

HUMAN RESOURCE OF PROJECT MANAGEMENT INFORMATION SYSTEM PROJECT AT PT. SYAPRIL JANIZAR

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ABSTRACT

PT. Syapril Janizar is a private company in the field of Engineering Planning consulting services, Management, Research and Studies and Telematics. In each planning project there are several divisions that are employed. At PT. Syapril Janizar Human resources are very limited so that when getting more than one planning project at the same time it is difficult to determine which employees will be hired to which planning project first. There are two planning projects that are carried out by the same person at the Mechanical division stage, causing one of the planning projects not to be completed on schedule. The cause of the work that is not completed according to the schedule because the Project Manager has difficulty knowing the employee who is working on the project or who has not worked on the project because the data in the company only shows the employee's name and division so that not one employee works more than one project finished in time. Based on the problems that exist in PT. Syapril Janizar requires an application to handle problems in the selection of project planning priorities so that the Project Manager can manage the employees who will be hired to handle the priority of the planning project using the Promethee method and also help organize the work of employees so that no employee handles two planning projects at the same time and recruiting new employees when experiencing shortages.

Keywords : Information Systems, Human Resource Management Projects, Decision Making Systems, Promethee Methods, PT. Syapril Janizar

1. INTRODUCTION

PT. Syapril Janizar is a private company in the field of consulting services, Engineering Planning, Management, Research and Studies and Telematics which is based in Bandung, owned and managed entirely by Indonesian experts. PT Syapril Janizar was founded on July 12, 2013 by professionals who were

moved by their conscience to contribute more to their thinking, abilities and competencies in designing, researching and developing potential resources for the benefit of regional regional development and community welfare.

At PT. Syapril Janizar has several divisions including Architect, Planning, Structure, Mechanical Electrical, Tender, Construction Management, Drafter and Estimator. In each planning project there are several divisions employed to complete the planning project. Each division is interrelated in the execution of a project. Based on the results of interviews with Ms. An An Anisarida as the General Manager who also arrived as Project Manager said that human resources at PT. Syapril Janizar is very limited so that when getting a planning project in excess of one project at the same time or being close to Ms. An An it is difficult to determine which existing employees will be hired to which planning project.

Based on the data obtained, on May 2, 2018 to June 13, 2018 there were two projects which were carried out by the same person at the Mechanical division stage, **proyek Perencanaan Apartement Rakyat Rancacili Tahap III** and **proyek Jasa Konsultan Perencanaan Teknis Renovasi Gedung Administrasi Adhyatma** and caused wrong one of the planning projects was not completed according to the estimated schedule. The cause of the work that is not completed according to the schedule estimated because the Project Manager is difficult to find out which employees are working on the project planning or who are not working on the planning project because the data in the company only shows the employee's name and division so that one employee works more than a planning project that results in work not being completed in time.

Based on the above problems, software is needed to handle the problem in choosing priority project planning so that the Project Manager can manage the employees who will be hired to handle the priority of

the planning project using the Promethee method and also help the Project Manager to arrange employee work so that no employee handles two planning projects at the same time and recruit new employees when experiencing a shortage of employees to complete other planning projects so that all the planning projects that are carried out do not experience delays.

1.1 Information System

A system made consisting of components in the organization to present information. [1]

1.2 Promethee Method (Preference Ranking Organization method for Enrichment Evaluation)

Promethee is a method of determining the order (priority) in multicriteria analysis. Allegations of the dominance of the criteria used in Promethee are the use of values in outranking relationships. All parameters that are stated to have a real influence according to the economic outlook. Promethee is included in the family outranking method.[4]

The steps for PROMETHEE calculations are as follows:

1. Determine several alternatives
2. Determine several criteria and outranking or weighting
3. Calculate the dominance of criteria.
4. Determine the type of preference for each of the most suitable criteria based on the data and consideration of the decision maker. This type of preference amounts to six (Usual, Quasi, Linear, Level, Linear Quasi and Gaussian).
5. Calculation of Multi Criteria Preference Index, Entering flow, Leaving flow and Net flow.
6. Ordering results according to the Net Flow value from the largest value to the smallest value

Promethee belongs to the family of outranking methods which include two phases:

1. Building outranking relationships from k
2. The exploitation of this relationship provides an answer to the optimization criteria in the General Manager problems multicriteria parade.

