

# **Solar Village: MBKM Village Community Service Program, Narotama University, Surabaya, Indonesia, Student Program and After Studies**

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## **Abstract**

MBKM KKN solar village is a program to encourage renewable energy in villages, thereby reducing dependence on conventional electricity by using solar cell-based electricity. Trending solar village articles on scopus.com. document by year, article title solar village, results of 102 documents, range of years to analyze: 2011 to 2021, only 1 (one) Indonesia affiliation, Universitas Gadjah Mada with 2 research article "solar village", Indonesia has 6 (six) research article "solar village". Analysis data using Crosstab, provides input or insight into the nature of the relationship because adding one or more variables to a two-way cross-qualification analysis is the same as keeping each variable constant. The research population is all students of Narotama University, 1633 students. The best Study Program for implementing MBKM KKN Village, are Civil Engineering (MBKM ranked 2) and Law (MBKM ranked 2), will improve especially MBKM KKN solar village.

## **Keywords:**

MBKM KKN village, solar village, renewable energy, electricity

## **1. Introduction**

Merdeka Learning - Merdeka Campus (MBKM) is inaugurated by the Ministry of Education, Culture, Research, and Technology in 2020, through the National Higher Education Standards. The emphasis on MBKM is the portion of 20 credits per semester for three semesters for all students to take courses outside the study program for one semester and off-campus for two semesters. This program has a significant impact in increasing the intensity of student interaction with the community through several choices: Student Exchange, Internship, Research, Village Community Service, Entrepreneurship, Independent Studies, Teaching Assistants, and Humanitarian Projects. Village Community Service is one of MBKM's flagship programs. It is a continuation of the similar program (KKN), running since 1970, making it easier to implement in the community. With 20 credits, it will be more intense to provide excessive benefits for the community. MBKM KKN solar village is a program to encourage renewable energy in villages, thereby reducing dependence on conventional electricity by using solar cell-based electricity. The basis of the research on the implementation of the solar village includes: Portable Inflated Solar Power Cold Storage House Technology as a Supporting Facility for Increasing Fisherman Fishery Production and Marketing <https://sinta.ristekbrin.go.id/authors/detail?id=5972975&view=research> . Research objectives are to map the

understanding of all Narotama University students related to the implementation of MBKM, especially for the development of solar villages (Nasihien et al., 2020; Setiawan et al., 2019; Sukoco et al., 2020)

## 2. Literature Review

*Good or bad? Solar microgrids and the dualistic nature of low-carbon energy transitions in rural Ghana.* An investigation of the dualistic nature of the low-carbon energy transition and the contextual factors to promote, or hinder, the full realization of sustainable energy projects in developing countries.

*Micro-hydro and solar photovoltaic-based renewable energy systems in rural areas: A case study in Yogyakarta* is based on the fact that many rural areas lack electricity supply. The potential of Hydroelectric and Solar Power Plant in rural areas is processed to determine the best capacity. Extended particle swarm optimization (PSO) technique was used to ensure capacity optimization of this hybrid system. The final result of this research is the optimal PLTA and PLTS generation capacity based on calculating the cost of capital, grid sales, cost of energy, and net present value.

*Energy security to safeguard community water services in rural Ireland: Opportunities and challenges for solar photovoltaics, socio-technical approach to assess the feasibility of solar PV installations* is written by independent Group Water Schemes in Ireland. It reviews the multiple relationships between water and energy needs and local stakeholders. They need to share knowledge about solar PV, its methods, and financial support to make a proper decision. Successful implementation can maintain energy and water supply in rural areas.

*Energy justice, renewable energy, and the rural-urban divide: Insights from the Southwest U.S* climate change is shaping ways renewable energy is being used today (and changed over time). It is written by different people and local organizations serving low-income individuals. The study issued policies and recommendations, including adding small solar power plants to the electricity supply. It also proposes increasing funding for local energy efficacy and adding renewable energy for low-income housing and non-residential efforts such as gardens and community centers.

*Enabling development impact of solar mini-grids through community engagement: Evidence from rural Sierra Leone*, empowering the community is essential to creating electricity demand and delivering development impact of renewable energy-based mini-grids in the deep poverty context.

*Economic and environmental assessment of solar-wind-biomass hybrid renewable energy system supplying rural settlement load* is done. The evaluation revealed that the CO<sub>2</sub> release from the proposed hybrid renewable energy system is negligible compared to coal-based power generation and the grid. Reducing CO<sub>2</sub> in a new perspective could cost \$8,000 a year.

*The research title is the effects of renewable energy-based village grid electrification on poverty reduction in remote areas: The case of Indonesia.* This initiative substantially enhances the new small industry in the village as many as three units, which proves that electricity is related to poverty eradication. These results give confidence in the importance of launching renewable power plants to reduce poverty in Indonesia's remote areas and outer islands.

*The study title analyzes electrification strategies for rural renewable electrification in developing countries using agent-based models.* In each case, a mix of grid expansion and decentralized generators coexist at the lowest cost in applying renewable energy, especially for rural electrification.

The title is *village development framework through self-help-group entrepreneurship, microcredit, and anchor customers in solar microgrids for cooperative sustainable rural societies*. Village development and electricity supply will benefit big customers, independent groups, and the microfinance community. This research can support legislators and the government in increasing the success of electricity entering the village.

The title is *opportunities and challenges to rural renewable energy projects in Africa: Lessons from the Esaghem Village, Cameroon solar electrification project*. Policymakers would do well to eliminate the identified obstacles and maximize the utility of the opportunities. Future research would do well to interrogate how institutional support structures and market forms jointly or separately affect investments in RET.

