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Technology Content Analysis with Technometric Theory Approach to Improve Performance in Radiodiagnostic Installation

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Abstract

Radiologic installation be facilitated with medical equipment for supporting of health services in investigation of disease. There are 3 (three) criteria technology of equipment: investigation with sophisticated equipment (CT scans single slice), investigation with a medium-sized enterprises equipment (general x-ray ≤ 300 mA / 125 KV) and simple equipment (Portable Dental x-ray ≤ 8mA /70 KV). In view of contribution to the Hospital, Radiologic installation from 2008 until 2012 has decreased, the data as follows: The year 2008 was 6.8 percent; in 2009 was 4.3 percent; in 2010 was 2.5 percent; in 2011 was 2.3 percent; and in 2012 was 2.6 percent.By using approach of technometric theory, the study measures the significant contribution of each component of technology that consists of aspects: Technoware, Humanware, Inforware, Orgaware in Radiologic Installation, and also want to know about the sophistication of the technology which is used in indicators Technology contribution coefficien (TCC), so factors that affect experienced performance result can be known, where TCC are: TCC High Technology TCC_tt =0,490 if T_tt= 0,387 H= 0,519 I= 0,538 O=0,534 TCC Middle technology TCC_tm=0,443 if T_tm=0,258 H=0,519 I=0,538 O=0,534TCC Simple technology TCC_ts =0,398 if T_ts=0,168 H=0,519 I=0,538 O=0,534If the value of component technology (T,H,I,O) is less than TCC, its means that Radiologic Installation Unit is in decreasing phase, a condition that cannot be left, need the directors's action immediately to formulate the right and fast policies to protect it from lost. The final result of study is a gap almost everywhere from the three technology component Humanware = 0,519, Inforware = 0,538, Orgaware = 0,534, but the gap between most components in technology aspects Technoware (0,387, 0,258, 0,168), that means that development strategy of Radiologic Installation unit be prioritized on increasing aspects Technoware (rejuvenation medical equipment).

Keywords: *technoware, humanware, infoware, orgaware, TCC (Technology Contribution Coefficien), technometric theory*

1. Introduction

Installing Radiologic is one of the supporting health services unit in the hospital. Service Quality radiologic, depending on the quality of human resources, beside that depends on sophisticated equipment that is used. This means that, equipment which is used always radiologic in its prime condition, both physically and function, so it can produce a high quality radiograph. Guarantee quality is produced, reflect unit radiologic can to pass a better service has been determined, who will finally be able to provide information and accurate diagnosis, by keeping (pressing be at a minimum) impact shelf radiation is on patients, operator, radiologist technician [1]. Business health services are managed by East Java government; especially Haji Hospital Surabaya in Installing Radiologic has good facilities supporting equipment diagnostic tests. According to decision of Minister of Health According to the decision R. I Number 1122 /SK/ VIII/2003 dated August 5, 2003, about technical guidance of equipment electrometric grouping into 3 groups levels of technology are simple technology (Dental x-ray, Panoramic View dental x-ray, The film Dryer, Film viewer); the technology and medium enterprises (Basic x-ray unit, x-ray mobile unit, automatic processing Film); and the high technology (CT scans single slice spiral diagnostic 500 mA/130 KV) [2].

Now the number of technology equipment medium-sized enterprises owned Haji Hospital is 3 (three) unit of General x-ray diagnostic capacity 500 mA/125 KV, 3 (three) Mobile

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unit x-ray diagnostic capacity 300 mA/125 KV, 1 (one) unit Thorax Airbags But x-ray 30 mA/100 KV, 1 (one) unit Dental x-ray diagnostic capacity 6 mA/70 KV, 2 (two) unit Panoramic View dental x-ray capacity 8 mA/70 KV, and 1 (one) unit of C-Arm x-ray diagnostic 300 mA/100 KV [3, 4].

