

## **IDENTIFYING THE CAUSES OF PPDB SUPPLY CHAIN MANAGEMENT BARRIERS BY USING CAUSAL LOOP DIAGRAM**

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**Abstract.** The research on supply chain management had been carried out in both manufacturing and services companies. In practice, supply chain management could also be applied to the education sector. Several types of research on supply chain management had been carried out in universities especially student enrollment system. Yet, the research on School Enrollment System (PPDB) supply chain management of private vocational schools (SMK) has never been conducted. In practice, the PPDB of private vocational school encounters challenges, restrictions, and obstacles in the process.

It takes strategic efforts to extend the number of new students. However, it is necessary to take accounts of the inhibiting factors and causes of PPDB. The mapping of inhibiting factors and the causes of PPDB supply chain management was performed through a system approach method with a causal loop diagram (CLD) model emphasizing the impact of influential factors associated with the cause and effect problems that affect the enrollment of new student quantity. The result is presented in the form of the causal loop diagram (CLD) model as a strategic effort in accepting the new students.

This paper aims to identify the causes of PPDB supply chain management barriers of private SMK in Indonesia. This study uses a qualitative approach, applying a causal loop diagram model to identify the causes of PPDB supply chain management constraints in vocational schools. These findings show the causal and inhibiting factors of PPDB supply chain management barriers.

This study focuses on identifying the causes of PPDB constraints from the operational aspects of supply chain management. This research recommends the government for paying attention to the educational sector particularly the expansion of scholarships at SMK level. It is also suggested that the government provide proper understanding to the people on the importance of education for their life.

**Keywords:** supply chain management, PPDB, causal loop diagram.

### **1. INTRODUCTION**

The student enrollment according to Prihatin (2014) is one of the crucial management activities, since no students mean nothing to handle or regulate. To achieve all-out results in PPDB socialization and higher number of students, a wide range of PPDB strategies were carried out including social socialization through social media, street banners, and brochure distribution. PPDB supply chain management in SMK Komputama Jeruklegi involves students, teachers and point centers in supplying new students. SMK Komputama Jeruklegi applies a specific strategy called as PostPoint Center (PPC). This PPC strategy involves the community in the process of accepting new students.

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Based on the data of the Ministry of Education and Culture in the academic year 2017/2018, SMK is the most popular secondary education unit in Indonesia. In contrast to the trend of increasing numbers of vocational students at the national level, SMK Komputama Jeruklegi has experienced a downward trend in the number of new students for the last three years, from 2016, 2017 and 2018. In regards to this, the supply chain management were observed in the last three years. The point center which previously provided the highest contribution to supply new students was compared to the contribution of teachers and students. However, it proved that the contribution in the last three years has turned down.

The learning process at SMK Komputama Jeruklegi runs well. The achievements of this school in terms of vocational competence increase as well, one of which is proven by winning first place in the student competency competition (LKS) on the vehicle engineering department. In terms of fulfilling the facilities and infrastructure, the school has excellent facilities and infrastructure that support the learning process. It points out that the downward trend of student enrollment is more likely caused by the disrupted PPDB supply chain. The PPC contributions are higher than teachers and students. If the contribution of PPC, teachers and students keep improving, PPDB will be successful in to gain the desired number of new students.

Based on these premises, the researchers were interested in identifying the causes of PPDB supply chain management at Komputama Jeruklegi vocational school by a causal loop diagram (CLD) model. It is widely used in problem solving with a system approach that considers the dynamic complexity of the system or support a system approach dynamic. The CLD model was selected for its ability to outline and map problems.

Supply chain barriers are the impediments for Komputama Jeruklegi vocational schools in PPDB. The PPDB supply chain disruptions in these schools include ineffective performance of some post point centers, the relatively high dropout rates of junior high schools in Jeruklegi, and the existence of plantations and rubber processing plants that recruit junior high school graduates. Relying on the background, then the problem formulates any causal and inhibiting factors in PPDB supply chain management in private vocational schools.

## **2. SUPPLY CHAIN MANAGEMENT**

According to Christopher (2011), supply chain management is a reciprocal relationship between providers and customers to deliver optimal values to customers at low costs but provide overall supply chain benefits. According to Rahadi (2012), the focus of supply chain management is to create relationships that produce optimal benefits for all parties involved in the supply chain management. The current development of business innovation illustrates the importance of supply chain management more broadly, not only as a chain but also as a network.

