Diffusion and implementation of innovation in Binuang agricultural training farmer groups

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Abstract To understand the Diffusion of Innovation and its impact on achieving organisational goals, this research investigates the utilisation of the D-Corp Division Model Based on Corporation, an innovative approach implemented within farmer groups and associations to establish the Division of Agricultural Training in Binuang. Employing a quantitative survey method, the study conducts regression analysis to ascertain the significance of relationships between variables. The findings reveal that the Diffusion of innovation variable demonstrates a significant effect on other variables, as evidenced by the tcount value (1.660) exceeding the critical ttable value (3.197) at a level of significance below the table score (0.002 < 0.05). Consequently, the initial hypothesis (a) is accepted, implying that the Diffusion of Innovation does not significantly influence the application of Innovation. On the other hand, the Innovation Variable exhibits a tcount value (5.003) more significant than the critical ttable value (1.660) with an influence score below the table score (0.000 < 0.05). Thus, the second hypothesis is accepted, indicating a substantial partial influence of Innovation on the application of Innovation in this study. Moreover, the Diffusion of Innovation and work innovation have a combined impact on the research data (0.000 < 0.05, Fcount = 34.663 > Ftable = 3.07). Consequently, Ha3 is accepted, signifying a simultaneous correlation between two independent variables: the innovation diffusion variable (X1) and work innovation variable (X2) concerning the application of innovation (Y) variable.

Keywords: diffusion of innovation; d-corp model; farmer group

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INTRODUCTION
The Division of Agricultural Training in Southern Kalimantan has significantly shaped Indonesia's agricultural sector. It functions as a training centre, equipping farmers with the necessary skills and knowledge, thus fostering a skilled and independent workforce within the agricultural domain (Setiawan et al., 2021). Aligned with this training division, the work desk is essential in creating competitive and professional farmers, fostering their independence in agriculture (Kartika & Edison, 2021).

A key objective of this Division is to nurture agricultural businesses, aiming to establish innovative public services within the agricultural work environment (Marta et al., 2019). The focus of the agricultural business Incubator devised by the Division of Agricultural Training encompasses various sectors, including husbandry, supported by internal and external stakeholders in the farmlands. The Incubator's scope includes divisions such as Breeder/Fishery, Mushroom Conservation, Alsintan (Agricultural Machinery), Post-Processing, Vital Agent, Vegetables and Horticulture, Gardenry, Waste Treatment, Fertiliser, and Agricultural Marketing.

According to a reliable source from this Division, the incubation of agricultural businesses offers numerous benefits to entrepreneurs, such as skill enhancement, practical implementation of agricultural knowledge, and the ability to develop urban plans with business principles. The Incubator's services facilitate a learning system for agricultural businesses, empowering entrepreneurs to engage in independent entrepreneurship (Personal Communication, 2023). Moreover, the Incubator provides valuable information, consultation, training, and guidance to foster the growth of regional agricultural ventures (Muthuprasad et al., 2021). In catering to these improvement needs, the Division has devised the D-Corp Model Division as a learning model for knowledge acquisition and implementation. This innovative model is implemented based on the Division of Agricultural Training of Binuang's strategies, as endorsed during a Working Cabinet Meeting, wherein the President of the Republic of Indonesia stressed the vital importance of developing and expanding farmers' corporations to enhance the overall quality of agriculture in Indonesia (Presidential Regulation of the Republic of Indonesia, 2011).

The Minister of Agriculture, Sahru Yasin Limpo, asserts that encouraging the growth and development of agricultural corporations is essential to elevate farmers' welfare and enhance their work performance, ultimately contributing to Indonesia's economic prosperity (Loose & Pabst, 2019). As part of the farmer's organisation's vision, maintaining the infrastructure of farmers is crucial to transition their economy from individual-based to corporate-based business endeavours. This strategic shift is envisaged to improve the farmers' quality of life and positively impact Indonesia's economy.
The Division of Agricultural Training in Binuang continues to fulfil its vital role as a training and educational centre, striving to generate a larger workforce within the agricultural sector. With a vision to become a premier destination for producing skilled, innovative, and competitive individuals in the agricultural business, the Division has implemented the Public Service Innovation Program, which leverages the D-Corp Model, a Corporation Based Division, to drive advancements in Indonesia's agricultural development.