(Bagheri et al., 2018; Ghorashi & Maranlou, 2021; Henni et al., 2021; Hirsch & Ribes, 2021; Hoicka et al., 2021; Knezović et al., 2021; Kouloumpis & Yan, 2021; Perera et al., 2021; Santamarta et al., 2021; Stock, 2021)

## 3. Methodology

Crosstab is an analytical method that presents two different variables into one matrix. Crosstab research shows tabulations that include rows and columns. Thus, the characteristic is that two or more variables have a descriptive relationship. The data are qualitative, especially on a nominal scale. The variables analyzed are variables that have a nominal scale. It is the easiest way to see associations in several data with percentage calculations and one of the most valuable tools because the results are easy to communicate. Furthermore, it provides input or insight into the nature

of the relationship because adding one or more variables to a two-way cross-qualification analysis is the same as keeping each variable constant. Cross tabulation can be used if:

- 1) One of the variables is qualitative, and the other is quantitative
- 2) Both variables are qualitative.

The left side (column) and the top row indicate the class for the two variables used. Two things need to be considered when interpreting the results of data processing:

- 1) Whether the level of association between the measured variables is significant or not.
- 2) How strong is the level of association between the measured variables?.

The variables presented are helpful for:

- 1) Analyzing the relationships between variables that occur.
- 2) Finding how the two or more variables are related.
- 3) Organizing data for statistical analysis purposes.
- 4) Controlling certain variables for spurious relations.
- 5) Checking for errors in the code or answers to the questionnaire.

The research population is all students of Narotama University, 1633 students.

#### 4. Result and Discussion

Trending solar village articles on scopus.com. Document by year, article title solar village, results of 102 documents, range of years to analyze: 2011 to 2021, there are: 2021 11 documents, 2020 9, 2019 15, 2018 17, 2017 5, 2016 11, 2015 10, 2014 10, 2013 6, 2012 6, and 2011 2 papers.

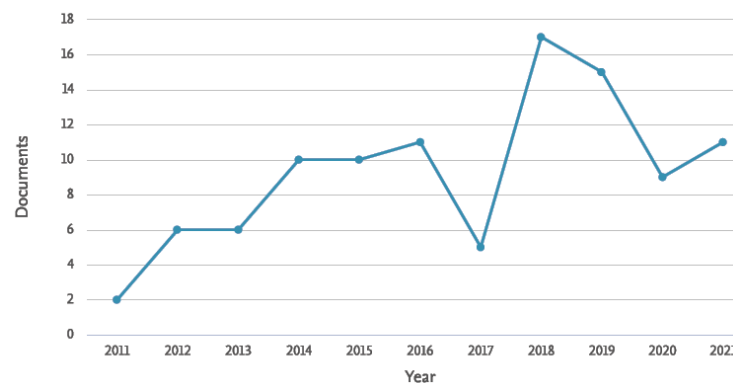


Figure 1. The trend of solar village research article in scopus.com

There are 102 document results of solar village articles on scopus.com. Select year range to analyze: 2011 to 2021, documents per year by source documents. There is more than one paper: Energy Procedia 5 documents, E3s Web Of Conferences 3, Energy 3, IOP Conference Series Earth And Environmental Science 3, Advanced Materials Research 2, Energy Policy 2, Energy Research And Social Science 2, Journal Of Cleaner Production 2, Lecture Notes In Civil Engineering 2, Proceedings of the ASME Design Engineering Technical Conference 2, and Renewable Energy 2 articles.

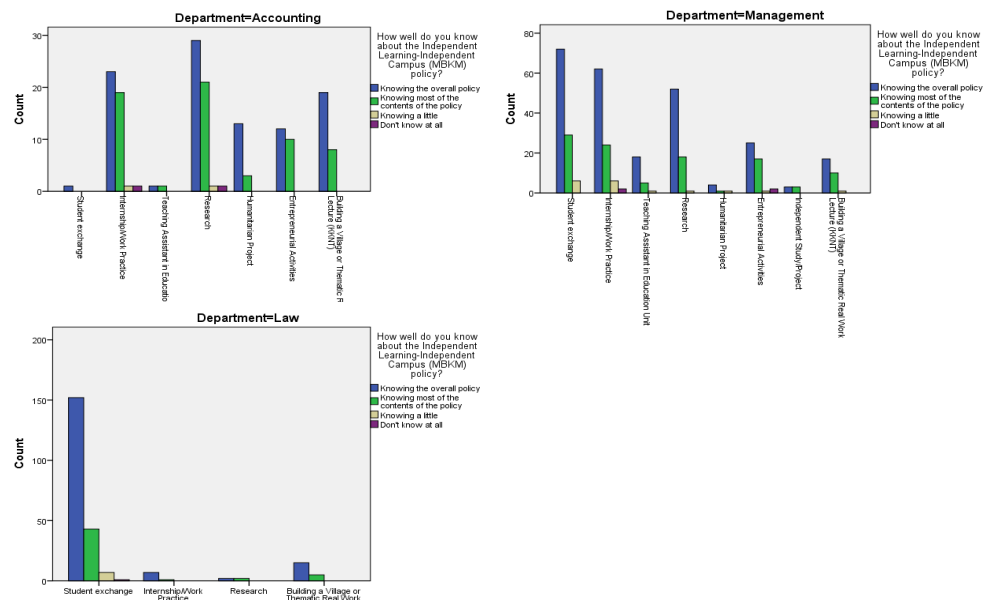
One hundred two document results of solar village article on scopus.com. Select year range to analyze: 2011 to 2021, documents by affiliation. There is more than one paper: Stellenbosch University 5 documents, Linköpings Universitet 3, Universitetet Oslo 3, The University of New Mexico 3, Villanova University 2, Rajasthan Technical University 2, Imperial College London 2, Universiti Teknologi Malaysia 2, Anna University 2, Massachusetts Institute of Technology 2, Universitas Gadjah Mada 2, Shandong Jianzhu University 2, Aalto University 2, Jawaharlal Nehru Technological University Anantapur 2, Amrita University, Amritapuri Campus 2, and TERI School of Advanced Studies 2 papers. Only 1 (one) Indonesia affiliation, Universitas Gadjah Mada with 2 research article “solar village”