Supply chain management is a network that is contained in organizations that are interconnected and need each other and work together to regulate, supervise and improve information flows from the point of the supplier to the end consumer (Balou, 2004). According to Heizer and Render (2004), supply chain management is the integration of material procurement and service activities, conversion into semi-finished goods and final products, and delivery to customers. Lizao and Zhao (2012) in Randy (2015)

describe the dimensions of integration of supply chain management, there are three is supplier integration, internal integration, and customer integration.

Based on the background, the researchers were interested in conducting research on identifying the causes of PPDB supply chain management at Komputama Jeruklegi vocational school using causal loop diagram (CLD) model that is widely used in problem solving with a system approach that considers the dynamic complexity of the system or to support a system approach dynamic. The CLD model was chosen because it can outline and map problems.

Supply chain barriers are an obstacle for Komputama Jeruklegi vocational schools in PPDB. Examples of PPDB supply chain disruptions that occur in Komputama Jeruklegi vocational school include not all pos point centers work optimally in PPDB, the dropout rates for junior high schools in Jeruklegi are still high, and there are plantations and rubber processing plants that recruit junior high school graduates. Based on the background of the problem, then the problem can be formulated is any factor that causes obstacles in PPDB supply chain management in private vocational schools.

The second dimension of supply chain management is internal integration, with internal integration of a company can increase customer satisfaction in various aspects. Internal integration can make consumer demand well understood by all companies through the exchange of information from the sales/marketing department to other departments. The long-term impact is when consumer orders are well integrated, all activities, functions, and departments that exist in the company adjust to the integrated orders so that it will shorten production time and increase speed to enter the market so that it will ultimately increase customer satisfaction.

The third dimension of supply chain management is customer integration, close interaction between companies and consumers build a close relationship to increase the accuracy of information exchange, the more accurate information obtained about consumer demand and consumer tastes. Customer integration also creates an opportunity for companies to improve the collaboration process, allowing for reduced costs, making more added value for consumers and accelerating the company's response to capture consumer desires.

## **2.1 Supply Chain Management in the Education Sector**

According to Lee and Severance (2007), the dimensions of integration of supply chain management in the education sector are divided into three. First, the company's relationship with customers will benefit the company in consumer loyalty to the company's products. To take advantage of these opportunities, the relationship must be maintained and mutually beneficial to each other. The application of relationships with customers in schools is to involve students in PPDB activities.

Second, the relationship between the company and the supplier will provide benefits to the company in terms of improving the quality of raw materials, the timing of raw material intermediation is more appropriate or more possible to apply the just in time technique and save costs. Maintaining a mutually beneficial relationship between the company and the supplier is essential for the company because it can provide opportunities to improve the company's competitive advantage, both in terms of cost reduction and or quality improvement. The application of relationships with suppliers in schools is to involve the

point center in PPDB activities and the socialization of school programs. Third, internal relations in schools can be seen from the interaction between teaching staff, administrative staff, and students in PPDB activities and teaching and learning process.

## **2.2 Supply chain management barriers**

Supply chain management requires support from various parties starting from the internal, in this case, all top management and externals; in this case, all existing partners. According to Chopra and Mendi (2001) the obstacles that will be experienced in the implementation of supply chain management are five: increased product variation, decreased product life cycle, increased consumer demand, the involvement of many parties in the supply chain and globalization.

First, product variations are increasing, meaning that the producers seem to spoil consumers, seen from various types of products on the market. The company's strategy that is always customer-focused also reinforces it. In the past, the strategy applied by producers was to divide customers into several segments. Manufacturers indulge consumers by creating products according to the wishes of each not according to the wishes of specific segments. In the world of education with more and more schools operating, a better strategy is needed, so that prospective students are interested in going to school that is tailored to the demands of prospective students and guardians of students to make it easier for students to get jobs after graduation.

Second, the declining life cycle of the products of the company is increasingly troubled by regulating the supply strategy of goods by decreasing the life cycle of a product. The product life cycle is the age of a product on the market. The application of appropriate strategies in maintaining the supply of students will be able to keep the school getting a good supply of students. The establishment of pos point center is expected to be able to answer the challenges of the product life cycle so that the supply, in this case, the prospective student numbers are precisely increasing. Third, increasing consumer demand, supply chain management can increase demand quickly to meet customer demand, although the demand from customers is very high compared to the standard. The high demand from the community for vocational schools is to demand that schools be able to create graduates who are ready to work and be competitive.

