

The effect of agricultural credit policy and cattle-raising business input productivity on farmer household welfare

by Jolanda K. J. Kalangi 5

Submission date: 29-Jun-2023 10:14AM (UTC+0700)

Submission ID: 2124192685

File name: The_effect_of_agricultural_credit_policy_and_cattle_raising.pdf (547.58K)

Word count: 4600

Character count: 25396

PAPER · OPEN ACCESS

The effect of agricultural credit policy and cattle-raising business input productivity on farmer household welfare

1

To cite this article: S J K Umboh *et al* 2021 *IOP Conf. Ser.: Earth Environ. Sci.* **637** 012093

8

View the [article online](#) for updates and enhancements.

You may also like

10

- [On the Improper Use of Yang Preferential](#)

10

- [ing in Determining Precipitate Densities in Crystalline Silicon](#)

Kwang Su Choe

9

- [Field Emission Microscope Observations](#)

9

- [H₂ and Metal-Phthalocyanines](#)

Hiroshi Morikawa Hiroshi Morikawa and Ken-ichi Okamoto Ken-ichi Okamoto

12

- [Capital raising of aerospace companies: equities or debts?](#)

L Hui-Shan, Y Taw-Onn and H Wai-Mun

The effect of agricultural credit policy and cattle-raising business input productivity on farmer household welfare

S J K Umboh^{1*}, J K J Kalangi¹ and B deRosari²

¹ Faculty of Animal Husbandry, Sam Ratulangi University Manado

² East Nusa Tenggara Institute for Agricultural Technology Assessment

Corresponding author: sintyaumboh1976@gmail.com

Abstract. This study examined the allocation of agricultural credits by farmer households and the effect of changes in agricultural credit policies and cattle-raising business input. The study was conducted in Kupang and East Central Timor (Timor Tengah Selatan (TTS) Regencies, East Nusa Tenggara (Nusa Tenggara Timur (NTT) Province, which is cattle production center and where the largest number of farmer households received agricultural credit in NTT. The data were analyzed using the 2-SLS method and the results were then validated and utilized using simulation models. In simulation 1, the agricultural credit increase was 25%, in simulation 2 the cattle-raising business input productivity increase was 20%, and simulation 3 was a combination between simulations 1 and 2. The study results revealed that in order to stimulate the increase in productivity and cattle-raising business production, it was not enough to provide agricultural credit, but it must be followed by improvements in the productivity of the cattle-raising business input such as improvements in the quality feeder calves, feed, and veterinary drugs. The policy implications are that agricultural credit is needed and it stimulates the use of better livestock-raising business input.

1. Introduction

The importance of credit in increasing farmer income and welfare has been proven in many countries, especially in developing countries. Agricultural credit can improve the poor farmers' standard of living through the improvement of production and increased consumption [1–5].

Agricultural credit is basically given to increase agricultural production. As the production increases, the farmer household income is also expected to increase. However, in reality, farmer households do not decide to fully allocate the capital to production activities as desired by the government; they also use the funds for consumption and investment [3,5,6].

The farmer households' decision to allocate the capital resources (total income) which includes the credit (full income) for production activities and consumption expenses is a household economic behavior which is interrelated with the household economic system. Therefore, an analysis of the farmer household economic behavior models of managing the agricultural credit they receive and the effects caused by changes in agricultural credit policy is needed.

Theoretically, farmer households are households which act as a producer and a consumer which maximize satisfaction or utility and receive profit from their agribusiness production. In other words, no farmer household acts a pure producer or pure consumer. Moreover, farmer household act as an economic organization, so they also apply liquidity of money principles. Production credit can be used



Content from this work may be used under the terms of the [Creative Commons Attribution 3.0 licence](https://creativecommons.org/licenses/by/3.0/). Any further distribution of this work must maintain attribution to the author(s) and the title of the work, journal citation and DOI.

for other expenses because agricultural credit is considered a source for maintaining the household liquidity [7].

In East Nusa Tenggara Province, the issue is that even though a large amount of agricultural credit has been given, the farmer household welfare is still poor, signified by the high poverty rate, low income rate, low food security, low agricultural productivity and production characteristics, and the stagnant repayment and credit revolving [5,7,8]. Therefore, a study of how households allocate the agricultural credit and what effects of changes in credit policies and improvement in cattle-raising business inputs are needed. In addition, the quality of the cattle-raising business input utilization also needs to be studied in order to establish a balance between the working capital and the livestock-raising business input performance.