Based on data Installing diagnostic Haji Hospital, Surabaya, has diagnostic support services since 2008 to 2012 especially for types of products General x-ray diagnostic tests, experienced in the range 12.47 percent every year while on the type of product Dental x-ray diagnostic products and CT scans diagnostic each, experienced around 17 percent each In. This condition pushed the directors to make improvements and continuous development in various aspects of the finishing process, one of them was Radiologic has planned to add 1 (one) unitMRI 0.5 tesla open gantry and 1 (one) unit Angiography and Catlab new generation. (5) Need much funds for investments in equipment diagnostic high-tech, and to prevent planning technology development which not appropriate, so it needs be done measurement technology components contributed to Haji Hospital, Surabaya, especially for aspects (Technoware technology the components (T), Humanware (H), Inforware (I) and Orgaware (O) hopeful the directors are able to determine about planning of good and right technology development policy [6-9].

2. Proposed Technology Content Analysis with Technometric Theory to Approach Performance

Base on those above, this study want to know about the technology aspects (T= aspects (Technoware, H= Humanware, I= Inforware and O= Orgaware) especially in unit installing radiologic.The result of the study are to know level sophisticated technology in unit Radiologic, also is needed in levels of management sebagai referensi to determine policy in the development and the increase supporting facilities from year to year in accordance with kebutuhanmasyarakat dynamics [10]. Use of technology management technometric has been adapted in or measurements dan control Jabarata water port [9]. After the corner based on MEMS (micro-elektromekanis system) accelerometers studied, the angle as much as accurate in any condition can be reduced the analysis of the acceleration of the wings double in the position that bebeda. Further research Yuan Rongchang applying folding wings are controlled to change the aspect ratio of the wing is an efficient way to get the best overall performance of the aircraft in different phases of flight missions [11].

Identification of the problems :The factors which influencing of radiodiagnostic technology are contribution of each component in radiodiagnostic installation T_irdx, % H_irdx) and its earnings contribution to the overall income of Haji Hospital, Surabaya for 5 (five) years (from 2008 until 2012).The problem: The study be restricted by technology aspects of the problem (T_irdx, H_irdx) of resources in Radiodiagnostic Intallation, Haji Hospital, Surabaya. Forrmula of Problem:

1) Is there any relationship between the technology to increase productivity?,

2) Is there any a significant relation exists between humanware to technoware (T_tt, T_tm, T_ts)?

3) How possible approach of technometric theory can be applied as technology development policy at Radiodiagnostic installation?

General purpose: To know the contribution of every component humanware, inforware and orgaware radiodiagnostic) at Haji hospital, Surabaya.Specific purpose: (1) To measures the level of sophistication (sophistication) of technology that be used in comparison with the state-of-the-art "current; (2) To measure/calculate contribution of Technoware and Humanware at radiodiagnostic installation of especially simple, medium and high elektromedik equipment; (3) To analyze the content of technology by calculating the contribution component of the technology (T, H) and calculate T C C at every level of technology (TCC_tt,TCC_tm,TCC_ts)

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3. Research Methodology

The Design is a non experimental research on research/analytical survey by survey research analytical cross sectional. The population are whole elektromedik equipment on the Radiodiagnostic Installation, Haji Hospital Surabaya, and the sample using Probability sample procedure. The samples are divided into 3 (three grouped), namely high-tech () medical

equipment, high technology and technology.The sample used in this study are grouped into 3 (three), namely high-tech (Sophisticated), médium, and simplel equipment, consist of 31 (thirty-one) the tool in every group, be grouping by using *proporsional stratified random sampling* techniques. The instruments and data collection techniques are using: Cheklist, interview with the user of equipment and expert opinion (expert).

Research hypotheses: (1) there is a relationship between the content of contribution of technology with increased productivity; (2) There is a significant relationship between the Humanware and Technoware (T_tt, T_tm, T_ts).

The place and time of study are at installation radiodiagnostic Haji Hospital, Surabaya, from December 2011 until the end of February 2012.

4. Results and Discussion

4.1. Results

4.1.1. Resultsand Data Analysis Technoware

4.1.1.1. Resultsand Data Analysis Technoware High Technology Equipment

Results and Data analysis of Sophisticated Technoware.The table below is data from sub components, Tube Housing Assembling technoware (THA) as a production machine radiation (T1_tt) is seen as the most important components or that has a value of straegis from the component technoware.