The trend of solar village article on scopus.com. 102 document results, select year range to analyze: 2011 to 2021, documents by country or territory. There are more than two papers: India 29 documents, United States 18, China 9, Indonesia 6, Malaysia 6, South Africa 6, United Kingdom 6, Norway 4, Australia 3, Nigeria 3, Russian Federation 3, Sweden 3, and United Arab Emirates 3 documents. Indonesia has 6 (six) research article “solar village”

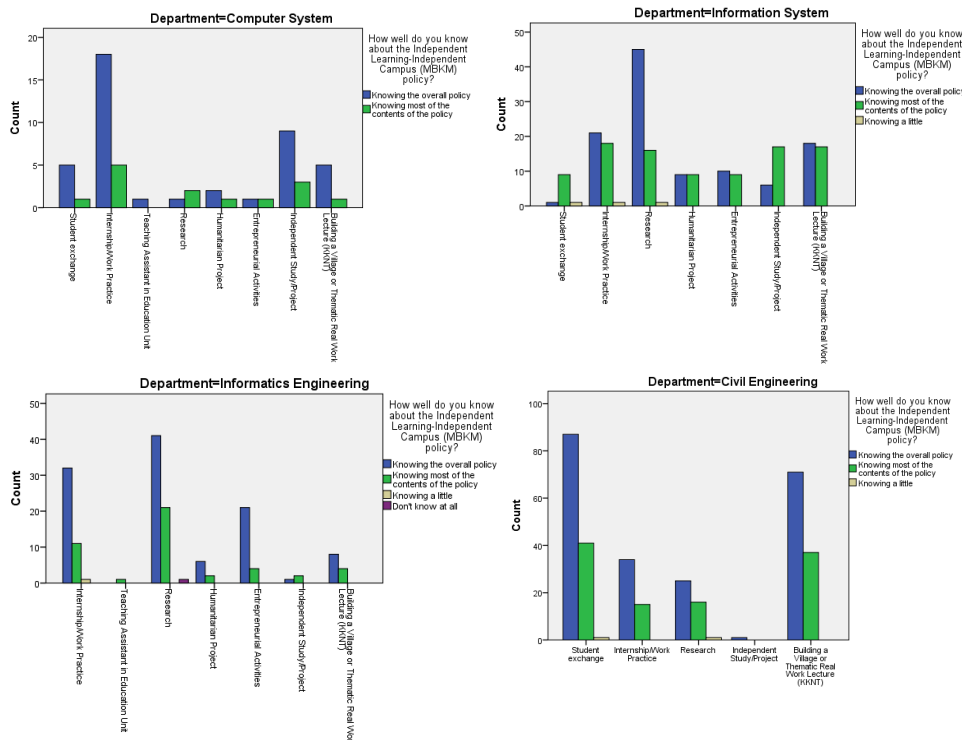
The trend of solar village article on scopus.com. 102 document results, select year range to analyze: 2011 to 2021, documents by subject area. There are more than two papers: Energy 52 documents, Engineering 47, Environmental Science 26, Computer Science 22, Social Sciences 17, Mathematics 11, Earth and Planetary Sciences 8, Physics and Astronomy 8, and Business, Management, and Accounting 7 researches.

The trend of solar village article on scopus.com. 102 document results, select year range to analyze: 2011 to 2021, documents by funding sponsor. There are more than two papers: Norges Forskningsråd 3 articles, Department of Science and Technology, Republic of South Africa 2, Ministry of New and Renewable Energy India 2, National Research Foundation 2, and Universiteit Stellenbosch 2 documents.

Furthermore, analysis of the relationship between solar village development and MBKM activities, especially the Village Community Service Program in each study program of Narotama University:

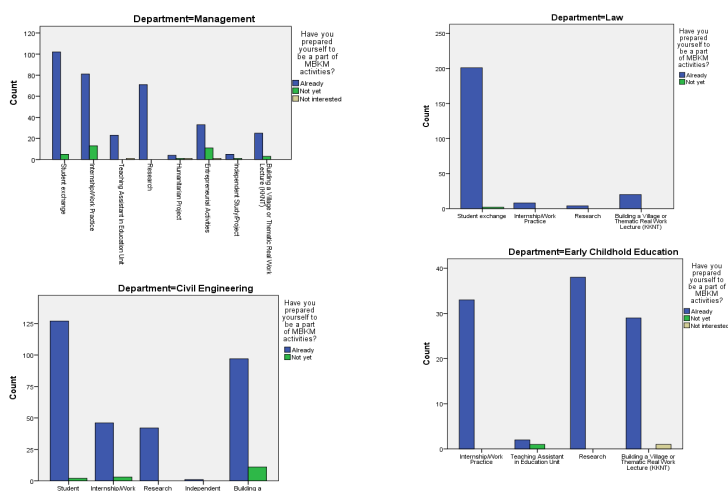


**Figure 2. Student understanding of MBKM & Village Community Service Programs in Accounting, Management and Law Studies, Faculty of Law, Economics and Education**