The purpose of this study was to analyze the allocation of agricultural credit by farmer households and the effect of changes in agricultural credit policies and changes in input productivity on the farmer households' production, income, and welfare.

2. Methods

2.1. Location, time, and data collection method

This study was conducted in 5 villages in Kupang Regency, namely Tunbaun, Oesao, Naibonat, Buraen, and Sillu Villages, and 3 villages in South Timor Tengah Regency (TTS), namely Boentuka (S9^o53'797" and E124^o12'048"), Benlutu (S9^o54'004" and E124^o13'423" S9^o54'027" E124^o13'443" and Oebobo Villages (S9^o56'013" DAN E124^o06'945"). The selection of regencies and villages was conducted purposively with the consideration that this area is a cattle-producing center and has the highest number of farmer households receiving agricultural credit in East Nusa Tenggara Province.

The data collection method was through interviews using structured questionnaires, focus group discussions (FGDs), and observations. Primary data were obtained from interviewing respondents, FGDs and observations. Secondary data were collected from a number of related institutions.

2.2. Data analysis

Data originated from the estimation results of a simultaneous equation system using the 2-SLS (two-stage least square) method and through a respecification phase, validation, and finally simulation. The simulations employed in this study were: (1) a simulation where there was a 25% increase in agricultural credit, (2) a simulation where there was an increase in cattle-raising input productivity by 20%, (3) a combined simulation where there was a 25% increase in agricultural credit and a 20% increase in input productivity.

3. Results and discussion

3.1. Allocation of agricultural credit by farmer households

Generally, loans are given by cooperations, *arisan* (a form of rotating savings in the Indonesian culture, a form of microfinance) groups, money-lending foundations, and loan sharks. Farmer households usually apply for credits for multiple purposes, productive purposes combined with consumptive purposes. Productive purposes might include capital for *warungs* (family-owned businesses such as a shop or a cafe), buying a motorcycle to be used as a motorbike taxi, cattle-raising business input (medicine and vitamins), crop-planting agribusiness input (herbicides/pesticides), and human resource investments (for education and health). The loans taken out for consumptive purposes might include purchasing foodstuffs, clothing, and cultural affairs. In this study, the percentage of farmer households that applied for credits from the sources mentioned above was 19.6 percent of 178 sample households. The credit interest rates varied, depending on the source of the credit, approximately 10 percent per year for cooperations, foundations, and *arisan* groups, while for loan sharks the rate reached 25 percent per month.

Capital grants were generally received from governmental institutions and this type comprised the majority of credits received by farmer households (80.4 percent) which applied for credits. The capital grants were received in the form of cash or tangible assets, and each form had pluses and minuses. The plus of capital grants in the form of tangible assets is that they are guaranteed to be used as the credit provider intended, for example, credits in the form of feeder calves or breeding cows. The weakness of grants in the form of tangible assets is the suspicions from the farmers that there are markups of livestock prices because the performance of the livestock they receive do not meet their expectations based on the value agreed upon. If the capital grants are received in the form of cash, the plus is that the farmer households have an opportunity to purchase cattle which meet their requirements and, within the household context, the farmer households have an opportunity to allocate the usage of the credit to the personal needs of their own household. In this context, it is apparent that there are allocations for productive activities, consumptive activities, and investment. The drawback of capital given in the form of cash is that, from the credit provider's point of view, the capital loaned out does not fulfill its purpose. In this study, the credit and capital grants were specifically aimed at agricultural businesses and were labeled as agricultural credits. Allocation of agricultural credit by farmer households is presented in Table 1.

Table 1. The amount, usage allocation, and repayment of agricultural credit by farmer households in East Nusa Tenggara

Credit value, usage allocation, and repayment (in a year)	Agroecosystem		NTT
	Wetland	Dryland	
a. Amount of agricultural credit (IDR)	3,763,600	4,713,840	4,459,860
b. Allocation (% of a):			
- cattle-raising business	80.56	74.88	76.22
- non-cattle agribusinesses	4.60	7.89	7.11
- non-agricultural businesses	3.15	1.94	2.23
- food consumption	4.44	5.11	4.95
- non-food consumption	1.00	1.47	1.36
- investments	6.26	8.71	8.12
c. Credit repayment (% of a)	55.28	50.08	53.35

In running their businesses, farmers always apply for loans from informal institutions (loan sharks) because of the simplicity in administrative requirements, despite the relatively high interest rate. Credit from non-formal institutions, especially loan sharks with a high interest-rate and short repayment term, is preferred by farmers because farmers are usually unable to fulfill the administrative requirements of other sources. This finding was in line with the situation in other developing countries [4,9].