Table 1. Contribution component Technoware CT Scan (T_tt)

Criteria		Value (1,00)	Normalized Contribution
Tube Housing Assembling (THA)	(T1_tt)	**0,20**	**0,333**
Power high voltage System	(T2_tt)	**0,20**	**0,356**
Diagonal moving gantryEngine	(T3 _tt)	**0,20**	**0,400**
Mobile transportMachine	(T4_tt)	**0,20**	**0,444**
Image procesing	(T5 _tt)	**0,20**	**0,400**
			T_tt : 0,387

From these data be compared to state-of-the-art (SOA), that the level of contribution technoware it is at the lowest level, it is given the sub-components T1_tt which has been used since 2003 when compared with the level sophisticated equipment technoware have a span of 6 years in the future that only occupy contribution level T1_tt = 0.333 lower than the level of the overall contribution technoware T_tt = 0.387. While technoware T_tt = 0.387 level was still much lower toward TCC_tt value = 0.490, meaning that the components technoware T_tt as an internal barrier to performance and productivity in the service of radiodiagnostic installation unit. Ideally technoware contribution must be greater or equal to the value of at least TCC_tt. So also in the sub-components technoware T2_tt = 0356 "high-voltage power system" when compared with the state-of-the-art today, where the level of technology is no longer using a single source, but most units have a CT scan using a double-source technology.

4.1.1.2. Results and Data Analysis Technoware Intermediated Technology Equipment

The table below is a sub-component of data technoware, (X-ray tube) as a sub-component of the radiation production machine (T1_tm).

Table 2. Contribution component Technoware X ray (tm)

Criteria		Value (1,00)	Normalized Contribution
X ray tube	(T1_tm)	0,20	0,311
HighVoltageGeneratorSystem	(T2_tm)	0,20	0,311
Control tabel sistem	(T3_tm)	0,20	0,178
Pasien table	(T4_tm)	0,20	0,133
Image processing	(T5_tm)	0,20	0,356
		T_tm : 0,256	

From the data above be measurement and be compared with state-of-the-art (SOA), the level of contributions that are at a level technoware contribution T1_tm = 0.311 means it is under the level value TCC_tm = 0.443,t1_tmdue tothe sub-components that have beenused 16 years ago. From the results of the measurement of the level of midle technology T_tm = 0.258 was still far lower than the value of TCC_tm = 0.443. On sub technoware components T2_tm = 0.311 (high-voltage power system), sub technoware components, T3_ts = 0.178 (table Control system), sub components technoware T4_tm = 0.133 technoware components and sub T5_tm = 0.356 (image processing) in its whole if be compared with state-of-the-art, it is lower to the TCC_tm = 0.443,it ismeans components technoware tm as inhibitors of internal productivity performance, especially the sub-components teknoware is considered the main sub-components in generating radiation. Technoware contribution should ideally be at least as large or mid value TCC_tm

4.1.1.3. Results and Data Analysis Technoware Simple Technology Equipment

The table below is a sub-component of data technoware, (X-ray tube) as a sub-component of the radiation production machine (T1_ts).

Table 3. Contribution component Technoware x ray (ts)

Criteria		Value (1,00)	Normalized Contribution
X ray tube	(T1_ts)	0,20	0,144
HighVoltageGeneratorSystem	(T2_ts)	0,20	0,249
Control tabel sistem	(T3_tm)	0,20	0,167
Pasien table	(T4_ts)	0,20	0,133
Image processing	(T5_ts)	0,20	0,156
	T_ts :	0,168	

From the data above be measurement and be compared with state-of-the-art (SOA), the level of contributions that are at a level technoware contribution T1_ts = 0.144 means it is under the level value TCC_ts = 0.398. From the results of the measurement of the level of simple technology T_ts = 0.168 was still far lower than the value of TCC_ts = 0.398. On sub technoware components T2_ts = 0.249 (high-voltage power system), sub technoware components, T3_ts = 0.167 (table Control system), sub components technoware T4_ts = 0.133 technoware components and sub T5_ts = 0.156 (image processing) in its whole if be compared with state-of-the-art, it is lower to the TCC_ts = 0.398, it is means components technoware as inhibitors of internal productivity performance, especially the sub-components teknoware is considered the main sub-components in generating radiation. Technoware contribution should ideally beat least as large or mid value TCC_ts

4.1.2. Results and Data Analysis Humanware at Radiodiagnostic Installation

Result of the contribution components humanware is from surveys and checklist those has been rated by the experts in their field.

