenomenon needs to overcome. The government's policies and intervention are required within economic development. This is the essence of the economic development to attain better life. Islamic economics in Indonesia has been established and run by Indonesian Muslims. The government seemed to be half hearted with its policies and financial instrument to synchronize Islamic economics. Nevertheless, at least monetary and fiscal policies of the government have involved Islamic monetary and fiscal principles. State expenditure and monetary steadiness need to be balanced by Muslims' role in the national development. A fair income distribution policy would not be present provided the government failed to act as regulator of development and welfare (Aprianto, 2016; Fadlan, 2010; Bahri S, 2016) .

To implement the policy, economic politics and sociology of economic politics become institution that should extend room for Islamic economics. Law and regulation, economic reinforcement, and institutional expansion of Islamic economics need to be internalized in the context of state and society. In the law domain, regulations and their derivatives related to Islamic economics ought to be priority of economic development policy in Indonesia. Relevant stakeholders are expected to act their roles in accelerating sharia based economic development. Success in delivering four laws of sharia economics needs a follow up since sharia economics is not merely dealing with banking, waqf endowments, zakat and SBSN matters. Another crucial matter in presenting a fair economic system on sharia basis is the role of economic and political democracy. The government ought to earnestly conduct economic democracy as mandated in Pancasila economic system. Should economic system not be applied thoroughly in line with political decisions, then economic democracy will only be figment. Exploitation by elites over the poor people as currently occurs will not realize welfare and justice mandated by 1945 Constitution (Abbas & Manan, 2005).

A role revealed in the study is community involvement in economic development constellation in Indonesia. Islam teaches its adherents to be

productive, that they have to optimize quantity and quality of production and development. Islamic sharia also give direction that ones should utilize resources to increase productivity in the way which is sincere and blessed by Allah. Natural resources should be utilized wisely and not destructively. Two important things explained in Al Quran are discipline and deed in their positions of creating and working (Effendi, 2007). In this relevance, education and development of human resources, technological empowerment, as well as proper and virtuous utilization of nature should gain methodical attention.

But in This study tries to analyze categorical data to simulate chi-square analysis in Islamic economic research. In several 93 categorical data, the researcher tested the chi-square hypothesis. From establishing a 3x2 contingency table, the researcher calculates the observed variables in the cell. The manual chi-square test can be seen in Table 1 below:

Table 1. 3x2 Contingency Table			
	Students work	Students don't work or anything	Total
GPA above 3.5	15	34	49
GPA between 3.49-3.0	18	24	42
GPA below 3.0	1	1	2
Total	34	59	93
Person <i>Chi-square</i>	1.621		
Table 2. Expected values for the hypotheses			
GPA above 3.5	$(34 \times 49)/93 = 17,9$	$(59 \times 49)/93 = 31,08$	
GPA between 3.49-3.0	$(34 \times 42)/93 = 15,4$	$(59 \times 42)/93 = 26,6$	
GPA below 3.0	$(34 \times 2)/93 = 0,73$	$(59 \times 2)/93 = 1,26$	
Df	2		

Source: Research data, processed

Based on table 1, it is known that the chi-square value is 1,621, Asym sig 2-sided = 44.5% and df is set = 2. Furthermore, researchers tested the chi-square hypothesis at a significance level of 5% or 0.05. Based on the chi-square distribution table (appendix 1) with 5% degree of validity, the results of the analysis concluded that the researcher rejected the null hypothesis and accepted

the alternative hypothesis (Vetter TR, 2018). This means that there is no relationship between student employment status and the acquisition of the Grade Point Average (GPA).

Furthermore, the results of the chi-square analysis on Sharia economic research (in the case of the relationship between student status and GPA at the Waqf campus) suggest that students have good time management. Even though they are in working status, they can still get the maximum GPA. More students with working status, non-working status or others have a higher chance of obtaining a GPA above the average. External analysis of the factors of obtaining student GPA on the Waqf campus is also a recommendation for the research results.

Conclusion

The core of the chi-square test only provides information on the probability of independence from a data distribution. In conclusion, the chi-square test is a simple way to test whether two variables are related without giving essential information about the relationship. An example of the chi-square analysis study on the Islamic economics research above which concluded that there was no relationship between the employment status of students at the Waqf campus and the acquisition of the Grade Point Average (GPA).

When the researcher knows there is no relationship between the two variables, the researcher can explore using other research methods to find out the influence of the variables, student status and GPA. Next, besides the student's internal capacity, other factors that can affect the acquisition of the GPA are the student's external factors. External factors also need to be analyzed, such as lecturer recruitment, campus collaboration partners, selection of programs to support lecture activities and other factors related to student GPA acquisition.

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