Designing a Performance Measurement System at Science Technopark using the European Union Model

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Keywords: Performance Measurement System, Science Techno Park, Science Techno Park Dimension, Institut

Teknologi Sepuluh Nopember Science Techno Park, Coffee, and Cocoa Science Techno Park

Abstract: The development of Science Techno Park in Indonesia has a goal to increase economic growth and strengthen

the role of science and technology. The European Union, as a country that has known Science Techno Park since the mid-1960s, in 2013 compiled the Science Techno Park model and stated that the success of the Science Techno Park was influenced by three dimensions, namely economic, sustainability and process improvement. So that the adaptation of the European Union Science Techno Park model to Science Techno Park in Indonesia is made in designing the performance measurement system. The design of the performance measurement system consists of the formulation of indicators on the dimensions of the Science Techno Park based on applicable rules for the Science Techno Park Indonesia including the assessment of the maturity of the Science Techno Park, display performance indicator properties, and trials at the Science Techno Park in Indonesia. The results of the trial show that Science Techno Park in Indonesia already has targets and documents on performance, but there are still a number of targets and realization that do not have data

availability

1 INTRODUCTION

According to the World Economic Forum in 2011, Indonesia is in the category of countries that are at the efficiency-driven stage so that they will try to develop to be in an innovation-driven position. However, Indonesia has a low technological readiness [1]. Therefore President of the Republic of Indonesia declared Nawacita as a nine priority agenda implemented during his administration, one of which reads. "Increasing people's productivity and competitiveness in international markets so that the Indonesian people can advance and rise together with the nations Other Asia." The 6th Nawacita program refers to the development of science technology parks in areas with the latest infrastructure and facilities. The development of science technology park aims to increase economic growth and strengthen the role of science and technology in economic development by promoting a culture of innovation and business competitiveness [2].

During the three years of development of Science Techno Park, of course, many developments and performances have been carried out. Based on Presidential Regulation No. 106 of 2017 concerning the Development of the Science Technology Area in article 24 regarding quality assurance of KST management, it is necessary to have a registration, assessment, giving recommendations, ranking, guidance, and supervision [3]. Quality assurance at Science Techno Park is carried out by the Ministry of Research, Technology, and Higher Education. However, there is no performance evaluation on the internal Science Techno Park on each performance indicator.

The development of Science Techno Park in the European Union began in the mid-1960s to the 1970s. So that Science Techno Park in the European Union is familiar with the characteristics and failures and successes of Science Techno Park. So the European Commission developed the Science Techno Park model composed of government, academia, and business which formed on three dimensions that led to the success of Science Techno Park, namely the dimensions of economic improvement, sustainability, and the process dimension to achieve economic improvement as well as sustainability [4]

Indonesia, as a country that has recently developed Science Techno Park, requires a performance measurement model. Given the need for performance measurement and keeping in mind that the Science Techno Park model developed by the European Union is ahead of Indonesia, the European Union Techno Park model prepared by the European Commission, Directorate-General for Regional and Urban Policy can be a guide for Science Techno Park in Indonesia which is under development. Performance measurement using the European Union's Techno Park model can be used as a basis for providing recommendations, ranking, assessing, and monitoring on Science Techno Park. Against this background, this study aims to determine the dimensions of the Science Techno Park based on the European Union Techno Park model, to know the rules related to Science Techno Park, to map the rules and to assess the maturity of the Science Techno Park dimensions, to design a Science Techno performance measurement system Park in Indonesia, and know the results of performance measurement trials at the Sepuluh Nopember Institute of Technology and Coffee and Cocoa Science Techno Park.

1.1 First Section

Data collected at this stage are the dimensions of the Science Techno Park based on the European Union's Techno Park model and the rules relating to Science Techno Park. Data collection is done by brainstorming on the data needed

1.2 Model Development

The stages of developing a performance measurement system model at Science Techno Park using the European Union model consist of:

- 1. Mapping the Rules of Science Techno Park against the Dimensions of Science Techno Park
- 2. Compilation of Performance Indicators
- 3. Designing Performance Indicator Properties
- 4. Performance Indicator Validation and Performance Indicator Properties
- 5. Designing a Performance Measurement Dashboard

1.3 Testing The Model

The model testing phase aims to find out whether the designed model can be applied to Science Techno Park as well as to find out the results of performance measurements at the Science Techno Park Sepuluh Nopember Institute of Technology and Coffee and

Cocoa Science Techno Park. There are two processes carried out in the pilot phase, namely weighing and measuring the achievement of the performance of Science Techno Park. Weighting is done by pairwise comparison by the expert at the relevant Science Techno Park.

