CHAPTER 4

Empirical Results

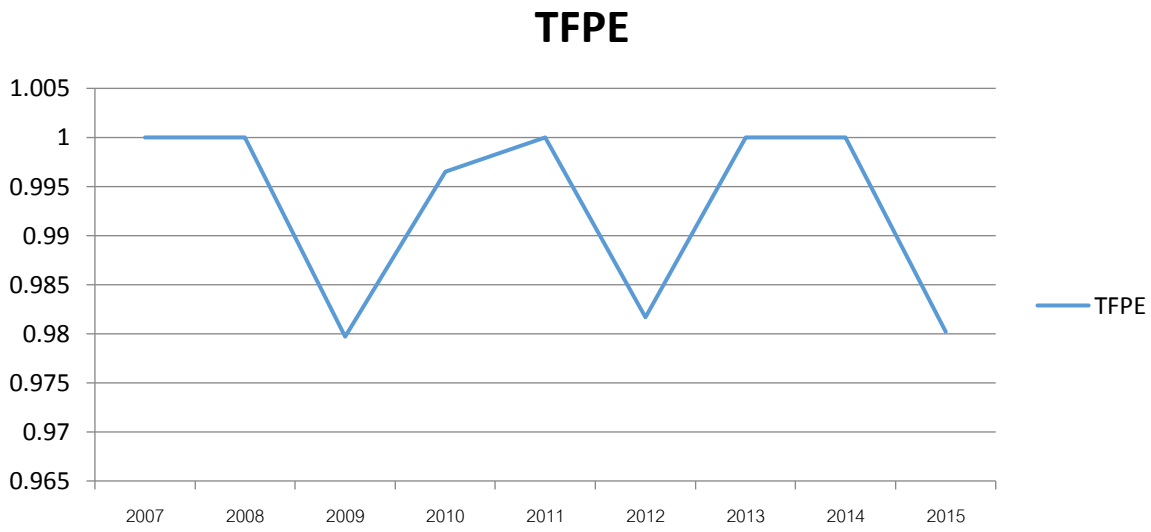
4.1 Empirical Result

Index number and theoretical underpinning of some of the commonly-used index number formulae about examine the mechanics of contacting price and quantity index number of TFP change To measure productivity changes, index numbers are used i measuring changes in the levels of outputs produced and the levels of inputs used i the production process over two time periods or across two firms. The focus of this section is to describe the computational methods used in deriving an index of TFP either over time or across firms or enterprises. A TFP index may be applied t

Table 3: Singapore port

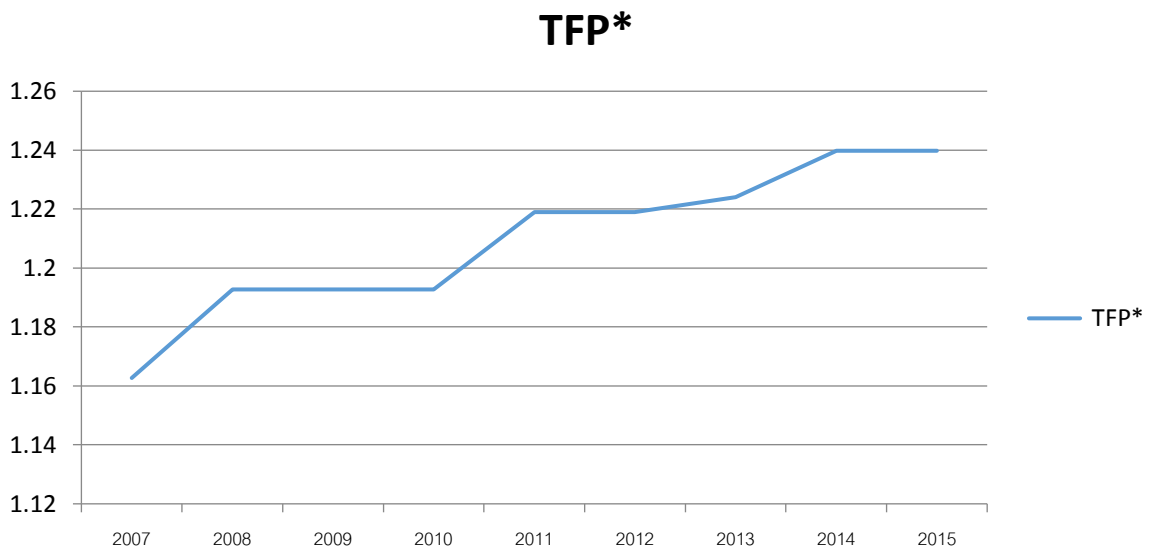
year	TFP	TFP*	TFP change	TFPE	OTE	OSE	OME	ROSE	OSME
2007	1.1627	1.1627	0.9748	1	1	1	1	1	1
2008	1.1927	1.1927	1	1	1	1	1	1	1
2009	1.1685	1.1927	0.9797	0.9797	1	1	1	0.9797	0.9797
2010	1.1885	1.1927	0.9965	0.9965	1	1	1	0.9965	0.9965
2011	1.2189	1.2189	1.0219	1	1	1	1	1	1
2012	1.1966	1.2189	1.0032	0.9817	1	1	1	0.9817	0.9817
2013	1.2241	1.2241	1.0263	1	1	1	1	1	1
2014	1.2398	1.2398	1.0394	1	1	1	1	1	1
2015	1.2153	1.2398	1.0189	0.9802	1	1	1	0.9802	0.9802
average	1.200	1.209	1.0067	0.9931	1	1	1	0.9931	0.9931