3.2. The effect of agricultural credit policy change

Policies to increase agricultural credit would have an impact on the allocation of agricultural credit to various farmer household purposes. An increase in agricultural credit would cause an increase in allocation for productive purposes, consumption, or investment. The largest change was in allocation for non-agricultural businesses followed by allocation for investment (Table 1).

From the cattle production, there was an increase in the number of cattle sold, thus decreasing the number of cattle still kept. The increased number of cattle sold was less than the decreased number of cattle kept, which caused a decrease in the overall cattle production. The use of inputs for cattle increased, especially for the purchase of feeder calves. The expense for purchasing feeder calves absorbed a large amount of money, leading to an increase in cattle-raising business cost.

The impact of an increase in agricultural credit was the decrease in the allocation of family member manpower to the cattle-raising business, and as the compensation, it was replaced by outsiders. The decreased manpower in the cattle-raising business was redirected to other agribusinesses. In addition, the demand for outsider male workers for other agribusinesses increased which decreased the outsider

female workers for other agribusinesses and allocation of family members to non-agricultural businesses. The effect of an increase in the cattle-raising business cost and a small increase in sales was that the income from the cattle-raising business decreased. The decrease in income from the cattle-raising business led to a decrease in the overall household income, even though there was an income increase from other agribusinesses and non-agricultural income. However, the difference was relatively marginal, so the household income decreased.

Table 2. The effect of agricultural credit increase

Block	Endogenous variables	1.25% CRED		
		Base value	% change	
CRED allocation	CRED : Agricultural credit	4,798,968	25.00	
	AUTS : Cattle-raising business	3,569,355	1.32	
	AUSS : Non-cattle agribusiness	333,079	11.53	
	ANON : Non-agricultural businesses	134,952	65.51	
	APGN : Food consumption	231,747	11.36	
	ANPN : Non-food consumption	67,246.7	26.25	
	AINV : Investment	462,590	46.05	
	RCBM : CRED repayment	1,525,639	-0.20	
Cattle production	JPRS : Cattle production	3,3351	-5.29	
	JSJU : Cattle sold	0,9482	0.46	
	JSPE : Cattle still kept	2,3869	-7.21	
Cattle Input	BKLS : Feeder calves	1,6021	0.81	
	PKNS : Feed	4,2059	-1.09	
	OBTS : Medicines and vitamins	9,3211	-1.26	
Manpower	PKUS : Male family to cattle AB	405.4	-3.67	
	WKUS : Female family to cattle AB	130.5	-3.75	
	PLUS : Outsider male to cattle	225.9	0.53	
	PKSS : Male family to other AB	307	0.06	
	WKSS : Female family to other AB	225.9	0.04	
	PLSS : Outsider male to other AB	39,4572	0.02	
	WLSS : Outsider female to other AB	98,9571	-0.33	
	TKKN : Family non-agriculture business	298.2	-0.16	
	Income	PUTS : Cattle AB	6,364,897	-15.03
		PUSS : Other AB	2,967,515	0.43
PNON : Non-agriculture		13,968,596	0.08	
PRTD : Household income		23,790,110	-3.92	
Expenses	KPBL : Food purchased	6,461,037	-3.57	
	KPNB : Food not purchased	3,816,174	3.75	
	KONP : Non-food	3,877,833	-1.76	
	IPRO : Production investment	2,178,325	-1.04	
	ISRT : Household social investment	2,466,664	-1.82	
	IPKS : Human resource investment	1,409,983	0.11	
	TABN : Savings	18,297,321	-4.91	
	TPRT : Total household expenses	18,800,033	-1.19	

An increased agricultural credit was responded to by farmer households by increasing the allocation of manpower to other agribusinesses, causing the production of other agribusinesses to increase. The increase in other agribusiness production caused the availability of food from their own agribusinesses to increase, thus reducing the expenses for purchased food.

In general, the expenses for investment decreased, except for human resource investment. The increased human resource investment for education and health reflected the farmers' views of the

importance of investing in education and health. Savings also decreased due to the decrease in household income.

The decrease in household income led to a decrease in the total household expenses, both consumption expenses and investments. The decrease in household expenses indicated a decrease in welfare. This signifies that agricultural credit policies alone are insufficient, support from other policies and other factors such as the availability of cattle-raising business technology to improve productivity and production.