Fourth, the involvement of many parties in the supply chain, the supply chain involves many parties who have their interests. This makes supply chain management increasingly sophisticated and complex. By maintaining good relations between school management, people, and the world of work/industry, the objectives of vocational education in Indonesia can be achieved. Fifth, globalization, which is the management of the supply chain, is influenced by global changes. Demand for reliable SMK graduates also comes from various overseas companies such as Malaysia, Japan, and Korea.

According to Zangouinezhad and Moshabaki (2011), the measurement of organizational performance is only focused on financial performance, among others: Schools have many offers of scholarships to students, school finance can cover operational activities of schools, the number of new students is always increasing every year. As the number of students increases, the financial condition of the school is also good.

Acceptance of new students according to Prihatin (2014) is one of the management activities of students that is very important, because if there are no students accepted, then there is nothing to be

handled or regulated in school. The process of receiving new students at Komputama Jeruklegi vocational school is carried out by the promotion section. This promotion section is the teacher/employee who gets the task to succeed PPDB. Then the promotion formed the PPDB committee consisting of five people who served as chairmen, secretaries, treasurers, and two members. The promotion section makes observations and selects community leaders who will become the point center posts. After choosing the point center, the post points the center to match the vision and mission. Pos point center disseminates information to the public regarding the PPDB of the Komputama Jeruklegi vocational school. Prospective new students can fill out and collect the registration form in PPC. Prospective students who have problems with school fees can also consult with PPC to subsequently be able to recommend that prospective students get fee waivers or scholarships.

The PPDB committee has the task of collecting data on prospective students and selecting majors. The goal is for students to choose majors that are following their desires and competencies. Furthermore, the results of the selection will be the material for determining whether new students are in the appropriate direction. Students who are declared accepted then re-register in the registration section and take school uniform material in the school cooperative.

### 2.3 PPDB supply chain

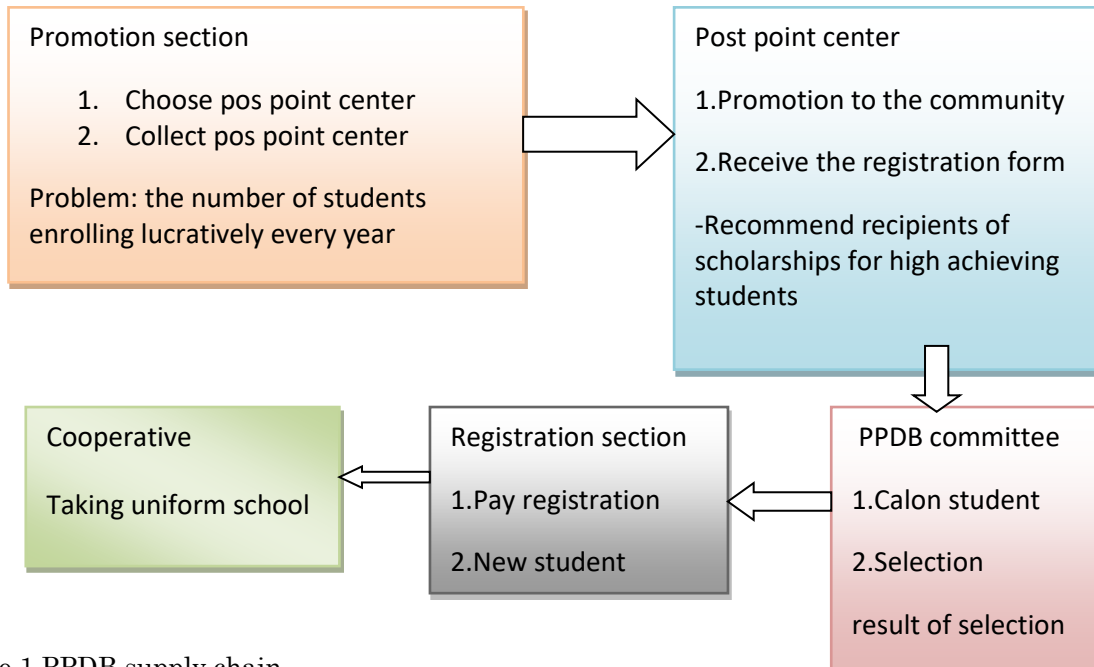


Figure 1 PPDB supply chain

School Enrollment System according to Prihatin (2014) is one of the management activities of students that is very important, because if there are no students accepted, then there is nothing to be handled or regulated in school. The process of receiving new students at Komputama Jeruklegi vocational school is carried out by the promotion section. This promotion section is the teacher/employee who gets the task to succeed PPDB. Then the promotion formed the PPDB committee consisting of five people who served as