Table 4. Results of Contribution component of Humanware

Criteria		**Value**	**Normalized Contribution**
Capability of doctor / Radiolog	(H1)	**0,25**	**0,746**
Capability of Radiografer	(H2)	**0,25**	**0,569**
Capability of technician	(H3)	**0,25**	**0,549**
Capability ofStaf f/ Administration	(H4)	**0,25**	**0,211**
		H : 0,519	

Value of the contribution on the humanware elements in the table above are the results of the survey and assessment by the head of the Radiodiagnostic installation. The results of measurements and calculations of humanware almost whole of the humanware (H1 = 0,746, H2 =0,569, H3 = 0.549, H4 = 0.211) is above the value of TCC = (TCC_tt = 0,490, TCC_tm =

0.443, TCC_ts = 0.398), it is mean that components of humanware is good so that the radiodiagnostic installation unit for human resources are good and capable of evolving to future.

4.1.3. Results and Data Analysis Inforware at Radiodiagnostic Installation

Result of the contribution components Inforware is from surveys and checklist those has been rated by the experts in their field.

Table 5. Results of Contribution component ofInforware

Criteria	Value	Normalized Contribution
Technoware specific Inforware (I1)	**0,33**	**0,530**
Humanware specific Inforware (I2)	**0,33**	**0,537**
Orgaware specific Inforware (I3)	**0,33**	**0,550**
	I : 0,538	

Value of the contribution on the Inforware elements in the table above are the results of the survey and assessment by expertswho are competent in their field. The results of measurements and calculations of Inforware almost whole of the Inforware is above the value of technoware. it is mean that components of Inforware is good so that the radiodiagnostic installation unit for inforware resources are good and capable of evolving to future.

4.1.4. Results and Data Analysis Orgaware at Radiodiagnostic Installation

Result of the contribution components Orgaware is from surveys and checklist those has been rated by the experts in their field.

Table 6. Results of Contribution component of Orgaware

Criteria	Value	Normalized Contribution
Work Organization(O1)	**0,25**	**0,524**
Work Facilities (O2)	**0,25**	**0,533**
Work Modification (O3)	**0,25**	**0,533**
Work Evaluation (O4)	**0,25**	**0,544**
	O : 0,534	

Value of the contribution on the Inforware elements in the table above is the results of the survey and assessment by experts who are competent in their field. The results of measurements and calculations of Inforware almost whole of the Inforware is above the value of technoware. it is mean that components of Orgaware is good so that the radiodiagnostic installation unit for Orgaware resources are good and capable of evolving to future.

4.1.5. The Measurement of Contribution Technology Components

The assessment is a Score of technological indicators be compared with state-of-the-art, then the value are normalized, if the result ≈ 1, means technology indicator are to be better.

Measurement of contribution components are by considering the limitations of the level of sophistication and rate of assessment (state of the art). The calculation results of all technology components in the Table 7.

Table 7. Measurement of contribution componen

No	Komponen Teknologi		Batas UL	Batas LL	SOA	Kontribusi Dinormalkan	T,H,I,O	TCC
1	*TECHNOWARE*							
	High Technology							
	Tube Housing Assembling (THA)	T1	6	2	0,25	0,333		
	High Tension Transformator (HTT)	T2	6	2	0,30	0,356		
	Diagonal Moving Gantry	T3	6	2	0,40	0,400	0,387	0,490
	Mobile Transport Machine	T4	6	2	0,50	0,444		
	Image Processing	T5	6	2	0,40	0,400		
	Intermediated Technology							
	X-Ray Tube	T1	6	2	0,20	0,311		
	High Tension Transformator (HTT)	T2	6	2	0,20	0,311		
	Control Table System	T3	4	1	0,20	0,178	0,258	0,443
	Patient Table	T4	3	1	0,10	0,133		
	Image Processing	T5	6	2	0,30	0,356		
	Simple Tehnology							
	X-Ray Tube	T1	4	1	0,10	0,144		
	High Tension Transformator (HTT)	T2	5	2	0,05	0,239		
	Control Table System	T3	6	1	0,10	0,167	0,168	0,398
	Patient Table	T4	3	1	0,10	0,133		
	Image Processing	T5	5	1	0,10	0,156		
2	*HUMANWARE*							
	Capability of Medical	H1	8	5	0,57	0,746		
	Capabilities of Radiografer	H2	7	3	0,53	0,569	0,519	
	Capability of Technician	H3	6	4	0,47	0,549		
	Capability of Staff/ Admistration	H4	4	1	0,30	0,211		
3	*INFORWARE*							
	Tehnoware specific INFORWARE	I1	6	3	0,59	0,530		
	Humanware specific INFORWARE	I2	6	3	0,61	0,537	0,538	
	Orgaware specific INFORWARE	I3	7	2	0,59	0,550		
4	*ORGAWARE*							
	Work Organization	O1	7	3	0,43	0,524		
	Work Fasilitation	O2	6	4	0,40	0,533	0,534	
	Work Evaluation	O3	6	4	0,45	0,544		
	Work Modification	O4	6	4	0,40	0,533		