3.3. The effect of changes in input productivity

Increased input productivity in the cattle-raising business is the increase in the quality of input used in the cattle-raising business. Improvements in input quality would increase input productivity (marginal productivity of inputs) because of the better utilization of technology (technology changes) [10]. The consequence of increased productivity is the use of less input that results in the same number of production units or using the same amount of input but resulting in a greater number of production units. This would theoretically shift the production curve upwards [11].

The effect of changes in cattle-raising business input productivity (feeder calves, veterinary drugs, and manpower; Table 3) is that it would reduce the farmers' dependence on agricultural credit availability. Changes in agricultural credit and the allocation had a negative value. However, it increased the cattle production, both cattle sold and those still kept. The utilization of feeder calves and feed were reduced, but instead, for veterinary drugs, it increased. The use of man power from within the family decreased and was redirected to other businesses.

Change of the allocation of family member manpower, male manpower, and other family members, to other agribusinesses and non-agricultural businesses, reflects the households' response to the increase in input productivity. This means that the increase in input productivity used in the cattle-raising business changed the households' decision in allocating their available human resources. The households' ability to rationally allocate the available family members to various productive activities had an effect on the income received from those activities.

The income from the cattle-raising business increased by a relatively large amount, thus increasing the household income. In addition to income from the cattle-raising business, contributions to the income also come from non-agricultural businesses. The income from other agribusinesses demonstrated a tendency to decrease and this was believed to be because the agribusiness cost was greater than the income.

Table 3. The effect of an increased cattle-raising business input productivity

Block	Endogenous variable	1.20% (BKLS + OBTS + TKUS)	
		Base value	% change
CRED allocation	CRED : Agricultural credit	4,798,968	-4.88
	AUTS : Cattle-raising business	3,569,355	-3.39
	AUSS : Non-cattle agribusiness	333,079	-3.42
	ANON : Non-agricultural business	134,952	-18.85
	APGN : Food consumption	231,747	-3.37
	ANPN : Non-food consumption	67,246.7	-7.78
	AINV : Investment	462,590	-13.69
	RCBM : CRED repayment	1,525,639	15.05
Cattle production	JPRS : Cattle production	3.3351	44.40
	JSJU : Cattlesold	0.9482	7.17
	JSPE : Cattlestill kept	2.3869	59.19
Input cattle	BKLS : Feeder calves	1.6021	-2.28
	PKNS : Feed	4.2059	-0.17
	OBTS : Medicine and vitamins	9.3211	7.13
Manpower	PKUS : Family male to cattle AB	405.4	-4.49
	WKUS : Family female to cattle AB	130.5	-1.99
	PLUS : Outsider male to cattle	225.9	0.58

	PKSS	: Family male to other AB	307	0.72
	WKSS	: Family female to other AB	225.9	1.15
	PLSS	: Outsider male to other AB	39.4572	-0.45
	WLSS	: Outsider female to other AB	98.9571	0.59
	TKKN	: Family non-agriculture business	298.2	0.23
Income	PUTS	: Cattle AB	6,364,897	148.88
	PUSS	: Other AB	2,967,515	-0.40
	PNON	: Non-agriculture	13,968,596	0.01
	PRTD	: Household income	23,790,110	39.79
Expenses	KPBL	: Food purchased	6,461,037	1.04
	KPNB	: Food not purchased	3,816,174	-1.12
	KONP	: Non-food	3,877,833	0.39
	IPRO	: Production investment	2,178,325	0.23
	ISRT	: Householdsocial investment	2,466,664	27.07
	IPKS	: Human resource investment	1,409,983	0.56
	TABN	: Savings	18,297,321	-1.98
	TPRT	: Total household expenses	18,800,033	3.79

The increase in household income encouraged expenses, both consumptive expenses, and investments. The consumptive expenses that had a positive effect were the purchase of food and non-food products. The increase in productivity had a positive effect on investments, ranging from productive business investments, social investments, and house hold investments to education and health investments. The increased consumption and investment are indicators of the improvement of farmer household welfare.

Compared with the agricultural credit increase simulation, in the increased productivity simulation, both cattle-raising business input and production increased. This means that by improving the farmer-level cattle-raising business technology, production increased in a fairly positive way. The utilization of existing technology was unable to increase production even though capital from agricultural credit was available.

This phenomenon strengthened the position of the importance of applying better technology. Improvement in the cattle-raising business technology input includes the improvement of the quality of feeder calves, feed, veterinary drugs and vitamins, and manpower. The improvement of feeder calf quality starts with genetic improvements (the parent stock), especially prevention of in-breeding and prevention of selling high-quality productive females.