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#### **2.4 Pos Point Center**

Pos point center (PPC) is a PPDB strategy implemented by Komputama Jeruklegi vocational schools. Pos point center is PPDB that uses student registration post and information about schools. The pos referred to here is community involvement in this case community leaders in the process of selecting new students. In this PPC the people can obtain important information about Komputama Jeruklegi vocational schools such as the procedures for registration, school programs, and study cost. Komputama Jeruklegi vocational school is a school located in a rural area. Characteristics of people in rural areas are still maintaining cooperation between people. The Komputama Jeruklegi vocational school read this situation as a potential to be able to succeed PPDB, because with this kind of characteristic village people still have more respect for influential people, namely community leaders in the region, such as religious leaders and youth leaders.

The community leaders were chosen to be school partners in the PPDB known as PPC. Community leaders who were members of the PPC came from various circles, such as village heads, religious leaders, junior high school teachers, community leaders, farmers and youth leaders, and others initially chosen based on emotional closeness with the school.

#### **2.5 Causal Loop Diagram ( CLD )**

Causal loop diagram (CLD) model explains how the variables of a system are interrelated (Sechaffernicht, 2006). The CLD model is a model that suppresses attention to the relationship as a result of the variables (components) of the system depicted in a diagram in the form of a curved line with an arrow that connects between one system component and the other. Where at the end of the arrow is affixed a positive sign (+) or S and negative (-) or O sign that describes the influence of variables with one another that changes dynamically in line with the development of time. CLD will help us explain the dynamics of causal relationships that occur in a complex system.

Positive sign (+) S (sameness) indicates that if the variable that influences (as a cause) changes (for example increases), then the variable that is affected (as a result) will change according to the direction of changes in the variables that affect it will increase as well. While the negative sign (-) O (oppositeness) is due to the opposite, meaning that if the variables that influence it to increase, then the variables that

influence it to decrease. In CLD, the arrows will form a loop marked R (reinforcing) and B (balancing). R means strengthening or weakening each other, while B means a balanced or reciprocal relationship.

CLD in helping explain the dynamics of causal relationships that occur in a complex system (Senge, 1992). The CLD model is one of the dynamic system models that will be more appropriate to use than the input-process-output model that we can use in solving organizations and management. Through the CLD model, all components or variables involved both internally and externally from the system concerned are identified. The CLD model explains how the variables of a system are interrelated. CLD is very useful to look at the problem of causal linkages between the elements in the loop in question, the influence of the elements of one element to another, including whether the influence of one element factor with another, including whether the effect is in the same direction or opposite.