**Figure 3. Student Understanding of MBKM & Village Community Service Programs in Computer Systems, Information Systems, Informatics Engineering, and Civil Engineering Study Programs, Faculty of Engineering and Computer Science**

Based on figures 2 and 3, there is a high understanding of the students regarding implementing the Village Community Service Program MBKM. It is, especially in the accounting study program (MBKM ranked 3), the law study program (MBKM ranked 2), Computer Systems (MBKM ranked 3), Information Systems (MBKM ranked 3) rank 3), and Civil Engineering (MBKM ranked 2) out of 8 MBKM surveyed.



**Figure 4. Student Readiness towards MBKM & MBKM Village Community Service Program in Management, Law, PGPAUD, and Civil Engineering Study Programs**

Based on figure 4, there is high readiness from students regarding the implementation of the Village Community Service Program MBKM, especially in the study program of law (MBKM ranked 2), PGPAUD (MBKM ranked 3), and civil engineering (MBKM ranked 2) out of 8 MBKM surveyed.

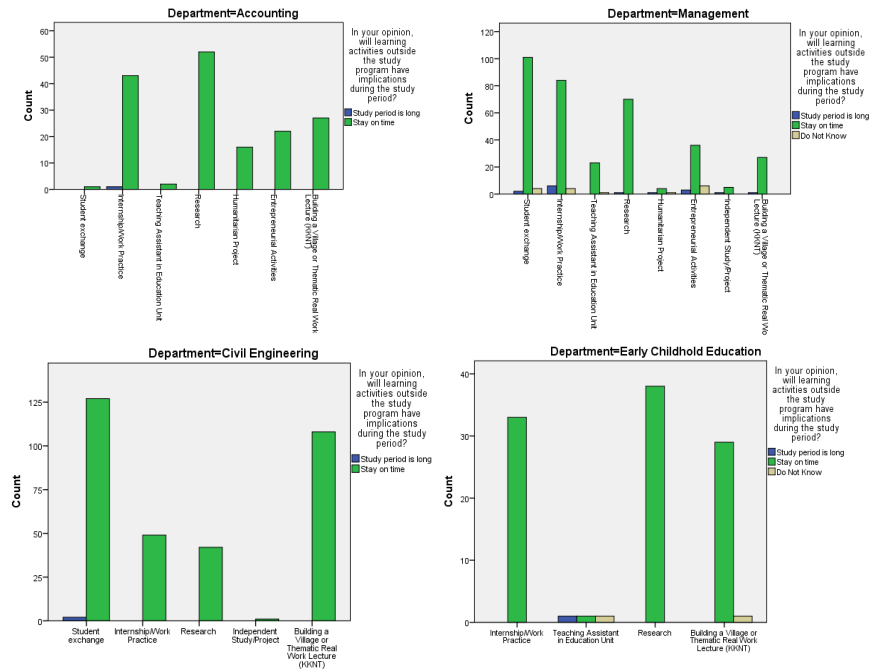


Figure 5. The optimism of Student Study Completion related to MBKM & MBKM Village Community Service Programs in Management, Accounting, PGPAUD, and Civil Engineering Study Programs