3.4. The effect of changes in agricultural credit policies and input productivity

An increase in agricultural credit combined with an increase in cattle-raising business input productivity had a positive effect on the allocation of agricultural credit to various posts. The increased agricultural credit allocation was believed to be because of the availability of agricultural credit at farmer household level. Compared with the agricultural credit increase simulation (Table 1), the allocation of agricultural credit due to changes in agricultural credit policies also had a positive value, demonstrating that farmer households would increase allocation to various household purposes if the agricultural credit is available. If it is not available, even if the input productivity is increased (Simulation 2), allocation to the various purposes will have a negative value (Table 4). This demonstrates that farmer households depend on the availability of capital when they want to improve their household businesses.

The policy to increase agricultural credit solely (Table 1) was unable to accelerate production cattle positively because the cattle-raising business cost was still greater than the cattle production. It demonstrates that the cattle-raising business productivity is still low, indicating that the existing technology is unable to increase cattle production even with agricultural credit. The combination

between the agricultural credit-increase policy and technology that can accelerate cattle production positively, in the number of both the cattle sold and the cattle kept.

Table 4. The effect of an increased agricultural credit and cattle-raising business input productivity

Block	Endogenous variable	1.25% CRED + 1.20% (BKLS + OBTS + TKUS)		
		Basic value	% change	
CRED allocation	CRED : Agricultural credit	4,798,968	25.00	
	AUTS : Cattle-raising business	3,569,355	0.08	
	AUSS : Non-cattle agribusiness	333,079	11.53	
	ANON : Non-agricultural business	134,952	65.96	
	APGN : Food consumption	231,747	11.31	
	ANPN : Non-food consumption	67,246.7	26.11	
	AINV : Investment	462,590	46.60	
	RCBM : CRED repayment	1,525,639	14.95	
Cattle production	JPRS : Cattle production	3,3351	41.95	
	JSJU : Cattle sold	0,9482	7.85	
	JSPE : Cattle still kept	2,3869	55.49	
Input cattle	BKLS : Feeder calves	1,6021	0.08	
	PKNS : Feed	4,2059	-0.71	
	OBTS : Medicine and vitamins	9,3211	7.56	
Manpower	PKUS : Family male to cattle AB	405.4	-6.14	
	WKUS : Family female to cattle AB	130.5	-4.52	
	PLUS : Outsider male to cattle	225.9	0.97	
	PKSS : Family male to other AB	307	0.85	
	WKSS : Family female to other AB	225.9	1.28	
	PLSS : Outsider male to other AB	39,4572	-0.12	
	WLSS : Outsider female to other AB	98,9571	0.02	
	TKKN : Family non-agriculture business	298.2	0.01	
	Income	PUTS : Cattle AB	6,364,897	140.69
		PUSS : Other AB	2,967,515	0.13
PNON : Non-agriculture		13,968,596	0.12	
PRTD : Household income		23,790,110	37.73	
Expenses	KPBL : Food purchased	6,461,037	-3.24	
	KPNB : Food not purchased	3,816,174	3.75	
	KONP : Non-food	3,877,833	0.56	
	IPRO : Production investment	2,178,325	0.33	
	ISRT : Householdsocial investment	2,466,664	25.57	
	IPKS : Human resource investment	1,409,983	0.73	
	TABN : Savings	18,297,321	-0.20	
	TPRT : Total household expenses	18,800,033	3.16	

The impact of the utilization of input in the form of feeder calves, feed, veterinary drugs, and manpower is similar to that of the simulation where the productivity is increased solely. The demand for feeder cattle and feed decreased, while veterinary drugs and vitamins had a positive value. The positive value for the demand for veterinary drugs and vitamins could be interpreted as the administration of these drugs and vitamins at the suggested dosages. The utilization of family member manpower for the cattle-raising business decreased and the demand for outsider workers increased. This phenomenon demonstrated the importance of technology in the demand for input, family member manpower allocation, and demand for outsider workers for the cattle-raising business. The increased productivity would encourage a higher utilization of input and a less allocation of family member manpower for the cattle-raising business. The manpower would be allocated to other agribusinesses or non-agricultural businesses, leading to an increased income from other agribusinesses and non-agricultural businesses [7].

The effect of this simulation accelerated the increase in household income from the cattle-raising business, other agribusinesses, and non-agricultural businesses. The increased income from various

productive household business sources showed the importance of the role of productivity or better technology utilization in the cattle-raising business. Compared to the effect of Simulation 1, where the government only provides agricultural credit without improvements in technology, in the short term, which will not improve the farmer household welfare. Therefore, this phenomenon strongly indicates that high-quality technology would have a positive effect on the farmer household income. The increase farmer households income gave an opportunity to increase their expenses. The increased household expenses for both consumption and investment would improve the farmer household welfare.