Communication, as a multifaceted activity, plays a crucial role in our lives. It involves individuals engaging in an interactive environment that can influence the very structure of communication itself (Latukolan et al., 2021). Derived from the Latin word "Communicare," communication is a means of interaction. The process involves a sender constructing a message, which is then disseminated to receivers. Upon receiving the message, individuals can react and provide feedback based on the communicator's transmission (Larasati, 2022).

Furthermore, communication is perceived as the distribution of ideas from a source to one or multiple recipients, impacting the audience's lifestyle and understanding, whether occurring instantaneously or progressively (Marta et al., 2022). Lestari (2021) further expounds on communication as a method of conveying messages to audiences, where the audience's response measures the effectiveness of message distribution. Successful transmission occurs when the average audience exhibits a parallel understanding with the communicator, fostering the emergence and proliferation of new lifestyles and ideologies within the community (Novtarianggi et al., 2020).

Communication Development is a multifaceted process that goes beyond mere social transformation, encompassing changes in both the physical and psychological aspects of individuals as a consequence of this transformation. Communication Development aims to empower individuals to exhibit their social status by emphasising social equity and active participation. Its scope extends to ensuring equality among all group members, giving them greater control over their environment (Nulhaqim et al., 2019).

Fuad (2021) defines development as transforming locations and tools to enhance social and economic systems, mainly targeting individuals without equitable benefits. In this context, communication plays a pivotal role in disseminating ideologies to various parts of the community within the region. By bridging the communicator's ideas to the region's citizens, communication enables them to reap the benefits of developmental transformations (Lang et al., 2020). These ideas contribute to the corporate identity (CI), which holds significance for all businesses, both internal and external to a company.

Tourky, Foroudi, Gupta, and Shalaan (2018) emphasise the critical aspects of corporate identity (CI), highlighting founder transformational leadership, employee identification, and top management behavioural
leadership as essential dimensions and sub-dimensions of CI. They propose a model illustrating the interrelationships between CI characteristics and their impact on corporate image, laying the groundwork for further empirical investigations. Companies strive to present a consistent and transparent image of themselves and their brand to internal and external stakeholders. This fosters a conducive environment for employees and subcontractors to work for the company, understanding its image, values, and objectives. Furthermore, a coherent self-image strengthens employee loyalty as they recognise their roles within a well-connected organisation, enhancing overall performance by promoting department collaboration.

Su (2021) interprets Innovation as an idea that introduces novelty into individual or group activities. Such innovative ideas are the foundation for improving quality of life or behavioural transformations. Hendratama (2022) identifies the characteristics of Innovation, including relative benefit, compatibility with community values and norms, complexity, practicality, and observability. These characteristics play pivotal roles in determining innovations' significance and successful implementation, ensuring their adaptability over time and observability of their benefits to individuals or groups.

Guarino (2021) discusses Diffusion as a specialised theory in communication. The Diffusion Innovation Theory, proposed by Rogger (2003), emphasises that a creative idea can be effectively transmitted through various media channels within a specified timeframe by the communicator. Yelvington & Parry (2023) further elaborate on the characteristics of Diffusion Innovation, which encompass Innovation, Communication media, Time estimation, and the Audience. In line with these principles, the D-Corp Model Corporate-Based Division is a transformative approach to Innovation within the Division of Agricultural Training of Binuang, focusing on enhancing Indonesian farmers' welfare. The Agriculture Business Incubator comprises ten distinct division concepts, serving as a model for agricultural companies. These divisions include the Promotional Marketing Division, Vegetable and Horticulture Division, Breeder and Fishery Division, Gardening Division, Vital Agent Division, Post-Processing Division, Waste Management Division, Alsintan Division, Mushroom Conservation Division, and Fertilizer Division.

The key objective is to foster synergy and integration among these divisions, ensuring that their operational systems function as subsidiary units under the Primary Company, the Incubator of the Agriculture Business. All products from these divisions are centralised in the marketing centre of the business unit. Notably, the e-commerce platform SIPROMIA further supports this innovative approach, bridging the gap between the Incubator and consumers, considering the growing e-commerce trend in Indonesia.