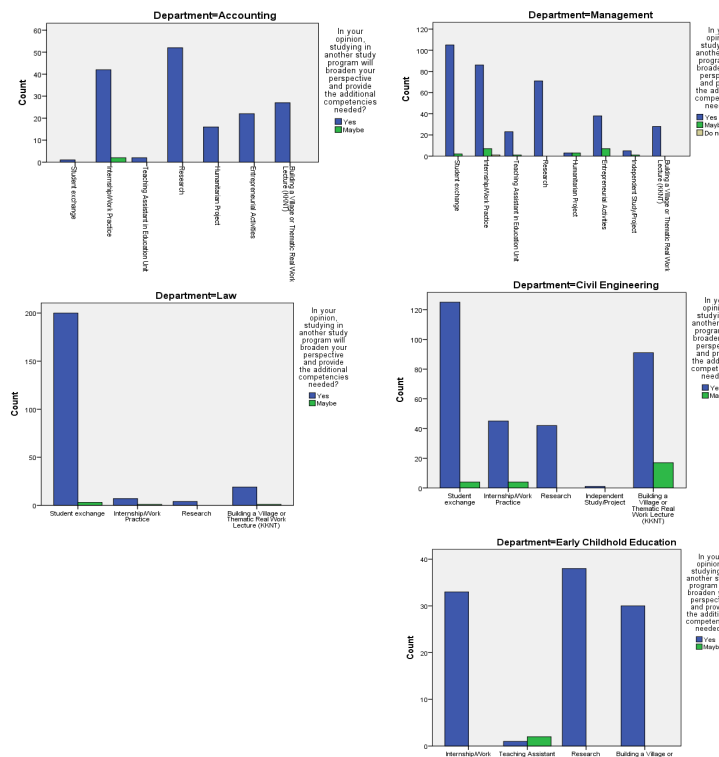
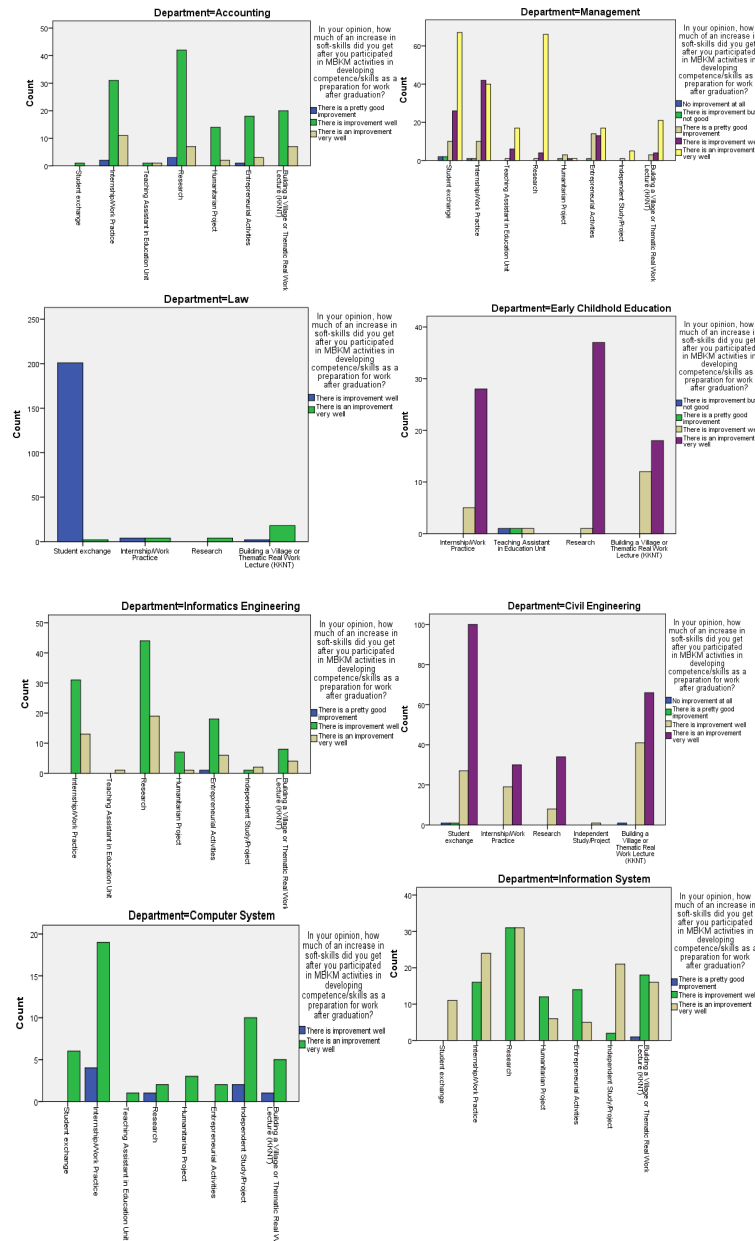


Figure 6. The optimism of other Study Program Students related to MBKM & MBKM Village Community Service Programs in Management, Accounting, PGPAUD, and Civil Engineering Study Programs

Based on figure 5, there is high optimism for the completion of studies from students if they are fully involved in the implementation of the MBKM Village Community Service Program. It is especially in management study programs

(MBKM ranked 5), accounting (MBKM ranked 3), PGPAUD (MBKM ranked 3), and civil engineering (MBKM ranked 2) out of 8 MBKM surveyed.