2 MODEL DEVELOPMENT

2.1 Data Collection

The data needed to develop a performance measurement model includes the direction of the development and development of Science and Technology based on direction from BAPENNAS, goals, objectives, and functions of Science Techno Park based on Republic of Indonesia's Presidential Regulation Number 106 Year 2017, and maturity assessment for Science Techno Park compiled by Ministry of Research, Technology and Higher Education.

2.2 Model Development

Model development begins with mapping the rules of Bapennas and the Republic of Indonesia's Presidential Regulation No. 106 of 2017 to the Science Techno Park dimension, mapping the maturity assessment of the Science Techno Park dimension as well as compiling performance indicators from the mapping results, then adjusting to the rules of the Bapennas and the Republic of Indonesia's Presidential Regulation Indonesia Number 106 Year 2017.

Table 1 Results of Arrangement of Rating Elements Based on Mapping Results

Index	Dimension	Index	Rating Element
		1.1	Tenant and client
			served
		1.2	Output Science
			Techno Park
	Economic	1.3	Startup income
1	Improveme	1.4	Increase in start-up
	nt		capital
		1.5	Science Techno
			Park Revenue
		1.6	Technology
			Transfer
		2.1	Tenant with
	Sustainabilit		regional potential
2	Sustamadini	2.2	Support from
	У		universities and
			research institution

Index	Dimension	Index	Dating Flament
maex	Difficusion	2.3	Rating Element Applied Research
		2.3	
		2.4	and Development
		2.4	Network with
			regional, national,
		2.5	international
		2.5	Financial
			independence of the
			management
			organization in
			operational
			activities
		2.6	Investments in the
			development of
			Science Techno
			Park
		2.7	New Technology
		2.8	Science Techno
			Park field
		3.1	Integration between
			the production
			process and
			preparation with
			marketed products
			and services
3	Process	3.2	Managers
)	Process	3.3	Partners
		3.4	Development of
			tenants
		3.5	Branding Science
			Techno Park
		3.6	Completeness of
			supporting facilities
	ENCE	AN	

Table 1 is an assessment element formed based on the results of the mapping of rules based on the Bapennas and Presidential Regulation of the Republic of Indonesia in 106 of 2017 relating to Science Techno Park and mapping of maturity assessment on the Science Techno Park dimension. For each assessment element formed, there are indicators used to measure performance in Science Techno Park.

Table 2 Performance Indicators

Index	Indicator	Unit
1.1.1	Number of tenants who	tenant
	receive services/facilities/	
	training / technical assistance	
	in Science Techno Park	
1.1.2	Number of clients outside the	partners /
	incubation tenant who receive	clients
	services/facilities/ training /	
	mentoring Science Techno	
	Park	
1.2.1	Number of new startups	startup
	formed	