Source: results of the calculation of the upper limit, lower limit, SOA as well as the contributions that normalized on the installation of Radiodiagnostic in 2009, the value of SOA (state of the art) Pandey (1998).

4.1.6. MeasurementTechnology Contribution Coefficient (TCC)

In calculations, the study used a valuing method for intensity as follows ($\beta t + \beta h + \beta i + \beta o = 1$) atau (0,25 + 0,25 + 0,25 + 0,25 = 1), every value is (β) = 0,25.. After known the value of the contribution and value of the intensity of the contribution of each component of the technology, then the value can be obtained by TCC as presented in the table bel ow, where: **$TCC = T^{\beta t} * H^{\beta h} * I^{\beta i} * O^{\beta o.}$**

Table 8. Results of calculation of TCC component Technology

Component Technology	Component Technology Contribution	Intensity of Component Technology Contribution (β)	TCC_Inst Rdx
Technoware (T_tt)	0.387		0.490
Technoware (T_tm)	0.258	0.25	0.443
Technoware (T_ts)	0.168		0.398
Humanware (H)	0.519	0.25	
Inforware (I)	0.538	0.25	
Orgaware (O)	0.534	0.25	

Interpretation of calculation technology content results is at level simple, intermediate, and high technology in the radiodiagnostic installation in 2009. High-tech Technologies from to simple calculation result TCC component Technology.

Table 9. Technology components High Technology, Intermediate Technology and Simple Technology

Technology Components	High Technology	Intermediate Technology	Simple Technology
Technoware (T)	0,387	0,258	0,168
Humanware (H)	0,519	0,519	0,519
Infoware (I)	0,538	0,538	0,538
Orgaware (O)	0,534	0,534	0,534

Table 7: Technology Contribution Coefficient

High Technology	(TCC_tt)	0,490
Intermediate Technology	(TCC_tm)	0,443
Simple Technology	(TCC_ts)	0,398

4.2. Discussion the results of the measurement of the degree of Recency Technoware

4.2.1.Measurement of the degree of Recency of High Technology Level

Measurement of the degree of immediacy of the Intermediate Technology Level.Measurement of the degree of immediacy of intermediate Technology in the form of "General X ray capacity ≤ 300 mA/125 KV", by considering of 5 indicators on the activity of production processes which include: radiation x-ray (T1_tm), a system of high-voltage Generators (T2_tm), Table Control System (T3_tm) and Patient Table (T4_tm) that works entirely controlled by operator (humanware = H2) are trained and skilled, and image prossesing (T5_tm).

Results calculation of the contribution of technology in sub component technoware above, contribution Image Processing (T5_tm) = 0.356 contributed to the highest level, followed by the next level of contribution at unit x-ray Tube (T1_tm) = 0.311, high-voltage Power System (T2_tm) = 0.311, System Control Table System (T3_tm) = 0.178 and lowest contributions were on the Patient Table (T4_tm) = 0.133.