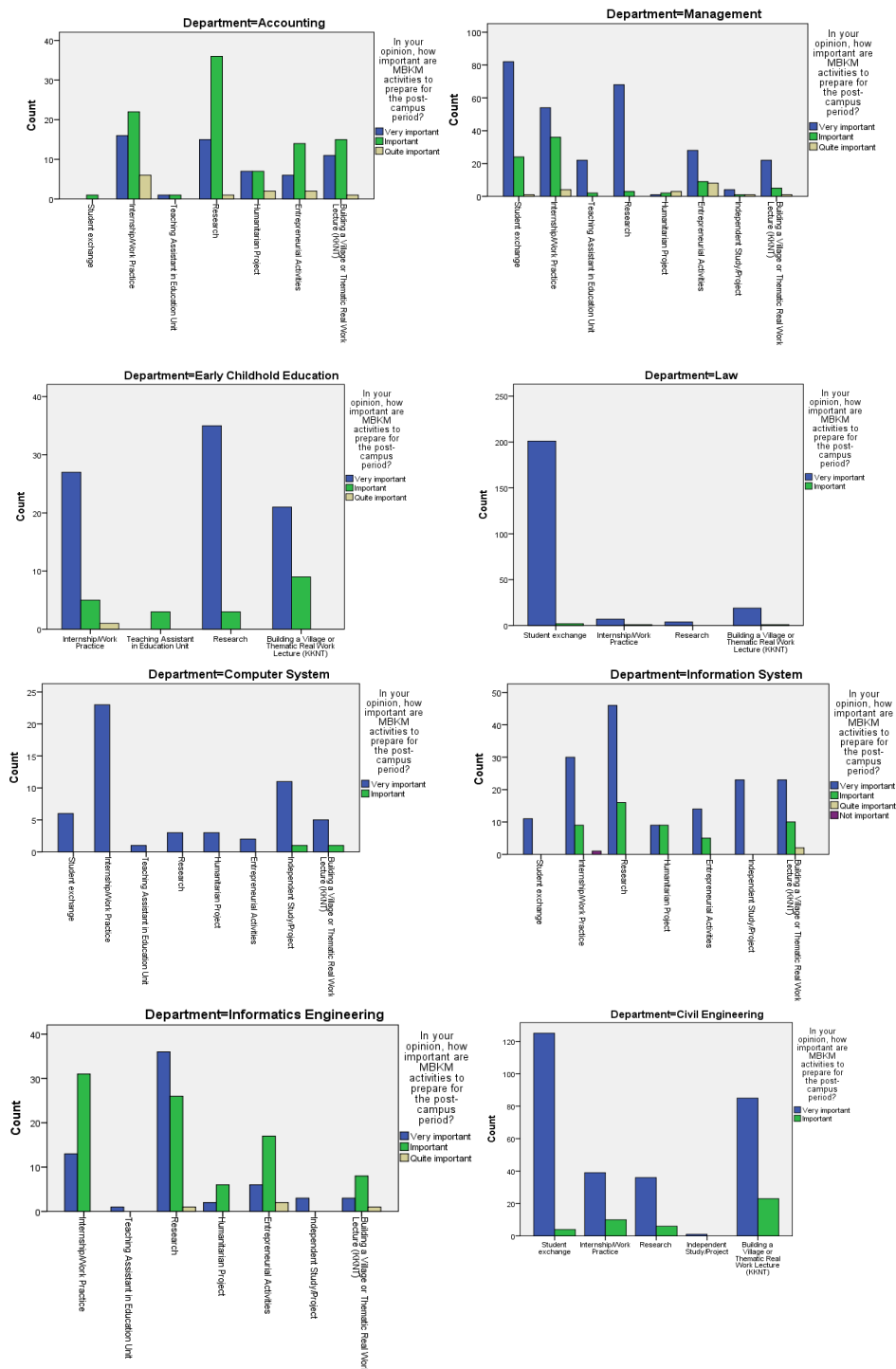
Based on figure 6, there is high optimism from students of other study programs who are fully involved in implementing the Village Community Service Program MBKM. It is especially in law studies (MBKM ranked 2), accounting (MBKM ranked 3), PGPAUD (MBKM ranked 3), management ( MBKM ranked 5), and Civil Engineering (MBKM ranked 2).



**Figure 7. Improvement of Student Soft-Skills related to MBKM & MBKM Village Community Service Programs in Informatics Engineering, Civil Engineering, Information Systems, and Computer Systems, Faculty of Engineering and Computer Science, Narotama University**

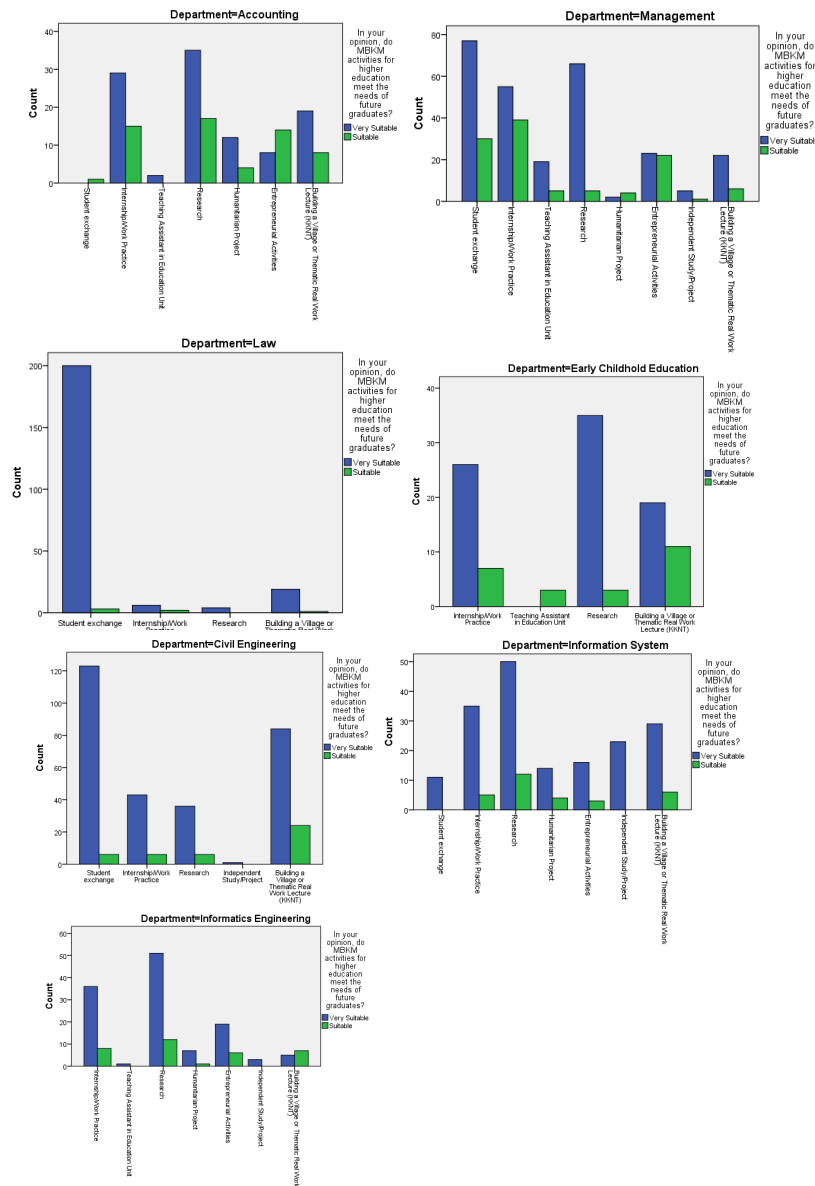
Based on figure 7, students feel an increase in soft-skills, especially when fully involved in the implementation of the Village Community Service Program MBKM, especially in law studies (MBKM ranked 2), accounting (MBKM ranked 3), PGPAUD (MBKM ranked 3), and management (MBKM ranked 3). rank 4), out of 8 MBKM surveyed at