1.2.2 Number of spin-off companies (accumulated) 1.3.1 Average start-up income in the current year of the 1.4.1 The amount of start-up capital that is increased to increase turnover and asset value through business cooperation with the industry 1.5.1 Total Science Techno Park income per year 1.5.2 Total contributions of Science Techno Park to the parent agency 1.6.1 Number of research technology applied to tenants/clients 2.1.1 Number of colleges and research institutions to support the potential of areas 2.2.1 Number of colleges and research institutions to support the development of Science Techno Park 2.3.1 Total Applied Research and Development is carried out 2.4.1 Total collaboration with regional institutions (in the form of employment contracts) 2.4.2 Number of collaboration with international institutions (in the form of employment contracts) 2.4.3 Number of collaboration with international institutions (in the form of employment contracts) 2.5.1 Percentage of the budget obtained from Science Techno Park services and the contribution of partners outside the parent institution to the total operating budget of Science Techno Park services and the contribution of partners outside the parent institution to the total operating budget of Science Techno Park 2.6.1 Amount of funds for the investment program facilities development 2.6.2 Percentage of program facilities development 2.6.3 Percentage of proof of land ownership for Science 2.8.1 Existence of proof of land ownership for Science 2.8.1 Existence of proof of land ownership for Science			
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To don	In diameter	T T:4
Index	Indicator	Unit
3.1.1	Percentage of products and	percent
	services that can be accepted and utilized by the	
	community	
3.2.1	Number of managers of	people
3.2.1	Science Techno Park	people
3.2.2	Percentage of certified	norcont
3.2.2	managers	percent
3.2.3	Number of meeting managers	meeting
3.2.3	to improve manager	meeting
	communication	
3.2.4	Number of HR development	programs
3.2.4	programs/managers	programs
	implemented	
3.2.5	Number of HR training	programs
3.2.3	(certification) development	programs
	programs implemented	
3.3.1	Number of active and	MoU
3.3.1	implemented MoUs that	MOU
	reflect the completeness of	
	the Academic, Business,	
	Government, and Community	
	(ABGC) partner	
3.4.1	Number of workshops, focus	workshop
3.4.1	group discussions (FGD),	workshop
	seminars conducted to	
	improve the competence of	
	tenant	
3.4.2	Number of research,	facilities
3.1.2	development, and technology	identities
	business facilities to support	
	the basic functions and	
50	services of Science Techno	LECHI
	Park	
3.4.3	Number of innovation	services
	services (R&D, technology	
	transfer services, specialized	
	high-value scientific	
	equipment)	
3.5.1	Percentage of internet and	percent
	website utilization as media	1
	branding and information	
3.5.2	Number of socialization and	program
	promotion programs for the	F - 3
	Science Techno Park	
	branding of the community	
3.5.3	Number of conferences,	conferences
	business meetings, business	
	matching	
3.5.4	Number of contracts resulting	contracts
	from conferences, business	
1	meetings, business matching	
2.61		
3.6.1	Existence of a meeting room	space
3.6.1	Existence of a meeting room Existence of secretariat	space space
3.6.2	Existence of a meeting room Existence of secretariat services	
	Existence of a meeting room Existence of secretariat	

Index	Indicator	Unit
3.6.4	The existence of a cafe and	space
	recreation facilities	
3.6.5	The existence of the	space
	exhibition center	

Table 2 is a performance indicator that is formed based on the results of the mapping of maturity assessment of the Techno Park dimensions and adjusted to the rules that apply to Science Techno Park. From the performance indicators formed, then the performance indicator properties are compiled, which include the nature of the measurements, the frequency of measurements, the frequency of reviews, formulas, and data sources. The majority of measurement properties are higher is better, except for the Science Techno Parkland valuation element, and the supporting facilities are zero one. The measurement frequency is adjusted to the maturity assessment conducted by the Ministry of Research, Technology, and Higher Education, which is quarterly so that the average measurement frequency is also done quarterly. While the frequency of reviews is done per semester. The formula is a formula used to calculate performance indicators. And the data source is a document that is needed to calculate performance achievements.

After the performance indicators and performance indicator properties are formed, then an expert is validated to determine whether the performance indicators and performance indicator properties that are formed are valid. If it is considered valid by an expert, then a dashboard of performance measurement is designed to help in measuring performance.