### 3. CAUSAL LOOP DIAGRAM THE CAUSES OF PPDB SUPPLY CHAIN MANAGEMENT BARRIERS PPDB SMK KOMPUTAMA JERUKLEGI

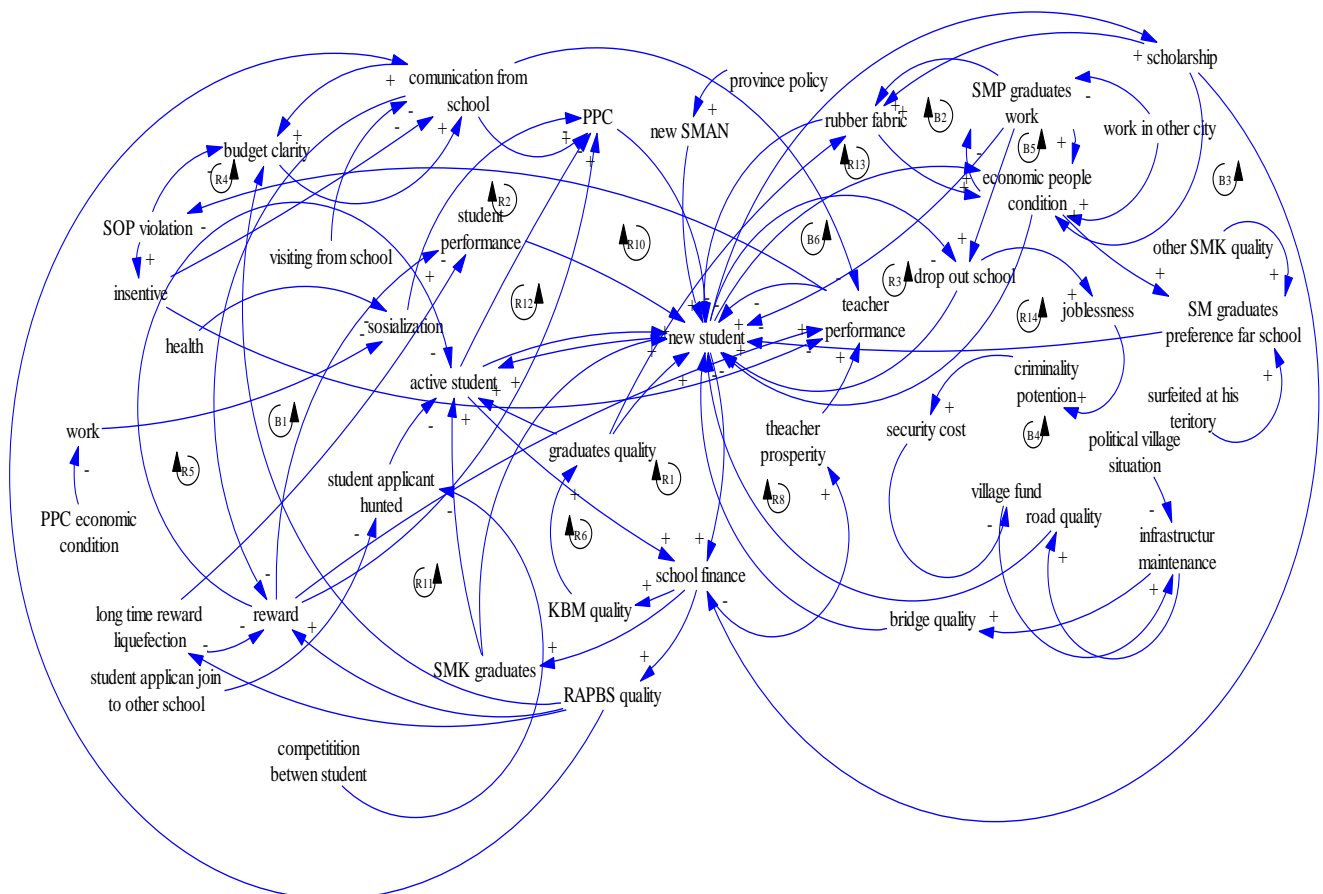


Figure 2 Loop PPDB supply chain barriers

### 3.1 Loop Pos Point Center (PPC)

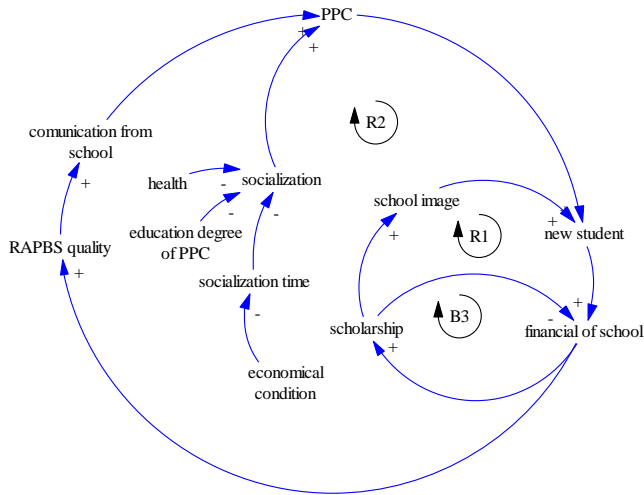


Figure 3 loop PPC

The loop diagram in figure 3 consists of loops, R1, and R2. The contribution of PPC in PPDB in 2011-2015 was high. This is because communication from the school is very good for PPC. It can be seen from the frequent visits and reciprocity that PPC also often comes and communicates with schools. The lack of communication from schools also caused new problems in PPC, namely the late reporting of students who applied to PPC. This problem results in the second data collection of new students, where more than one person registers one student. Whether from fellow PPC or even registered by students.