the Faculty of Law, Economics, and Education. Students also realized the same improvement in Civil Engineering study programs (MBKM ranked 2), Informatics Engineering (MBKM ranked 4), Information Systems (MBKM ranked 2), and Computer Systems (MBKM ranked 3), Faculty of Engineering and Computer Science.



**Figure 8. Student optimism regarding the critical impact of MBKM & MBKM Village Community Service after studying in Management, Accounting, PGPAUD and Legal Studies Study Programs (Faculty of Law, Economics and Education), Informatics Engineering Study Program, Civil Engineering, Information Systems and Computer Systems (Faculty of Engineering and Computer Science ) Narotama University**

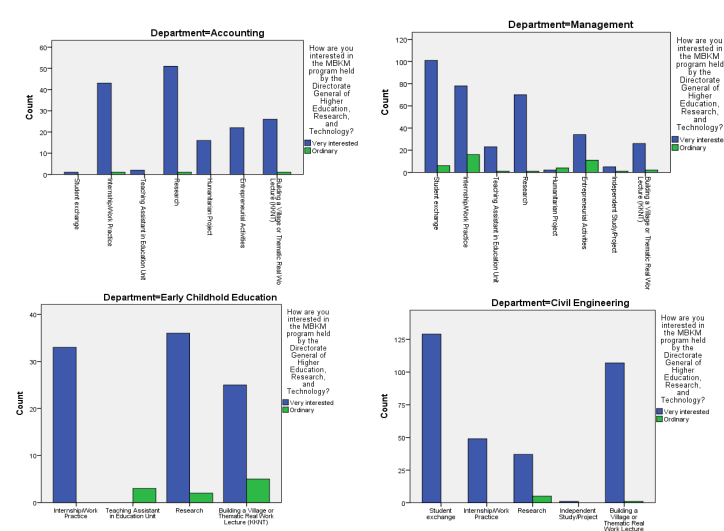
Based on figure 8, students feel a significant impact after studying, especially when fully implementing the Village Community Service Program. It is especially in law studies (MBKM ranked 2), accounting (MBKM ranked 3), PGPAUD (MBKM ranked 2), and management ( MBKM ranks 5), out of 8 MBKM surveyed at the Faculty of Law, Economics, and Education. The same thing happened in Civil Engineering study programs (MBKM ranked 2), Informatics Engineering (MBKM ranked 4), Information Systems (MBKM ranked 3), and Computer Systems (MBKM ranked 3), Faculty of Engineering and Computer Science.



**Figure 9. Student optimism regarding the vital impact of MBKM & MBKM KKN Desa after study and future careers in Management, Accounting, PGPAUD and Legal Studies (Faculty of Law, Economics and Education) and Informatics Engineering, Civil Engineering and Information Systems (Faculty of Engineering and Computer Science)**

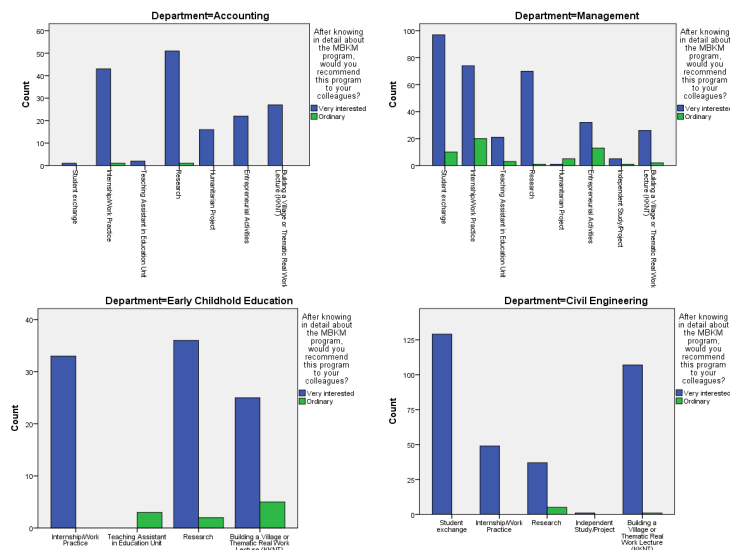
Based on figure 9, students feel a meaningful impact after studying, especially if they are fully involved in implementing the Village Community Service Program MBKM. It is especially in law studies (MBKM ranked 2), accounting (MBKM ranked 3), PGPAUD (MBKM ranked 3), and management (MBKM ranked 3) of the 8 MBKM

surveyed, the Faculty of Law, Economics and Education. The same influence also occurred in Civil Engineering study programs (MBKM ranked 2), Informatics Engineering (MBKM ranked 4), Information Systems (MBKM ranked 3), Faculty of Engineering and Computer Science.