Figure 1 Home Page Dashboard



Figure 2 Menu Page Dashboard

Timesi	Sober	Elegas conitains	Sober	Letters	Sature	104	Seber	Tarret	Zarigai	Property	Indikator Terbobos	Pencagulan	Pencaguian
	\$22 115	Email product	577 ITS	Section where the new desirior	22.00		SEPTE	- mage	,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,	- 6	HP H3	Dissert 577 (75	Alber STP 275
		Zenary dan kilan terlapani	0,092	peligracas fini li tai training pedangingan skela di Science Sector Pork	nur	higher is better	0,223			HDEVIOR	#DEV/01		
				Partiah Miles 61 har tenent inforbest yang mendepatkan pelapanan Sauli sauli salah jegandangangan Sulawa Partina Parti	mits Mier	higher is better	0,167			MDEV/01	ADIV/01		
		Outest Science Steine Park	0.189	Nation communications yang redemok	money	higher is better	0,933			HDEV/OF	HOUVES		
teninataran			0,110	hedds personner hard spin-off tetremisk (skresslest)	personan	higher is better	0,167			*DEVICE	ADDV/01		
Rizeoni	0,243	Peodegasias contrip	0,041	Rara-cas produjusas chor up pada situs bejutas	rapids	higher is:	1,000			HDEV/OI	HOUV/OI	*DEVICE	
		Penesbehan sodal storrup	0,196	Patilah model : norr up yang benasbah untuk meningkatkan otsust dan tillal sasi dengan adanya kerjawan biantu dengan industri	rapish	higher is better	1,000			*DEV/08	ADDV/02		
		Dentantas Science Science Park	0,333	Soci pedapuas Science Sorine Acrit per satus	rapids	higher is better	0,150			HDEV/OI	HDEV/OF		
		- Company		Justish kontribusi Science Dickno For hispada lesbaga induk	ruplah	higher is beter	0,250			*CCV/01	400V/01		
		Transfer televologi	0,149	hedeh teknologi havil penelitian yang diaphilasikan be arusur bilas	peretition	higher is better	1,000			HDEV/OI	HOEV/OF		
		Severe dengan potensi daerah	0,206	fustals secont yang seedulrung potensi daesah.	Nurr	higher is better	1,000			*CCV/01	ADDIVIOR		
				helds perpense ringgi der lesbags pendition schuk medulung pengesbangan Science Parks Park	leshaga								
		Dukongan pergunuan tinggi dan testaga perabiskan	0,088	Suidat perguran ringgi yang sendakung pengesbangan Shikrov Rinton Park	lesbegs	higher is better	1,000			MDEA/OF	ADEV/OF		
			Sedah Sebaga pendikian yang mendakang pengenbangan Di krov Dickso Parit	lesbaga	1								
	Applied Research and Development	0,116	Total applied Basers k and Zene leptons techniques	rise	higher is better	1,000			*CCV/01	HOUVE .			
			hasiah kerjanasa dengan lesbaga regional (dalam bentuk kontrak kesja)	lesteps	higher is better	0,607			*DEVICE	ACKIV/O			
		Never k denger regional, succosal, international	0,091	Marin be brack degas testags solved (bras bend toros):	Seabaga	higher is better	0,303			*CCV/OI	HOUVE .		
				funish kerjasana dengan lembaga Internasional (dalam bentuk kembala kerjal	Jenhera	higher is better	0,090			errye	400V/F		

Figure 3 Scoring Page Science Techno Park ITS

$\overline{}$		Coffee and Cocoa Sc		schne Park										-
Disensi	Select COSTP	Depen perilbian	Sebet CCSTP	Indikace	Senses	Stát	Total CCSTP	Tape	Zechoni	Zercapsis 6	Indikaser Terbobos CCSTP	Perception Diseasi CCSTP	Pencapulan AUDA CCTTP	
		Zever de klie selenei	0.002	Somish Ameri yang mendepakan pelapasan Saidian mining pendampingan mbala di Srimor Daring Park	Distant.	Algher is Senter	0,833			100V.01	10000			
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		Outros Science Zechno Park	0.100	Susisk corrup ben yang sebessik	zwrsp	Algher is: Switer	0,833			1007001	40000			
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		Penambahan model oters up	0,196	Sumbh modd mer up yang benanbah sanak menlegiarian omor den mini mer dengen adanya kerjesama bisnis dengen seduani	mpté	higher is better	1,000			*GEV.EI	*DECE			
		Pendapatan Science Zechno Aust	9,333	Tind pedapate Science Salmo And per tabus	mpid.	Juglar Iz Seper	0,833			100000	100000			
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		Transfer teterotogi	0,149	Jumish seknologi hasil pendirian yang dapilikasikan be semen Mum	pendidas	higher is	1,000			10000	10000			
		Zeverr dengan potensi demb.	0,208	Jumish Arran' yang mendalang potenti danah	tenent	Algher is better	1,000			400VB1	100/01		1	
				Sonish perperan ringgi dan lembaga pendirian untuk mendalang pengenbangan Srienus Tarlino Auril	Senbaga							1		
		Dokungen pergunuen tinggi dan Jendaga peratirias	0,000	Tomish pergarase Singal yang mendukung pengembangan Science Zeolme Park	Senbaga	Algher is Jener	1,000			400V0	10000			
				Sucial Serbaga pendities yang mendulung pengenhanpan Science Tachto Park	Senbaga	1								
		Applied Research and Development	0,116	Total applied Research and Development techniques	dat	higher is	1,000			10000	10000	1		
				Surish Sejasana dengan Serbaga regional (dufan Sental:	lembaga	higher is	0,574			HODE OF	40000	1		