### 3.2 Loop teacher

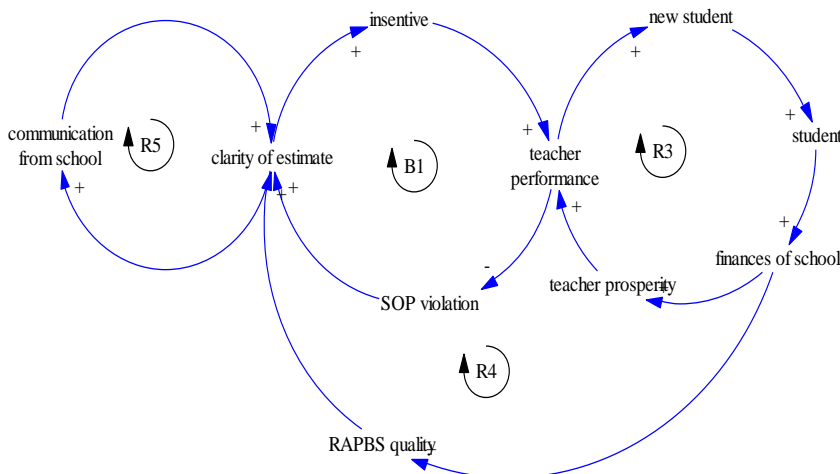




Figure 4 loop teacher

Figure 4 consists of loops R3, R4, R5, and B1. Based on loop R3, R4, R5, and B1, the efforts that can be made to increase teacher contribution to PPDB at Komputama Jeruklegi vocational school in addition to improving communication patterns in schools, can also be done by rearranging the applicable SOP, so that there are no duplicate jobs, especially in activities PPDB. The RAPBS can be a solution for rearranging SOP and rearranging other programs, for example, a new teacher admission program. By rearranging the rules related to teacher acceptance and the application of work contracts for teachers. The frequent changes in teacher formation in schools has resulted in the coordination of the PPDB program being hampered because the teacher's experience with PPDB is also different. It will be easier to form a PPDB team with relatively similar teacher experience.

### 3.3 Loop Student

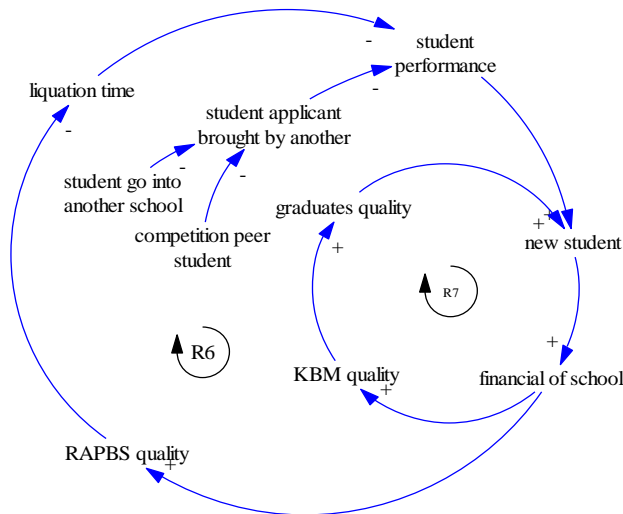


Figure 5 loop student

Loop R6 and loop R7 are student contributions and quality of graduates in increasing the number of new students. So the thing that needs to be done by schools is to improve the quality of teaching and learning activities (KBM). This will have a positive impact on graduates and students who are still active in the socialization of PPDB. It can be said that maintaining the quality of KBM is a valid and inexpensive promotion because students and graduates will recommend their school to the closest junior high school graduates.