**Figure 10. Students feel the importance of MBKM & MBKM KKN Desa in Management, Accounting, and PGPAUD Study Programs (Faculty of Law, Economics and Education) and Civil Engineering Study Program (Faculty of Engineering and Computer Science)**

Based on figure 10, students feel it is essential, especially if they are fully involved in implementing the Village Community Service Program MBKM. It is especially in accounting study programs (MBKM ranked 3), PGPAUD (MBKM ranked 3), and management (MBKM ranked 5), out of 8 MBKM surveyed in the Faculty of Law, Economics, and Education. The same is also felt in the Civil Engineering study program (MBKM rank 2), Engineering, Engineering, and Computer Science.



**Figure 11. Students feel the importance of MBKM & MBKM KKN Desa in Management, Accounting, and PGPAUD Study Programs (Faculty of Law, Economics and Education) and Civil Engineering Study Program (Faculty of Engineering and Computer Science)**

Based on figure 11, students feel it is crucial, especially if they are fully involved in implementing MBKM KKN Desa. It is especially in accounting study programs (MBKM ranked 3), PGPAUD (MBKM ranked 3), and management (MBKM ranked 5), out of 8 MBKM surveyed at the Faculty of Law, Economics, and Education. A similar thing

happened in the Civil Engineering Study Program (MBKM rank 2), Engineering, Faculty of Engineering and Computer Science.

## 5. Conclusion

MBKM KKN solar village is a program to encourage renewable energy in villages, thereby reducing dependence on conventional electricity by using solar cell-based electricity. Trending solar village articles on scopus.com. document by year, article title solar village, results of 102 documents, range of years to analyze: 2011 to 2021, only 1 (one) Indonesia affiliation, Universitas Gadjah Mada with 2 research article “solar village”, Indonesia has 6 (six) research article “solar village”. There is a high understanding of the students regarding implementing the Village Community Service Program MBKM. It is, especially in the accounting study program (MBKM ranked 3), the law study program (MBKM ranked 2), Computer Systems (MBKM ranked 3), Information Systems (MBKM ranked 3), and Civil Engineering (MBKM ranked 2) out of 8 MBKM surveyed. there is high readiness from students regarding the implementation of the Village Community Service Program MBKM, especially in the study program of law (MBKM ranked 2), PGPAUD (MBKM ranked 3), and civil engineering (MBKM ranked 2) out of 8 MBKM surveyed. there is high optimism for the completion of studies from students if they are fully involved in the implementation of the MBKM Village Community Service Program. It is especially in management study programs (MBKM ranked 5), accounting (MBKM ranked 3), PGPAUD (MBKM ranked 3), and civil engineering (MBKM ranked 2) out of 8 MBKM surveyed. there is high optimism from students of other study programs who are fully involved in implementing the Village Community Service Program MBKM. It is especially in law studies (MBKM ranked 2), accounting (MBKM ranked 3), PGPAUD (MBKM ranked 3), management ( MBKM ranked 5), and Civil Engineering (MBKM ranked 2). students feel an increase in soft-skills, especially when fully involved in the implementation of the Village Community Service Program MBKM, especially in law studies (MBKM ranked 2), accounting (MBKM ranked 3), PGPAUD (MBKM ranked 3), and management (MBKM ranked 3). rank 4), out of 8 MBKM surveyed at the Faculty of Law, Economics, and Education. Students also realized the same improvement in Civil Engineering study programs (MBKM ranked 2), Informatics Engineering (MBKM ranked 4), Information Systems (MBKM ranked 2), and Computer Systems (MBKM ranked 3), Faculty of Engineering and Computer Science. students feel a significant impact after studying, especially when fully implementing the Village Community Service Program. It is especially in law studies (MBKM ranked 2), accounting (MBKM ranked 3), PGPAUD (MBKM ranked 2), and management ( MBKM ranks 5), out of 8 MBKM surveyed at the Faculty of Law, Economics, and Education. The same thing happened in Civil Engineering study programs (MBKM ranked 2), Informatics Engineering (MBKM ranked 4), Information Systems (MBKM ranked 3), and Computer Systems (MBKM ranked 3), Faculty of Engineering and Computer Science. students feel a meaningful impact after studying, especially if they are fully involved in implementing the Village Community Service Program MBKM. It is especially in law studies (MBKM ranked 2), accounting (MBKM ranked 3), PGPAUD (MBKM ranked 3), and management (MBKM ranked 3) of the 8 MBKM surveyed, the Faculty of Law, Economics and Education. The same influence also occurred in Civil Engineering study programs (MBKM ranked 2), Informatics Engineering (MBKM ranked 4), Information Systems (MBKM ranked 3), Faculty of Engineering and Computer Science. students feel it is essential, especially if they are fully involved in implementing the Village Community Service Program MBKM. It is especially in accounting study programs (MBKM ranked 3), PGPAUD (MBKM ranked 3), and management (MBKM ranked 5), out of 8 MBKM surveyed in the Faculty of Law, Economics, and Education. The same is also felt in the Civil Engineering study program (MBKM rank 2), Engineering, Engineering, and Computer Science. students feel it is crucial, especially if they are fully involved in implementing MBKM KKN Desa. It is especially in accounting study programs (MBKM ranked 3), PGPAUD (MBKM ranked 3), and management (MBKM ranked 5), out of 8 MBKM surveyed at the Faculty of Law, Economics, and Education. A similar thing happened in the Civil Engineering Study Program (MBKM rank 2), Engineering, Faculty of Engineering and Computer Science. So the best Study Program for implementing MBKM KKN Village, are Civil Engineering (MBKM ranked 2) and Law (MBKM ranked 2), will improve especially MBKM KKN solar village.

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## Biographies

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