Figure 4 Scoring Page Coffee and Cocoa Science Techno Park

Figure 1, Figure 2, Figure 3, and Figure 4 are some of the views on the dashboard measuring the performance of Science Techno Park. Figure 1 shows the first page that appears on the dashboard as the home page. Figure 2 shows the menu on the dashboard. There are four menus provided, namely the Science Techno Park dimension menu, the Performance Indicator menu, the Performance Indicator Properties menu, and the Scoring System menu. Figures 3 and 4 are the views on the Scoring System for Science Techno Park at the Sepuluh Nopember Institute of Technology, and Figure 4 shows the scoring system for Coffee and Cocoa Science Techno Park

Scoring on the performance assessment of Science Techno Park can be done by entering the target value and realization in the target and realization column. After completing the target values and realization, the dashboard will process the results of the achievement of the performance of Science Techno Park.

Dashboards can also be used by Science Techno Park other than the Science Techno Park of the Sepuluh Nopember Institute of Technology and Coffee and Cocoa Science Techno Park but must first enter the weight of each indicator, element, and dimension on the dashboard

3 MODEL VERIFICATION

3.1 Trials at the Techno Park Science of Sepuluh Nopember Institute of Technology (ITS)

Based on the weighting trial results, dimension 2 (sustainability) has the greatest weight compared to other dimensions. Because the dimension of sustainability has the greatest weighting of 54.8%, it will simultaneously make the element of financial independence have the greatest weight among the other elements. This is because the element of financial independence is in the sustainability dimension. So the success of this element will drive the success of Science Techno Park in measuring overall performance.

Based on the results of trials at the Science Techno Park of Sepuluh Nopember Institute of Technology in 2018, only target a number of arranged indicators. The targets determined only cover tenant indicators that receive services/facilities/ training / technical assistance in Science Techno Park, number of new start-ups, number of technology transfers, existence of certificates, applied R&D implemented, number of HR development programs, number of HR certification development programs, the number of new technologies in the form of IPR, the number of innovation services, and the target of procuring conferences / business meetings / business matching. In addition to the limitations on setting targets, many of the realization of the indicators on the performance measurement system have not been filled because Science Techno Park does not yet have a comprehensive record of all activities and agreements on Science Techno Park. The record on the performance of the Science Techno Park Sepuluh Nopember Institute of Technology, is the most staggering at each center, with varying availability at each center. There are centers that set targets, don't set targets, take notes, or don't take notes. Given the limitations on-target information and realization for Science Techno Park, it causes obstacles to performance comprehensive conducting а measurement of the Science Techno Park Sepuluh Nopember Institute of Technology.

Even though overall performance measurements cannot yet be carried out, a trial of performance measurement at the Science Technology Park of the Sepuluh Nopember Institute of Technology can show indicators that have not yet been achieved by the Science Techno Park Sepuluh Nopember Institute of Technology, which is indicated by the traffic light system. Performance that needs to be improved and

improved is the formation of a new startup from the results of incubation. In the current year, no start-up was formed from a total of seven tenants incubated. Improved performance results can be done by providing more intensive services or providing motivation for tenants to follow the incubation process better. In addition to the number of newly formed start-ups that are far below the target, the discovery of applied research and development that is still less than the target so that the performance achievement is 70%. In addition to applied research, the number of new technologies or IPRs is still less than the specified target. This was conveyed by the interviewees that the desire for innovation by researchers is still lacking. The existence of innovation is more inclined because of the motivation from outside, such as government funding that has been given and must be used for innovation activities. This requires the implementation of innovation so that funds can be accounted for by the government