TFP efficiency (TFPE) is a measure of overall productive performance table 3 indicates that this measure was an average 0.993122 which mean that Singapore port in 2007 – 2015 fell shortly about 0.01 percent on average according to port activity and transshipment. in detail have a little bit fall in 2009 (0.13 percent) , 2010 (0.01 percent) , 2012 (0.02 percent) and 2015 (0.02 percent) . The number of fallen in detail and overall does not have significant that can be indicated activity of this port is not efficiency in 9 years. However, the number of 0.9931 it quite high and close to 1 percent of efficiency in Singapore port. the outcome of TFPE illustrate that port of Singapore have high potential to run business and steady can be put all outcome into the graph to look how steady of TFPE of a port in Singapore

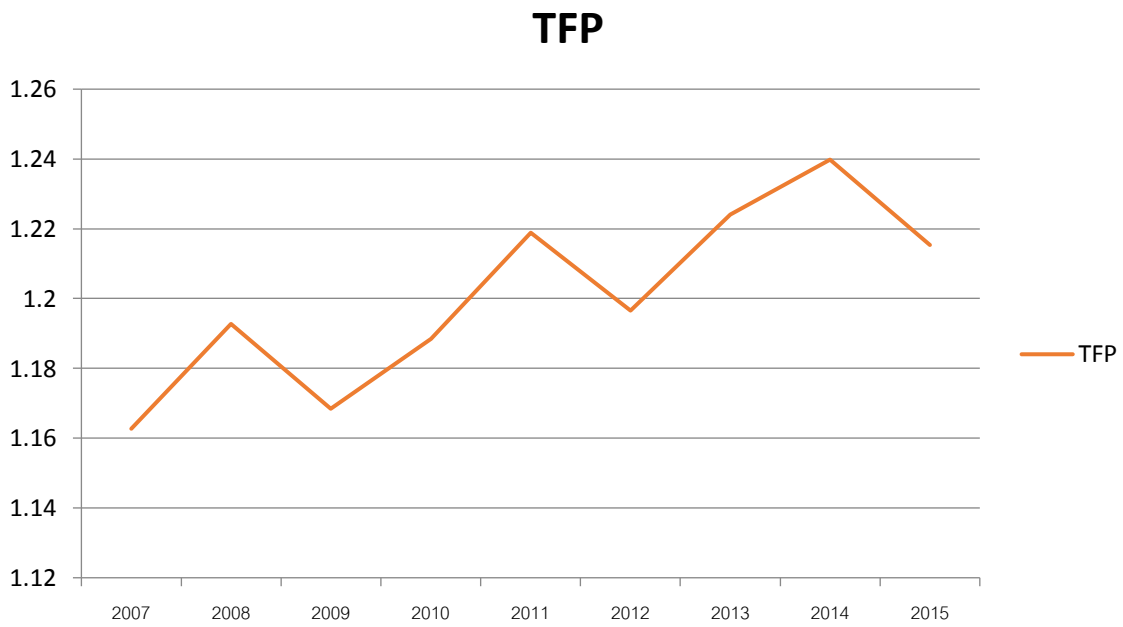


Following TFPE table show number of TFPE does not fall below 0.98 it swing between 1 and 98 only change of efficiency only about 0.2 percent, it mean this port constraint performance of port work to handle all ship and cargo in port very well