4. Conclusion and policy implication

Giving agricultural credit without following it with improvements in input productivity in the cattle-raising business could not consistently improve the welfare of farmer households because there is a possibility that the agricultural credit would be utilized for non-productive household expenses, even though it is meant to maintain the balance between the households' economic and social aspects, and the performance of the existing technology is unable to accelerate the improvement of productivity and production in the cattle-raising business. Providing agricultural credit followed by the increase in agricultural input productivity would have a positive effect on the improvement of the cattle-raising business production and productivity, the farmer household income, and also increasing the farmer household welfare.

Agricultural credit is beneficial as capital for the cattle-raising business in farmer households in East Nusa Tenggara; therefore, the agricultural credit policy is still needed to accelerate the advancement of the cattle-raising business, but it must be followed by improvement in the cattle-raising business input. Improvement in the cattle-raising business input stems both from the farmer household's internal and external elements. Improvement of input productivity from the internal element of the farmer households is the improvement of the knowledge and skill in the cattle-raising business and a more commercial business outlook. Improvement of input productivity from the external element is the availability of better breeding technology, feed, and veterinary drugs and also support in product marketing.

References

- [1] Nuryartono N 2007 *Jurnal Manajemen dan Agribisnis* **4** 15–21
- [2] Adebayo O O and Adeola R G 2008 *Anthropologist* **10** 313–314
- [3] Nwaru J, Essien U A and Onuoha R E 2011 *Journal of Rural and Community Development* **6** 129–139
- [4] Saleem M A 2011 *European Journal of Business and Management* **3** 111–121
- [5] deRosari B B, Sinaga B M, Kusnadi N and Sawit M H 2014a *IJFAEC* **2** 81–9
- [6] (BPTP) Balai Pengkajian Teknologi Pertanian NTT 2018 *Laporan Tahunan* (Kupang: Badan Litbang Pertanian, Ministry of Agriculture)
- [7] deRosari B B, Sinaga B M, Kusnadi N and Sawit M H 2014b *Global Journal of Commerce and Management Perspective* **3** 1–7
- [8] (BPS) Badan Pusat Statistik Provinsi NTT 2018 *Nusa Tenggara Timur dalam Angka* (Kupang)
- [9] Kundu K and Ganguly D 2011 *Research Journal of Economics and Business Studies* **1**
- [10] Lole U R, Hartoyo S, Kuntjoro K and Rusastra I W 2013 *Media Peternakan* **36** 70–78
- [11] Muayila H K 2012 *AJFAND online Scholarly Peer Reviewed* **12**

The effect of agricultural credit policy and cattle-raising business input productivity on farmer household welfare

ORIGINALITY REPORT

12%

SIMILARITY INDEX

11%

INTERNET SOURCES

8%

PUBLICATIONS

7%

STUDENT PAPERS

PRIMARY SOURCES

1	eprints.unram.ac.id Internet Source	4%
2	journalijdr.com Internet Source	1%
3	repository.uin-suska.ac.id Internet Source	1%
4	www.iosrjournals.org Internet Source	1%
5	Submitted to Syiah Kuala University Student Paper	1%
6	karya.brin.go.id Internet Source	1%
7	jglobal.jst.go.jp Internet Source	1%
8	Submitted to Universitas Riau Student Paper	<1%
9	Hiroshi Morikawa Hiroshi Morikawa, Ken-ichi Okamoto Ken-ichi Okamoto. " Field Emission	<1%

Microscope Observations of H - and Metal-Phthalocyanines ", Japanese Journal of Applied Physics, 1996

Publication

10

Toshiro Maruyama, Tetsuya Kanagawa. "Electrochromic Properties of Molybdenum Trioxide Thin Films Prepared by Chemical Vapor Deposition", Journal of The Electrochemical Society, 2019

Publication

<1 %

11

eprints2.undip.ac.id

Internet Source

<1 %

12

iopscience.iop.org

Internet Source

<1 %

13

Submitted to Higher Education Commission Pakistan

Student Paper

<1 %

14

Hendricus Andy Simarmata. "Phenomenology in Adaptation Planning", Springer Science and Business Media LLC, 2018

Publication

<1 %

15

pinpdf.com

Internet Source

<1 %

Exclude bibliography On