3.2 Trials at Coffee and Cocoa Science Techno Park

Based on the weighting trial results, dimension 1 (economic improvement) has the greatest weight compared to other dimensions. Because the dimension of economic improvement has the greatest weighting of 58.1%, this is because economic improvement is the main objective of the existence of Coffee and Cocoa Science Techno Park and is the vision of Science Techno Park. Then at the same time will make the tenant element, and the underserved client will have the greatest weight among the other elements. This is because the tenant element and the underserved client are in the dimension of economic improvement. So the success of this element will drive the success of Science Techno Park in measuring overall performance.

Based on the results of trials of performance measurement models at Coffee and Cocoa Science Techno Park, in 2018, it has set targets for performance. This is indicated by the fulfillment of targets, and the realization of the indicators arranged. However, there are two indicators that have not been targeted and do not yet have available documents, namely the indicator of Science Techno Park's income per year and the number of contributions of Techno Park to the parent institution. If the overall performance measurement is done by giving 0% or 100% achievement on the two performance indicators, it will get a value of 51.182% and 60.843%. So that if the two indicators can be measured, the achievement of performance in Coffee

and Cocoa Science Techno Park will be in the range of values of 51.182% to 60.843% with each dimension achieving 13.699%, 20.203%, and 16.089% for the dimensions of economic improvement, sustainability, and process in a row.

Achievement performance of 51.182% to 60.843% shows that there are still many performances that need to be improved and improved to get better performance achievements. There are 14 performance indicators that get red traffic light, which shows that the performance is still far below the target and needs to be evaluated to improve the results.

The fourteen indicators found the need to be given an evaluation, such as holding a conference with better preparation, so that it will provide an outcome in the form of additional investment funds from conference participants, as well as additional start-up capital to increase turnover. With the addition of funds to the investment program, the procurement of goods carried out will be smoother. Evaluation can be done together with all relevant stakeholders so that it will give better consideration.

Therefore, recommendations in general for 2019 and beyond, namely recording all things contained in the Science Techno Park business process, and evaluating the performance in the previous year so that they will get a strategy for implementation in the following year while increasing the results of performance appraisal.

4 CONCLUSIONS

- 1. The success of Science Techno Park is driven by three dimensions, namely the dimension of economic improvement, the dimension of sustainability, and the process dimension to achieving economic improvement as well as sustainability.
- 2. The preparation of performance measurement models using rules related to the guidelines for the development and development of Science Techno Park, namely Presidential Regulation No. 106 of 2017, and Development Guidelines by BAPENNAS, and assessment of maturity by the Ministry of Research, Technology and Higher Education.
- Maturity rules and assessments that apply are categorized or mapped against the dimensions of Science Techno Park so that we get 6 elements and 9 indicators on the economic improvement dimension, 8 elements and 12 indicators on the sustainability dimension, and

- 6 elements and 19 indicators on the process dimension.
- 4. Performance indicator properties that are used as guidelines in measuring the performance of Science Techno Park are general in nature so that they can be used for a variety of Science Techno Park, which includes units, properties, frequency of measurement, frequency of reviews, formulas, and data sources. Performance measurements are also displayed in the form of a dashboard using Visual Basic in Microsoft Excel.
- A trial of performance measurement is carried out at the Science Techno Park Sepuluh Nopember Institute of Technology and Coffee and Cocoa Science Techno Park, which shows that both Science Techno Park already had targets and performance documents in 2018. From the performance measurement trials it is known that Coffee and Cocoa Science Techno Park scores in the range of 51.182% to 60.843%, while the Science Techno Park Sepuluh Nopember Institute of Technology, the results of overall performance measurements are not yet known because there are a number of target documents and the realization of indicators that are not yet available.

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ACKNOWLEDGMENTS

This research was partially supported by the Coffee and Cocoa Research Center and the Sepuluh Nopember Institute of Technology. Dr. Eng. Kriyo Sambodho, S.T. dan Ibu Sulistyani Pancaningtyas, S.P., who provided insight and expertise that greatly assisted the research, although they may not agree with all of the interpretations/conclusions of this paper.

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