This shows that the contribution of the intermediate-tech equipment on technoware only at position T_tm = 0.256, means much lower still to TCC, where (TCC_tm) = 0.443. That is when the amount of the contribution technoware (T_tm) = 0.256 ≤ (TCC_tm) = 0.443 ≤ 1, it can be said that the ability of technoware far behind because of the great contribution is ideally technoware (TCC_tm) ≤ (T_tm) ≤ 1. Such a condition can result in a performance in service will be derailed or can result in high response time to exceed minimum service standards (SPM).

Measurement Of The Degree Of Immediacy Of Simple Technology.

A simple form of technological units of measurement "portable Dental x-rays capacity ≤ 8 mA/70 KV" which has been measured by considering 5 or at activity indicator of radiation production processes which include: X-Ray Tube (T1_ts) = (T1_ts) = 0.144, high-voltage Power System (T2_ts) = 0.249, Table Control System (T3_ts) = 0.167 and Patient Table (T4_ts) = 0.133 as well as Image prossesing (T5_ts) = 0.156, which work completely controlled directly by the operator (humanware = H2).

By looking at the results above, the contribution of technology in sub component technoware, seen that the contribution System Voltage Generator Tingggi (T2_ts) = 0.249 is contributed the largest and lowest contributions were on the Patient Table (T4_ts) = 0.133.

The overall contributions on simple technology equipment (unit "Portable Dental x-rays capacity ≤ 8 mA/70 KV") only can be reached to (T_ts) = 0.168, means it is still much lower than the simple technological level for TCC i.e. (TCC_ts) = 0.398. This condition is affected by the length of the operation of the tool has been (16 years).That means if the number of contributions on simple technological technoware (T_ts) = 0.168 ≤ (TCC_ts) = 0.398 ≤ 1, it is means radiodiagnostic installation to the level of simple technology in unhealthy conditions, consequently decreasing automatically performance and capability contributions also decreased.

4.2.2. Measurement Of Degree Of Recency Humanware

Humanware at this research is divided according to the position and tasks of the existing workforce, health worker is divided into direct health worker (the doctor/medical personnel and Radiografer) and indirect health worker (head of the installation, the head of the room, technicians, administrative personnel), while the indicators being measured is an indicator that can be developed and applied. Data processing at this part seen that degree of sophistication in the installation radiodiagnostic have approached the ideal conditions with the overall contribution of humanware (H) = 0.519, where conditions are far above the level of technology at both TCC high, medium and simple, namely the level of contribution of humanware (H = 0.519) ≥ (TCC-tt = 0.490, tm = 0.443-TCC, TCC-ts = 0.398).

4.2.3. Measurement on Direct Health worker

Direct health worker in conditions by installing radiodiagnostic on only medical personnel (physicians Radiology) and Radiografer personnel who have been specially trained for the operation of a CT Scan equipment i.e. H1 (0.746) and H2 (0.569), the magnitude of the H1 and H2 that exceeds the amount of the contribution humanware H (0.519) and also on the value of the TCC (TCC-tt = 0.490, tm = 0.443-TCC, TCC-ts = 0.398). This means aspects of humanware are quite ready to embrace technological developments in medical equipment, which will improve management or add a much more up-to-date facility/modern.

4.2.4. Measurement on Indirect Health Worker

Indirect health worker here include head installation, internal and external technician technicians from the single agent Administration Officer as well as tool origin. From the measurement results obtained (0.549) H3 and H4 (0,211), this means that the necessary staff and officers and held a special administration skills enhancement in order to increase the response time the time service, so all lines of humanware can run well.

4.2.5. The High Base-technology Gap on Technoware Component

Underlying the low contribution of high technology on technoware once compared the state of the art (SOA), as well as with the results of studies directly to the existence of high-tech equipment owned by the installation of Radiodiagnostik until the year and month components of some measurement technology with the main component level on a CT-Scan, clear look that "Housing Tube Assembley (THA)" T1_tt (SOA = 0.25) and contribute only reached 0.333, as well as on the "high-voltage power system" T2_tt (SOA = 0.30) and contributions which only reached level T_tt = 0.356 contribution means a position under the TCC_tt = 0.490. When compared to the State of the art (SOA) are far behind, can understand that CT Scan single slice is installed since 2003 is up to date at the time, but with the development time as well as advances in technology that have been popping up for a 64 slice CT Scan, CT Scan of immediacy means installation radiodiagnostic positions are only at level (T_tt) = 0.356, resulting in much lower against TCC_tt = 0.490, especially if compared with the technology of today (SOA = 0.999).