### 3.4 Loop Infrastructure

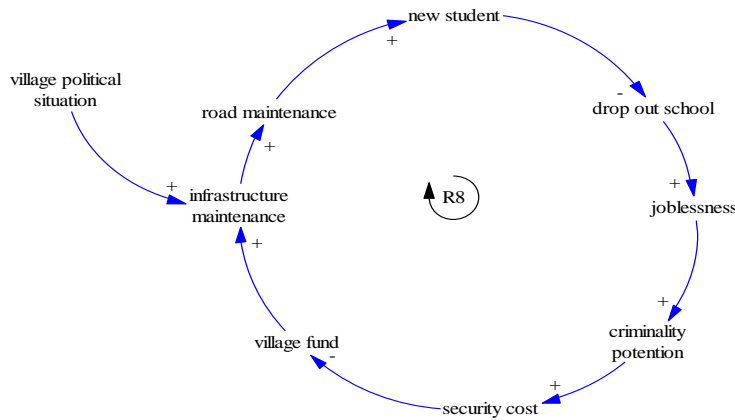


Figure 6 loop Infrastructure

Figure 6 consists of the R8 loop. Loop R8 explains that road quality has an effect on derivation the number of new students. Derivation of new students has an impact on increasing school dropout rates. Middle school graduates who drop out of school increase the number of joblessness. The number of joblessness people in the village caused the potential for crime in the village to increase. The potential for crime affects the increase in security costs in the village. Increased security costs affect the village budget. Village funds affect the maintenance of infrastructure. Infrastructure maintenance affects road quality. Incorrect allocation of village funds resulted in poorly maintained village infrastructure. Lack of infrastructure maintenance results in road damage and bridge breaks. The availability of infrastructure has an impact on the social system and economic system that exists in the community, so infrastructure needs to be understood as the basis for policy making (J. Kodoatie, 2005).

### 3.5 Loop competitor

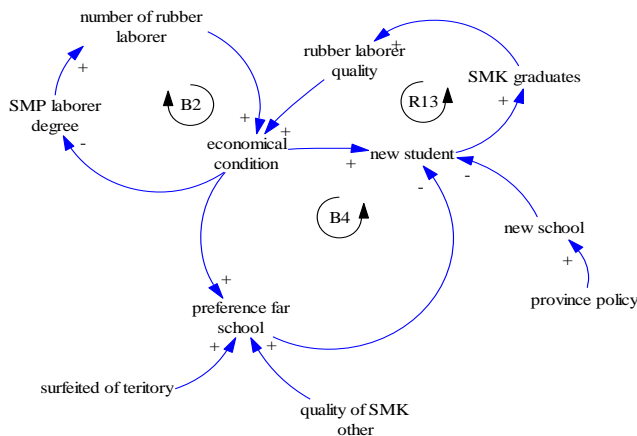


Figure 7 loop competitor

Figure 7 consists of loops, B2, B3, and B4. Loop B1 shows that there are plantations and rubber processing plants that accept junior high school graduates to become workers resulting in a decrease in the number of new students. Even though many new students will have an impact on graduates. Where a rubber processing plant will recruit the output. Some junior high school students will choose to work on rubber plantations and processing plants because they are acceptable.

Loop B2 describes the problem that occurs in junior high school graduates who live not so far from the Komputama Jeruklegi vocational school. The presence of other SMK affects the derivation of new students. This decreasing caused by students choosing schools that are further away because of being bored in school them area. This was also supported by the economic situation of the surrounding communities who worked on increasing plantations and rubber processing plants, so they were able to send their children to schools that were farther away and needed higher transport and pocket money.

Loop B3 shows that the existence of a rubber processing plant should increase the number of new students because of the economic situation of the people increases. However, this has the effect of decreasing new students because some junior high school graduates choose to go to school further away. It is different from the people who work as casual daily laborers and farmers who choose to send their children to the closer school.

Some junior high school graduates work outside the city to improve the family's economic situation. In several villages found domestic servants and building project workers who channel graduates of this junior high school to work outside the city. Especially distribution to the capital city of Jakarta and its surroundings. The presence of competitors is familiar in competition. Where prospective students are free to choose the desired school. Recently happened around Komputama Jeruklegi vocational school is the existence of government policy that seems forced by the establishment of new SMAN in Jeruklegi District. This is inversely proportional to the state of the junior high school graduates in the region which is relatively small. Average junior high school graduates per year around 700 students.

### 3.6 Loop Reward

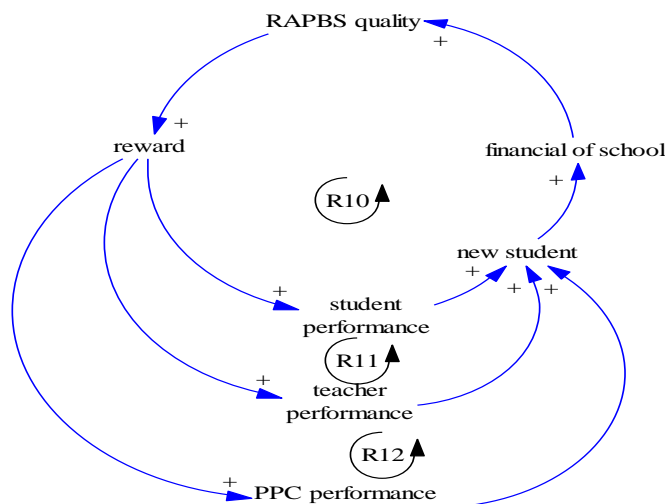


Figure 8 Loop reward

The loop diagram in figure 8 consists of loops R10, R11, and R12. School finance affects the quality of RAPBS. The quality of the RAPBS affects the rewards given by the school to students, teachers, and PPC that bring new students to the magnitude and time of disbursement. Reward affects students, teachers, and PPC in PPDB work. Students, teachers, and PPC influence new students. New students influence school finances.