The Incubator's model is designed to foster public service innovation by adopting information technology advancements, particularly benefiting farmers and instilling an entrepreneurial mindset.
in the younger generation through internships within the Division of Agricultural Training. The agricultural business incubator model aims to bring about positive transformations, as illustrated in the accompanying figure 1.

![Diagram](image)

**Figure 1. Agricultural Business Incubator Model**  
*Source: Author’s Material (2023)*

The product of each Division focuses on the Promotional Marketing Division, such as IA Mart, IA Cafe, and Farmer's Market as their conventional commerce. At the same time, SIPROMIA poses as their digital commerce. The D-Corp Model is an innovation devised by the Division of Agricultural Training of Binuang to incubate their agriculture business. The innovation replica constructed will be integrated into the Division of Promotional Marketing, which supports zero-waste farming through conventional and digital commerce.

As per information from the head of Binuang's Division of Agricultural Training (Personal communication, month, 2021), their program aims to enhance the quality of life for farmers through advancements in crop capacity, employee skills, organisational efficiency, and entrepreneurial practices within the agricultural domain. This program actively supports farmer corporations in adopting technology to improve the effectiveness of their agricultural practices (Widiyanti et al., 2020).
The D-Corp Model (Figure 2) serves as a theoretical framework and a technological foundation to expedite the dissemination of cutting-edge technology in various aspects of crop production, post-processing, high-quality product cultivation, and marketing of husbandry products, all while considering local customs and technology. Embracing technology hybridisation, this model enhances the precision of agricultural operations, reducing wasteful practices (Septiarysya et al., 2021).

As a contemporary business concept, the D-Corp Model contributes to the development of the agriculture industry, boosting the value and competitiveness of corporations, enabling them to thrive in both national and international markets. Its implementation involves the strategic utilisation of human resources, influencing the entire agricultural system as an integral component of the associated organisations. This comprehensive approach encompasses crop planning, farming, post-processing, and product marketing, ensuring the sustainable continuity of the D-Corp Model (Iskandar et al., 2020).

Drawing from the Diffusion Innovation Theory, the D-Corp Model effectively harnesses the potential of human resources within husbandry corporations. By systematically and continuously improving husbandry capacity, the model facilitates the development of strategies to bolster Indonesia's agricultural strength and capacity, aligned with the country's agricultural demography and transformation model, ultimately guiding and elevating business corporations within the husbandry sector.

The application of this program incorporates Communication Theory and Diffusion Innovation Theory to enhance the competitiveness of agricultural products in Indonesia. Farmers are actively implementing agricultural corporations, promoting interaction among farmers specialising in different crops within specific demography. Further details of this implementation are illustrated in the accompanying figure 3.
Therefore, this study aims to discuss the Division of Agricultural Training of Binuang's effectiveness in implementing its program for farmers in Southern Kalimantan. This study will identify how Diffusion and Innovation will affect the Implementation of Innovation based on D-Corp Model Corporation Based Division during the agricultural training. The authors also propose a theoretical framework for the study, which consists of three variables. Innovation and Diffusion will be the independent variables of the research, whereas the Implementation of Innovation will pose as the dependent variables, as explained in Figure 4.
Therefore, the variables shown in Figure 4 are hypotheses, as the independent variables will influence the dependent variable. The first hypothesis will assume that the Diffusion variable will affect the Implementation variable partially. The second hypothesis will assume that the Innovation variable will affect the Implementation variable partially. The final hypothesis will assume that both Diffusion and Innovation variables will influence the Implementation variable simultaneously.

**METHODODOLOGY**

The present study adopts a quantitative approach, employing a survey to gather data. The research will employ regression analysis to explore the significance of the Diffusion and Innovation variables concerning the Implementation variable. As explained by Sugiati (2019), quantitative research values the numerical data collected within a specific timeframe. The data collected in this study will be used to identify specific characteristics within the research variables, as outlined in the theoretical framework presented in the Introduction.