In the initial stage, the value of outranking relationships is based on consideration of the dominance of each criterion. The preference index is determined and the outranking value is graphically presented based on the preferences of the decision maker. For evaluation basic data with the Promethee method are presented as follows:

Table 1 Basic Analysis of Promethee

C	$f_1(\cdot)$	$f_2(\cdot)$	...	$f_k(\cdot)$	...	$f_n(\cdot)$
a1	$f_1(a_1)$	$f_2(a_1)$	...	$f_k(a_1)$	...	$f_n(a_1)$
a2	$f_1(a_2)$	$f_2(a_2)$	...	$f_k(a_2)$	...	$f_n(a_2)$
...
a _i	$f_1(a_i)$	$f_2(a_i)$	...	$f_k(a_i)$	...	$f_n(a_i)$
...
a _n	$f_1(a_n)$	$f_2(a_n)$	...	$f_k(a_n)$	...	$f_n(a_n)$

Preference structures are built on the basis of criteria:

$$\left. \begin{array}{l} \forall a, b \in A \\ f(a), f(b) \end{array} \right\} \begin{array}{l} f(a) > f(b) \Leftrightarrow a P b \\ f(b) = f(b) \Leftrightarrow a I b \end{array}$$

1.2.1 Recommended preference function for application requirements

In the PROMETHEE method there are six forms of preference criteria functions namely Ordinary Type (Usular Criteria), Type Quasi (Quasi Criterion or U-Shape), Linear Type (Linear Criterion or V-Shape), Type of Level (Level Criterion), Linear Type Quasi (Linear Criterion with Indifference) and Gaussian Type. For this study only using the Ordinary Type (Usular Criteria) because the same value is the weight between criteria.

- Usular Criteria

Usular Criteria is a type that does not have a threshold value. This Usular type is considered to have no difference in each alternative, there is an alternative a = alternative b or $f(a) = f(b)$, then the preference value is 0 (Zero) or $P(x) = 0$. If the criteria value between alternatives has a different value, then the preference value is 1 (One) or $P(x) = 1$ for alternatives that have a better value. The function $P(x)$ for this preference is presented in the figure

$$P(x) = \begin{cases} 0, & x \leq 0 \\ 1, & x > 0 \end{cases}$$

Figure 1 Usular Criteria

1.2.2 Threshold or Trend Value

There are 6 types of criteria equations that can be considered in the Promethee method, which can be more easily determined by the value of the tendency or parameter because only 1 or 2 parameters must be determined. Only for Usular types that do not have parameter values.

1. The usual indifference threshold is represented by the character m or q. If the difference value (x) is less than or equal to the indifference value $x \leq m$ then x is considered not to have a difference value $x = 0$.

2. The usual preference threshold is represented by characters n or p. If the value (x) is more than or equal to the preference value $x \geq n$ then the difference has an absolute value $x = 1$.

1.2.2 Graph direction for outrank value

There are three forms used by the Promethee method in sorting, including:

1. Entering flow

Entering flow is the sum of those that have an approaching direction from a node and this is the character of the outward measurement. For each a node value in the graph the value of ranking is determined based on entering flow by:

$$\Phi^-(a) = \frac{1}{n-1} \sum_{x \in A} \varphi(x, a)$$

Figure 7 Formula Entering Flow

1. Leaving flow

While Leaving flow is the number of those that have a direction away from the node a. And this is an outward measurement. As for the way:

$$\Phi^+(a) = \frac{1}{n-1} \sum_{x \in A} \varphi(a, x)$$

Figure 8 Formula Entering Flow

2. Net Flow

So in determining Net flow value is obtained by:

$$\phi(a_1) = \phi^+(a_1) - \phi^-(a_1)$$

Figure 9 Formula Net Flow

The smaller the leaving flow value and the greater the Entering flow, the alternative may not be selected. Ranking in PROMETHEE I is done partially, which is based on values of Leaving flow and Entering flow. While PROMETHEE II includes complex sorting because it is based on the value of Net flow of each alternative, namely an alternative with a greater Net flow value occupies a better ranking.