4.2.6. The Intermediate-technology Gap on Technoware Component

Underlying the low contribution of high technology on technoware after compared with State-of-the-art, as well as with the results of studies directly to the existence of a dental panoramic equipment with a capacity of 300 mA/120 KV, almost all sub components are very far behind technological advances in recent years, the average value of the maximum contribution only where T_tm = 0.20 (≤ 0.20 SOA ≤ 1). Locally installed technologies since 2003 have not undergone rejuvenation technology, so it has not been able to offset the power of resilience in the global currents. Immediacy of Panoramic dental x-rays that there could only be at level (T_tm) = 0.256, still much lower against TCC_tm = 0.443, especially if compared with the technology of today (SOA = 0.999).

4.2.7. The Simple-technology Gap on Technoware Component

Underlying the low contribution technoware on technology is simple once compared State-of-the-art, as well as with the results of studies directly to the existence of the portable equipment dental x-rays capacity of 8 mA/70 KV Radiodiagnostic Installation owned by almost all sub components are very far behind technological advances millenium, maximum average

value of contributions only a maximum of T_ts = (0.168 ≤ SOA = 0.398 ≤ 0.99). This is indeed the facilities installed since 2003 haven't changed rejuvenation technology.

5. Conclusion

(1) The percentage contribution of high technology equipment technowarepada (T_tt = 0.387), high technology (T_tm = 0.256) and simple technology (T_ts = 0.168), while for component technologies Humanware (H = 0,519), (2) The percentage of the contribution revenue unit installation radiodiagnostic of the overall hospital revenue over the past 5 years since 2008-2012terbukti decline of 6.8% (2008), 4.3% (2009), 2.5% (2010), 2.3%(2011) and 2.6% (2012). This means that the installation radiodiagnostic income for 5 years only experienced an average growth of 3.7%, however in 2008 the contributions unit installation radiodiagnostic precisely under the average estimated that only 2.6%.(3) Technological Aspect on technoware and humanware, where the amount of the contribution technoware (T_tt) = 0.358 ≤ (TCC_tt = 0.490) ≤ 1, then it can be said that the ability of technoware far behind. This can lead to performance in service will be derailed or result in high response time to exceed minimum service standards (SPM). (4) Contributions on simple technology technoware (T_ts) = 0.168 ≤ (TCC_ts) = 0.398 ≤ 1 means on the level of simple technology in unhealthy conditions, consequently decreasing outomatis performance and capability contributions also decreased. (4) the overall contribution of humanware (H) = 0.519 where conditions are still far above the level of technology at both TCC high, medium and simple means that the level of contribution of humanware (H = 0.519) ≥ (TCC-tt = 0.490, tm = 0.443-TCC, TCC-ts = 0.398). Broadly speaking skill is much more appreciated than on education (qualification), this is caused by often requiring human resources skill development training to follow, so the expertise owned can be standardized. With individual contributions reaching humanware (H = 0.519), felt was enough to cover on to the three levels of existing equipment technology, but if it is still deemed necessary to improve the skill of humanware can be improved in the framework of anticipating possible skill demanding technoware is higher. (5) There is a significant relationship between the humanware and high-tech equipment on technoware, medium sized and simple; and there is a connection between contributions to the content of the technology with the increased productivity. (6) By applying the theory of technometric can be found the solution in the implementation of the policy on installation of radiodiagnostic in the future. (7) The results of measurements of the degree of immediacy of the technology with respect to the level of power of the state-of-the-art, apparently the result is still very far from the immediacy of state of the art (1.0). While on a high-tech technoware only reached TCC_tt = 0.490, TCC level high technology TCC_tm technoware = 0.443 simple technology, and on the value of TCC_ts only = 0.398.(8) The results of measurement and calculation of the contribution of technology in some components and humanware technoware for high-tech T_tt = 0.387, medium = 0.258 T_tm technology, and simple technology T_ts = 0.168 and humanware H = 0.519 this indicates that the component has a higher contribution of humanware from technoware.

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