The sampling method chosen for this research is purposive sampling, based on specific classifications. The target population consists of farmers participating in the Farmer's Economy Development Training Program in Southern Kalimantan, conducted in two cities in 2020. The training program successfully trained 536 farmers across 18 classes (Devina et al., 2021). The author selected four training classes from Bataguh District, Dadahup District, and Tamban Catur District, totaling 120 respondents for the research.

The Hypothesis test will play a pivotal role in determining the significance of Diffusion and Innovation in implementing Innovation within the agricultural sector. As previously mentioned, the hypothesis test will utilise regression analysis as a statistical tool (Imantoro et al., 2018).

\[ Y = b_0 + b_1X_1 + b_2X_2 \]

This research identifies the Implementation of Innovation (Y) as the dependent variable. The Diffusion variable (X1) and the Innovation
variable (X2) are independent variables, both of which impact the Implementation of Innovation. The hypothesis test will use b values as coefficients to support the significance of these independent variables in the research.

To assess the significance of the independent variables, the hypothesis test will employ the T and F tests, which will determine their simultaneous and partial effects, respectively. The survey will evaluate the D-Corp Model the Division of Agricultural Training proposed, explicitly focusing on the participants' knowledge of Innovation (Zubaedah, 2017).

In the F Test hypothesis model, a probability test with a value not less than 0.05 indicates that H0 and Ha are rejected, meaning that all independent variables do not correlate simultaneously to affect the dependent variable (Syardiansah, 2020). Conversely, a lower score suggests that Ho is rejected while Ha is accepted, indicating a simultaneous correlation between the Diffusion and Innovation variables affecting the Implementation of Innovation.

The Coefficient Determination Test will be used to gauge the influence of the Diffusion and Innovation variables on implementing Innovation within the context of Agricultural Training in Southern Kalimantan. The coefficient score will range from zero (0) to one (1), with a value closer to one (1) indicating higher significance of the independent variables (Pramezvary et al., 2021).

For the sample, the research includes the entire population, with a respondent composition of 30 participants from the Organization of Farmer's and Economy Development Training Program in Bataguh District, 30 participants from Agricultural Training in Bataguh District, 30 participants from Agricultural Training in Dadahup District, and 30 participants from the Organization of Farmer's and Economy Development Training Program in Tamban Catur District.

RESULTS AND DISCUSSION
The Division of Agricultural Training in Binuang has taken significant strides in improving the welfare of farmers in Southern Kalimantan. Their efforts have been implemented through the Organization of Farmer's and Economy Development and the Agricultural Training program conducted in Pulang Pisau City and Kapuas City in 2020.

During this program, four squads of farmers were trained, with each squad comprising 30 participants. For the research, a representative population sample was chosen, consisting of four training groups from Bataguh District, Dadahup District, and Tamban Catur District. The research sample consisted of farmers who participated in agricultural training under the Organisation of Farmer's Economy Development and were stationed at the Food Estate Programs in Central Kalimantan. In total, the survey included 120 respondents from the four training squads, as illustrated in the Figure 5.
The research respondents generally range from 22 to 58 years old as the most frequent respondents. This context will then be supported by the educational background of each respondent, which will be explained in the following Figure 6.

Figure 6 shows that most respondents are from elementary and middle school backgrounds, with a total of 40.8% of each educational background. The participants based on high school background are allocated as many as 18.3% of the total sample. In contrast, the participants that graduated from college were allocated 2.5% of the total population. The samples will be elaborated further using age distribution as described in the following figure 7.
Figure 7. Gender Distribution of Research Respondents  
Source: Author's Survey (2023)

Figure 7 depicts the dominance of male respondents in the research survey, comprising 103 individuals. This accounts for approximately 85.8% of the total respondents, while female respondents were represented by only 17 individuals, making up 14.2% of the respondents.

**Validity and Reliability Test**
The authors collected the survey data in tabular form to assess how Diffusion and Innovation influence the Implementation of Innovation among farmers during the Agricultural Training. To ensure the research data's authenticity and consistency before regression analysis, the validity and reliability test will be performed using SPSS software. This test will ascertain the credibility and reliability of the data throughout the research process.