2. CONTENTS OF RESEARCH

2.1 Problem Analysis

Based on the results of research conducted at PT. Syapril Janizar, found problems, namely:

1. Manager Project has difficulty in prioritizing planning projects when having more than one planning project to be carried out simultaneously, with the existence of a Human Resource Management Information System this project to determine the priority of planning projects will be ranked using the Promethee method.

2. The Project Manager has difficulty finding out which employees have not been hired to handle the project or

who have handled the project so that it is difficult to arrange the employees who will be hired to handle the planning project. The solution given in the system created is making employee recommendations needed to work on planning projects.

2.2 Determining Project Priorities

Determination of project planning priorities carried out in this study is to use PROMETHEE (Preference Ranking Organization Method for Enrichment Evaluation), after which after getting priority project planning will be continued for the selection of employees to be employed. Based on planning project data in table 2.

Table 2 Planning Project Data of PT. Syapril Janizar

Nama Proyek Perencanaan	Harga Proyek	Waktu Pengerjaan	Kebutuhan Manpower	Tanggal Pengerjaan
Proyek A	Rp.197.078.000	6 Minggu	11 orang	01 Mei 2018-17 Juni 2018
Proyek B	Rp.49.800.000	4 Minggu	10 Orang	01 Mei 2018-30 Mei 2018
Proyek C	Rp.45.810.000	4 Minggu	11 Orang	11 Mei 2018-08 Juni 2018

1. Determine Some Alternatives

Determination of alternative values from data is the first step in promethee to find out alternatives to existing criteria. To determine the priority of existing planning projects at PT. Syapril Janizar has several alternatives. Here are some alternatives at PT. Syapril Janizar.

- Price
- Time
- Manpower (Employee Needs)
- Work Date

2. Determining Some Criteria and Outranking Criteria

For each alternative it has a weight that can be used as a parameter for selecting planning projects. The following are the assessment weights of priority project planning at PT. Syapril Janizar:

- Price Criteria

Table 3 Price Criteria

Kriteria Harga	Bobot Penilaian
Rp.20.000.000-Rp.70.000.000	1
Rp.70.000.001 – Rp.200.000.000	2
Rp200.000.001 – Rp.500.000.000	3
\geq Rp.500.000.001	4

- Time Criteria

Table 4 Time Criteria

Kriteria	Bobot Penilaian
≤4 Minggu	4
5 Minggu – 12 Minggu	3
13 Minggu – 24 Minggu	2
≥25 Minggu	1

- Manpower Criteria

Table 5 Manpower Criteria

Kriteria	Bobot Penilaian
≤ 5 Orang	4
6 orang - 10 orang	3
11 Orang – 15 Orang	2
≥ 16 Orang	1

- Working Date Criteria

Table 6 Working Date Criteria

Kriteria	Bobot Penilaian
< 1 Bulan	3
1 Bulan – 3 Bulan	2
>3 Bulan	1

Project data taken based on table 2, refers to the formula so that the project data is obtained in the following table

Table 7 project planning data

No	Kriteria	Nilai		
		Proyek A	Proyek B	Proyek C
1	Harga	Rp.50.000.001 – Rp.200.000.000	Rp.20.000.000 - Rp.50.000.000	Rp.20.000.000 - Rp.50.000.000
2	Waktu	5 Minggu – 12 Minggu	≤4 Minggu	≤4 Minggu
3	Manpower	11 Orang – 15 Orang	6 orang - 10 orang	11 orang - 15 orang
4	Tanggal Pengerjaan	< 1 bulan	< 1 Bulan	1 Bulan – 3 Bulan

Based on the data in table 7 if the data is converted based on agreed criteria, the data obtained can be seen in table 8 as follows

Table 8 Conversion Result Data based on assessment weights

No	Kriteria	Nilai		
		Proyek A	Proyek B	Proyek C
1	F(1)	2	1	1
2	F(2)	3	4	4
3	F(3)	2	3	2
4	F(4)	3	3	2

3. Calculating the dominance of criteria.

After getting the weight of the value according to the alternative, then the value of domination will be

calculated by comparing between one alternative with another alternative, by reducing the first alternative value with the second alternative, then calculating the value of preference according to the type of preference used. The type of criteria used for promethee calculations is the usual criteria (Usular Criteria). For usual formula the criteria can be seen in Figure 1.