Reward in PPDB SMK Komputama Jeruklegi is given to PPC, teachers, and students who bring new students to the new school year. Rewards are given in the form of cash and kind. Reward by PPC and teachers is also understood as a form of attention from schools in terms of meeting accommodation in the process of finding new students. The problem related to rewards in PPC is that schools pay less attention to accommodation for communication between PPC with schools. Reporting and coordinating with PPC schools requires communication facilities.

The problem of reward for teachers occurs when the teacher disseminates to the middle school or the community. The teacher in charge complained about the amount of transport and honorariums that were inconsistent so that they were raised. The rewards that are received by teachers who bring students also experience obstacles. The problem is that the amount of reward received is not appropriate due to the incompatibility of data recorded by the committee with data from the teacher carrying the student. The form of reward problems for students is the payment of reward that takes too long. This causes students to keep asking when rewards will be given. This long reward disbursement was due to the slowness of financial officers in submitting disbursements to schools. Rewards that should have been received in July have been delayed until October.

Based on the above problems, the strategy recommendations for increasing the number of new students at Komputama Jeruklegi vocational school are improving school communication with PPC, officers from schools more often visit PPC to obtain information from the community submitted by PPC, improve the quality of RAPBS, especially SOP on PPDB activities for standardized work, to establish the amount of reward consistently and the time of disbursement must be done as quickly as possible and improving communication channels between schools and point center posts in order to run rapid information from PPC, including information technology-based PPDB socialization.

#### **4. CONCLUSION**

The causes of PPDB supply chain management barriers in SMK Komputama Jeruklegi related to PPC include communication issues, the existence of plantations that recruit junior high school graduates, a few number of junior high school graduates, competitor schools, damaged road infrastructure, poor communication channels, and integrated information systems. Meanwhile, the causes of PPDB supply chain management barriers in SMK Komputama Jeruklegi related to teachers involve the unclear Operating Standard Procedures of PPDB for teachers, the quality of the RAPBS resulting in the budget problem. Finally, the student-related causes are too long-awaited disbursement award from the school and fellow students fight over prospective students.

#### **5. MANAGERIAL IMPLICATIONS OF THE STUDY**

By this research, encouraging synergies among schools, government and society must be increased to encourage the junior high school graduates to pursue a higher level. This can be implemented by increasing the allocation of scholarships for underprivileged students to decrease the dropout rate. The declining number of new students is affected by the economic conditions of underprivileged people. Undoubtedly, it takes government strategies and programs to suppress the drop-outs.

Based on the results of this study, the authors recommend the following. The schools need to improve communication with PPC, to heighten the quality of RAPBS and implement SOP consistently, and to supervise the PPDB implementation. Besides, they need to improve the quality of communication channels with PPC and build information systems in schools, especially academic information systems or the one that can integrate the PPDB process with the demands.

For the Government, it is recommended to expand free education programs for high school/ vocational high schools to reduce dropout rates; prohibit plantations and rubber processing plants employing school-age children, and to improve the quality of infrastructure to boost student enthusiasm. Towards the properly-distributed allocation of village funds, the Central Java Provincial Education and Culture Office should carry out in-depth analysis before the establishment of a new school unit to avoid the existence of interest-ridden schools. In fact, the government-owned schools in the area still experience students shortage.

The most recommended model for overcoming the problem of PPDB supply chain management at Komputama Jeruklegi vocational school is to improve the quality of the school budget plan (RAPBS) among which will have an impact on the reward given to teachers, students and PPC. By doing so, performance in PPDB will also increase along with the improvement of students numbers at SMK Komputama Jeruklegi.

## **6. LIMITATIONS AND RECOMMENDATION FOR FURTHER RESEARCH**

This research was conducted to map the causes of supply chain management barriers in SMK. The limitation of this study is the identification of the causes of PPDB barriers using causal loop diagrams emphasized in the operational aspects of supply chain management. Based on the limitations of this study, the recommendation for the next researcher is researching to identify the causes of the obstacles PPDB uses causal loop diagrams on aspects of human resources and marketing.

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