The validity test aims to determine the authenticity of the research data collected through the survey. Each question in the survey will undergo an authenticity assessment to calculate its validity value. For the 120 respondents in the survey, the degree of freedom (df) is set at 118. The alpha score is 0.05, and the Rtable value is 0.176 (Prasetyo, 2021). The author found that the entirety of the research questions in the survey is valued above 0.176. This test would indicate that the research data is valid for further testing. The following test will be a reliability test to determine the data's consistency.

The reliability Test will be used to test the research data's consistency. Reliable data will show its consistency through testing as time shifts. The reliability Test will use an Alpha Model from Cronbach with a determination score above 0.06 (Riyanti & Suwartono, 2018). The reliability test results describes that the Cronbach Alpha Score of this research is placed above 0.06, concluding that the research data is reliable and continuously tested.

**Normality Test**
The normality Test will determine how the research data is distributed. Data distribution will affect the correlation test within each research's variables (Sintia et al., 2022). The normality test uses Kolmogorov-
Smirnov Model with the support of SPSS Software. The research data will be considered equally distributed when the score exceeds 0.05 (Srimani et al., 2021).

The author found that the data distribution in the survey is recorded at 0.070 using the 2-tailed model. The result of this test aligns with the probability test, indicating a value above 0.05. Consequently, the data distribution in this research is considered normal and unaffected by any external intervention. The measure of dispersion in Figure 8 also indicates a significant value of 0.070 (Tuaputimain, 2021).

The normality test employs a regression model, observing the research data through a diagonal line. As depicted in Figure 8, the data is distributed along the diagonal line, complying with the regulations of the Standard Regression model, signifying that the research data is normally distributed.

**Heteroskedasticity Test**

Heteroskedasticity Test is purposed to identify any similarities within a regression test. Any differences within the variable's correlations affected the entire survey observation. The survey data will be Homoskedastic if consistent throughout different tests and vice versa. It will be Heteroskedastic if it shows signs of difference if tested in a different time span (Sulaeman et al., 2022).

The Glajer Test was used to determine the heteroskedasticity of research data. This test was standardised at a value of 0.05, and the tested data must score below the standard value to identify heteroskedastic data. The results summarises that the independent variable's significance values were higher than 0.05, scoring 0.343 and 0.551, respectively. The data will also be tested through a Scatterplot Graph, where the data distribution will not show any signs of line or shape to be considered a heteroskedastic data (Dewianawati et al., 2022). The test results using a Scatterplot Graph will be displayed in the Figure 9 using SPSS software.
Figure 9 illustrates that the research data is heteroskedastic, which means that the author did not find any pattern or shape that was constructed during the research data's distribution.

**Multicollinearity and Linearity Test**

Multicollinearity test functions as a correlation test between two or more research variables. The regression Model can be used to identify multicollinearity in the study, which generally would not show any simultaneous correlation between independent variables (Kurniawan & Auva, 2022). The correlation test will be based on Variance Inflation Factor (VIF) and Tolerance (TOL). Regression will be free of any variable connections if VIF is valued below ten and the Tolerance level is higher than 0.1. The finding elaborates that the tolerance value of this survey is 0.286, with a VIF valued at 1.347. The analysis results have shown no multicollinearity between independent variables of the research, following the requirements that the Tolerance level is above 0.1 and the VIF value is below 10.

Linearity test will determine the correlation between Diffusion and Innovation Variables towards an Implementation of Innovation Variable. The Linearity Test model will be designated at 0.05, which will determine the acceptance of the hypothesis if it goes beyond or below the value designation (Khrishananto & Adriansyah, 2021). The linearity test will assume the regression test will be fulfilled if the dependent variable has a linear correlation between the independent variables of the survey. Hypothesis 0 will show the linear correlation within the research's data. In contrast, hypothesis A will show some linearity between the research data.

Author found that the alpha value is below the linearity score, which means Ho was rejected, and Ha was accepted. Both of the research's hypotheses have fulfilled their requirements that the data is in line with the hypothesis, allowing the author to execute the regression model analysis.
Diffusion Towards Implementation of Innovation (X1)
The research data explained that the $t_{\text{count}}$ of the survey is at a higher value than $t_{\text{table}}$, which is designated at $3.197 > 1.660$. The significance level of this hypothesis is designated at 0.002, which is lower than 0.05. Ho will be rejected in the study with the acceptance of Ha in the first hypothesis. This test has shown a partial influence between Diffusion to Implementation of Innovation.