The following calculation looks for the dominance values below:

a. F₁ = Price

F₁ (Proyek A, Proyek B)

$$x = F_1(\text{Proyek A}) - F_1(\text{Proyek B})$$

$$x = 2 - 1$$

$$x = 1$$

because $x > 0$

Then P(x) = 1

b. F₂ = Time

F₂(Proyek A, Proyek C)

$$x = F_2(\text{Proyek A}) - F_2(\text{Proyek C})$$

$$x = 3 - 4$$

$$x = -1$$

because $x \leq 0$

Then P(x) = 0

c. F₃ = Manpower

x = F₃(Proyek A) - F₃(Proyek B)

$$x = 2 - 3$$

$$x = -1$$

Because $x \leq 0$

Then P(x) = 0

d. F₄ = working date

x = F₄(Proyek A) - F₄(Proyek B)

$$x = 3 - 3$$

$$x = 0$$

because $x \leq 0$

Then P(x) = 0

After calculating the dominance value for each alternative, the results can be seen in the following table

Table 9 Preference value for all Criteria

Kriteria	proyek a, proyek b		proyek a, proyek c		proyek b, proyek a		(proyek c, proyek a)		(proyek c, proyek b)			
	x	F(x)	x	F(x)	x	F(x)	x	F(x)	x	F(x)		
Harga	1	1	1	1	-1	0	0	0	-1	0	0	0
Waktu	-1	0	-1	0	1	1	0	0	1	1	0	0
Manpower	-1	0	0	0	1	1	1	1	0	0	-	0
Tanggal Pengerjaan	0	0	1	1	0	0	1	1	0	0	0	0

4. Calculate the Multi Criteria Preference Index

Multi criteria preference index is determined based on the weight average of function the Pi preference this formula refers to the formula in the figure

$$(a, b) = \frac{1}{\text{many criteria}} (f_1 + \dots + f_n)$$

Figure 10 Multi Criteria Preference Index Calculation Formula

(a, b) is the intensity of the decision maker's preference which states that both of the alternatives b with simultaneous consideration of the overall criteria. This can be presented with a value between 0 and 1, with the following conditions:

- a. (a,b) = 0, show weak preferences for alternatives a > alternative b based on all criteria.
- b. (a,b) = 1, shows a strong preference for alternatives a > alternative b based on all criteria.

Based on the data in Table 10 using the formula in figure 11 so that the Multi Criteria Preference Index is obtained. Here's the calculation

1. A project, B project

$$= \frac{1}{4}(1 + 0 + 0 + 0)$$

$$= \frac{1}{4} \times 1 = 0.25$$

So, preference multicriteria indeks A project to B project value is 0.25.

2. A project, C project

$$= \frac{1}{4}(1 + 0 + 0 + 1)$$

$$= \frac{1}{4} \times 2 = 0.5$$

So, preference multicriteria indeks A project to C project value is 0.5.

3. B project, A project

$$= \frac{1}{4}(0 + 1 + 1 + 0)$$

$$= \frac{1}{4} \times 2 = 0.5$$

So, preference multicriteria indeks A project to B project value is 0.5.

4. B project, C project

$$= \frac{1}{4}(0 + 0 + 1 + 1)$$

$$= \frac{1}{4} \times 2 = 0.5$$

So, preference multicriteria indeks B project to C project value is 0.5.

5. C project ,A project

$$= \frac{1}{4}(0 + 1 + 0 + 0)$$

$$= \frac{1}{4} \times 1 = 0.25$$

So, preference multicriteria indeks C project to A project value is 0.25.

6. C project, B project

$$= \frac{1}{4}(0 + 0 + 0 + 0)$$

$$= \frac{1}{4} \times 0 = 0$$

So, preference multicriteria indeks A project to B project value is 0.

From the calculation of multicriteria preference index can be presented in the following table form.

Table 10 Table Index Preference Multicriteria

	Proyek A	Proyek B	Proyek C
Proyek A	-	0.25	0.5
Proyek B	0.5	-	0.5
Proyek C	0.25	0	-

5. Calculate Leaving Flow

At this stage is calculating leaving flow. Leaving flow is the number of curved line values that have a direction away from node a and this is the character of outranking measurements. The leaving flow formula can be seen in Figure 7.

Based on table 10 with the leaving flow calculation formula in Figure 7, the calculation of leaving flow is generated below

- A project

$$= \frac{1}{3 - 1} (0.25 + 0.5)$$

$$= \frac{1}{2} \times 0.75$$

$$= 0.375$$

so, leaving flow A project value is 0.375

- B project

$$= \frac{1}{3 - 1} (0.5 + 0.5)$$

$$= \frac{1}{2} \times 1$$

$$= 0.5$$

so, leaving flow B project value is 0.5

- C project

$$= \frac{1}{3 - 1} (0.25 + 0)$$

$$= \frac{1}{2} \times 0.25$$

$$= 0.125$$

so, leaving flow C project value is 0.125

After the calculation of leaving flow is obtained, then it is presented in a table that can be seen in the following table.

Table 11 Calculation Leaving Flow Table

Name of Project	leaving flow value
Proyek A	0.375
Proyek B	0.5
Proyek C	0.125

6. Calculate Entering Flow

At this stage is counting the entering flow. Calculation of Entering Flow can be seen in Figure 8

Based on table 11 with the entering flow calculation formula, entering flow calculation is generated below

- A project
$$= \frac{1}{3-1} (0.5 + 0.25)$$
$$= \frac{1}{2} \times 0.75$$
$$= 0.375$$

so, entering flow value A project is 0.375

- B project
$$= \frac{1}{3-1} (0.25 + 0)$$
$$= \frac{1}{2} \times 0.25$$
$$= 0.125$$

so, entering flow value Proyek B is 0.125

- C project
$$= \frac{1}{3-1} (0.5 + 0.5)$$
$$= \frac{1}{2} \times 1$$
$$= 0.5$$

so, entering flow value C project is 0.5

After entering flow calculation is obtained, then entered into a table that can be seen in table 12.

Table 12 Calculation Entering Flow table

Name of Planning Project	entering flow value
Proyek A	0.375
Proyek B	0.125
Proyek C	0.5

7. Calculate Net Flow

This stage is the final stage of promethee for priority setting. Based on table 11 and table 12 using the formula in figure 9 so that the net flow value is obtained as follows

$$\begin{aligned} \text{A project} &= 0.375 - 0.375 = 0 \\ \text{B project} &= 0.5 - 0.125 = 0.375 \\ \text{C project} &= 0.125 - 0.5 = -0.375 \end{aligned}$$

Based on the results of the calculation of net flow above if inserted into the table can be seen as table 13 below

Table 13 Ranking Promethee Method Table

Alternative	Leaving Flow	Entering Flow	Net Flow	Ranking
Proyek A	0.25	0.625	0	2
Proyek B	0.5	0.25	0.375	1
Proyek C	0.25	0.25	-0.375	3

Based on data in table 13 If Net Flow is minus, it means that the value of entering flow is greater than leaving flow. This means that from the comparison of several alternative criteria it is no better than the other alternatives. Based on the value of Net Flow, the order of priority of project planning can be seen in table 14.

Table 14 Order Priority Planning Project

Name of Planning Project	Priority Order
Proyek B	1
Proyek A	2
Proyek C	3

Based on table 14 above, the ranking of each alternative is obtained. Alternative B project or Perencanaan Gedung Rusun I (Apartemen Rakyat Cross Tahap III) have the highest net flow so that you get the top rank, then **Proyek Perencanaan Gedung Rusun I (Apartemen Rakyat Cross Tahap III)**. It is recommended to be a priority for project planning, which is then carried out by employee selection to work on the Planning Project. Following **data proyek Perencanaan Gedung Rusun I (Apartemen Rakyat Cross Tahap III)** in the table 15.

Table 15 Data Proyek Perencanaan Gedung Rusun I (Apartemen Rakyat Cross Tahap III)

Name of Planning Project	Project Price	Working Date	Manpower
Perencanaan Gedung Rusun I (Apartemen Rakyat Cross Tahap III)	Rp.49.800.000	4 week	10 person

2.3 Determine Employee Recommendations

After getting the next project planning priority is the stage of determining employee recommendations that will be chosen to work on the priority of the project. The following is a priority project planning table along with details of the number of needs of people and their divisions.