Diffusion is an innovation process that is distributed through different media of communication. The innovative message transmission will occur in different timespan, allowing different audiences to receive the message regarding the change in human activity and its benefits (Kristanti & Marta, 2021).

Based on the onsite observations, the execution of the training by The Division of Agricultural Training has proven effective in distributing any innovations regarding agriculture that will benefit farmers and corporations alike. The Diffusion of new information can be accepted by the community during the training session, which allows the implementation of Innovation to occur, even if it requires some time to adjust to the change.

Innovation towards Implementation of Innovation (X2)
The regression analysis shown in Table 5 has identified that the Innovation variable has a larger $t_{\text{count}}$ than the $t_{\text{table}}$, which is designated at $5.003 > 1.660$. The significance level of this hypothesis was valued at 0.000. This means that Ho will be rejected, and Ha will be accepted in the second hypothesis, which results in the partial correlation between Innovation towards Implementation of Innovation

Simultaneous Significancy Test (F Statistic Test)
F Test is aimed to scale the correlation between Diffusion and Innovation variables towards the Implementation of Innovation variable. The base of the independent variable's value is designated at 0.05, which will determine whether the research hypothesis will be simultaneously correlated if it is higher than 0.05. This test will also show if the independent variables are not affecting the dependent variables simultaneously (Rusyidi et al., 2019).

The analysis has shown through F Test that the simultaneous correlation between Diffusion and Innovation Variables was designated at 0.000. The $F_{\text{count}}$ discovered in the analysis is 34.663, with $F_{\text{table}}$ at 3.07. It can be concluded that Ha is accepted in the third hypothesis, which signifies a simultaneous correlation between Diffusion and Innovation towards the Implementation of Innovation during the agricultural training of Central Kalimantan.

Coefficient Determination Test ($R^2$)
The Coefficient Determination Test ($R^2$) will scale the correlation between Diffusion and Innovation variables toward an Implementation
of Innovation variable. The study context will show that the independent variables will affect the dependent variable at a significance level of 61%. The test will display the Diffusion and Innovation executed properly towards implementing Innovation using the D-Corp Model program by the Division of Agricultural Training of Binuang.

The coefficient value through regression analysis will be placed at zero (0) and one (1). The capabilities of the independent variables will be determined as the score is closer to one (1). The $R^2$ score is ranged between zero and one value, which will be explained in the following table (Marta & Suryani, 2016):

Finding implied that the Coefficient Determination was valued at 0.61 or 61%. This means there is a significant influence between the independent variables towards the dependent variable. The implementation of Innovation has received considerable influence by Diffusion and Innovation based on the D-Corp Model program by the Division of Agricultural Training of Binuang with $R^2$ valued at 36.1%. The other 63.9% were external factors not discussed in the research.

CONCLUSION
The research analysis has discovered that the $T_{count}$ of the survey was higher than the $T$ table of the base analysis, which is 3.197 and 5.003, respectively. Both research hypotheses have been accepted, implying a partial correlation between Diffusion and Innovation toward an Implementation of Innovation.

The significance of Diffusion and Innovation is correlated simultaneously towards implementing Innovation with a significance score of 0.000. This is supported by the $F_{count}$ designated at 34.663, higher than the $F$ table valued at 3.07. The third hypothesis is accepted during the analysis process in the study of the Agricultural Training Program evaluation towards the agricultural development of Central Kalimantan.

The coefficient Determination Test of this research has discovered that the two independent variables have a significance level of 61%. This analysis shows that Diffusion and Innovation have contributed considerably to implementing Innovation in the Agricultural Training Program by the Division of Agricultural Training of Binuang.

The $R$ Test has the $R^2$ valued at 0.361, translated as a 36.1% significance level between the independent variables towards the dependent variable. The other 63.9% of the variables were external factors that were not a part of the research. Future research should explore these external variables to identify which contributes to the development of Agriculture in Central Kalimantan.

REFERENCES