Tabel 16 Priority Data Project

Nama Proyek Perencanaan	Kebutuhan Manpower
Perencanaan Gedung Rusun I (Apartemen Rakyat Cross Tahap III)	<ul style="list-style-type: none"> ▪ 2 orang divisi Arsitektur ▪ 1 orang divisi Elektrikal ▪ 1 Orang divisi Mekanikal ▪ 2 orang divisi surveyor ▪ 2 orang divisi Drafter ▪ 1 orang divisi Estimator ▪ 1 orang divisi Administrasi

- In the initial stage, first choose employees in accordance with the division needed to work on the planning project. For example, the chosen division is the Architecture division. Below is a table of names of employees whose architecture divisions.

Table 17 Architect Division Employee Table

No	Nama Karyawan	Divisi	Status	Total Proyek yang sudah dikerjakan
1	Laraswati Kusumadewi	Arsitektur	Mengerjakan Proyek	2
2	Rianto Prabowo,ST,MT.	Arsitektur	Mengerjakan Proyek	1
3	Arif Kamaludin Firdaus Akbar,ST.	Arsitektur	Tidak Mengerjakan Proyek	2
4	Feri Suryaman,ST.	Arsitektur	Tidak Mengerjakan Proyek	2
5	Belonia Prihandini Utami,S.Ars.	Arsitektur	Tidak Mengerjakan Proyek	3
6	Imam Ayituri Primadi,S.Ars.	Arsitektur	Tidak Mengerjakan Proyek	1
7	Nadiah Khairunnisa ahmad,S.Ars.	Arsitektur	Tidak Mengerjakan Proyek	1

After that, selected employees who are not working on a planning project to do sequencing.

Table 18 Architectural Division Employee that has not worked on the Planning Project Table

No	Nama Karyawan	Divisi	Status	Total Proyek yang sudah dikerjakan
1	Arif Kamaludin Firdaus Akbar,ST.	Arsitektur	Tidak Mengerjakan Proyek	2
2	Feri Suryaman,ST.	Arsitektur	Tidak Mengerjakan Proyek	2
3	Belonia Prihandini Utami,S.Ars.	Arsitektur	Tidak Mengerjakan Proyek	3
4	Imam Ayituri Primadi,S.Ars.	Arsitektur	Tidak Mengerjakan Proyek	1
5	Nadiah Khairunnisa ahmad,S.Ars.	Arsitektur	Tidak Mengerjakan Proyek	1

Ordering employees who will work on planning projects is seen from the number of planning projects that have been done. Employees who have worked on planning projects at least in each division will be ranked top on employee recommendations for working on

project planning while employees who have worked on planning projects will at most be the final rating on employee recommendations. At this stage all employees in this Architecture division will be compared using the value of the project that has been done by each employee. Then the results of the comparison are in the table

Tabel 19 Tabel Karyawan hasil Pengurutan

No	Nama Karyawan	Divisi	Status	Total Proyek yang sudah dikerjakan
1	Imam Ayituri Primadi,S.Ars.	Arsitektur	Tidak Mengerjakan Proyek	1
2	Nadiah Khairunnisa ahmad,S.Ars.	Arsitektur	Tidak Mengerjakan Proyek	1
3	Arif Kamaludin Firdaus Akbar,ST.	Arsitektur	Tidak Mengerjakan Proyek	2
4	Feri Suryaman,ST.	Arsitektur	Tidak Mengerjakan Proyek	2
5	Belonia Prihandini Utami,S.Ars.	Arsitektur	Tidak Mengerjakan Proyek	3

3. CONCLUSION

3.1 Conclusion

Based on the results of the implementation and testing that has been done on the final project with the title "Human Resource Management Information System Project at PT. Syapril Janizar "so conclusions can be drawn including the following:

- Human Resource Project Management Information System at PT. Syapril Janizar assisted Project Managers in determining more prioritized projects to arrange for employees to be hired to handle the planning project.
- Human Resource of Project Management Information System at PT. Syapril Janizar helps Project Managers know employees who have handled planning projects or who have not handled planning projects by providing employee recommendations.

3.2 Advice

Human Resource of Project Management Information System at PT. Syapril Janizar there are still many shortcomings that are built, therefore improvements and development are needed. As a suggestion that the Human Resource Management Information System Project at PT. Syapril Janizar to be better as follows:

- Open a job vacancy facility for HRD that is connected with social media so that HRD can immediately announce job vacancies on social media through the system.
- Display to make it more attractive.

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