When TFPE is further decomposed into OTE and OSME, the estimates indicate that OTE is almost always equal to 1.0 and, in particular, equals 1.0 for all states in both 1990 and 2011. Other studies that have calculated OTE also find most values are equal to 1.0 or at least very close, suggesting that pure technical efficiency is commonly achieved



The maximum TFP (TFP*) estimates are obtained under the assumption that in any given period all states experience the same set of production possibilities, which can be observed in the second and third column of TFP* estimates in Table. The third column of TFP* estimates reveals that over the period between 2007 and 2015



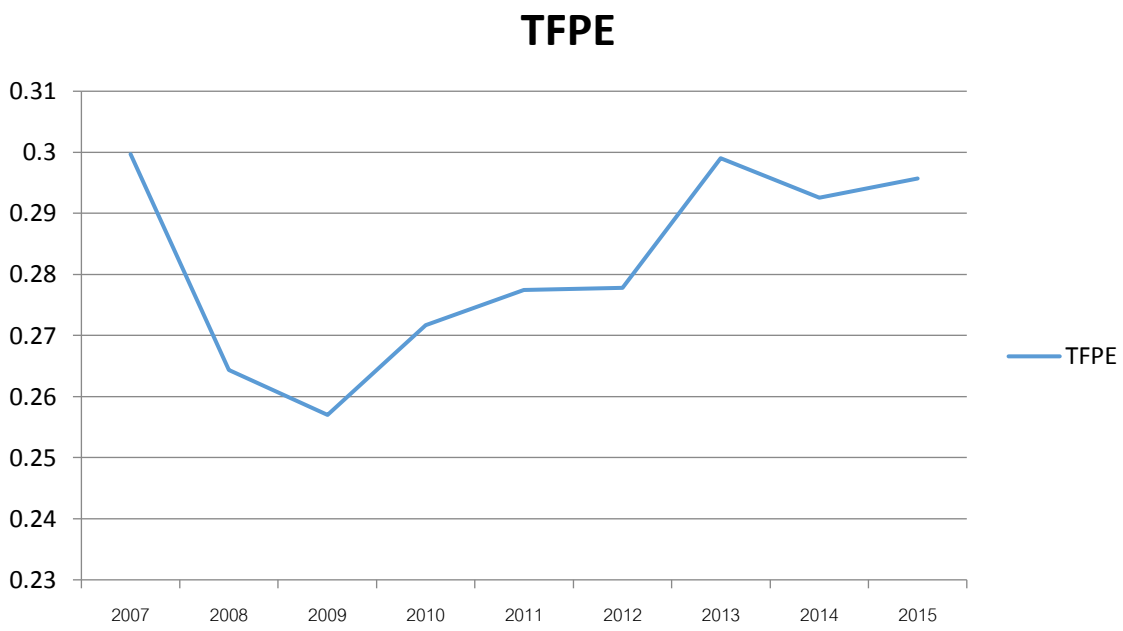
TFP of Singapore port in 2007 is the lowest point in graph then it has trended to go higher on average. However, take a look in detail graph got increase in one year and go down after that TFP increase again. On average efficiency go higher but in detail Singapore port have

changed almost years by years in significantly. In number of TFP show that efficiency of port decrease or increase can be defined that Singapore port is the better one because they run business efficiency every year

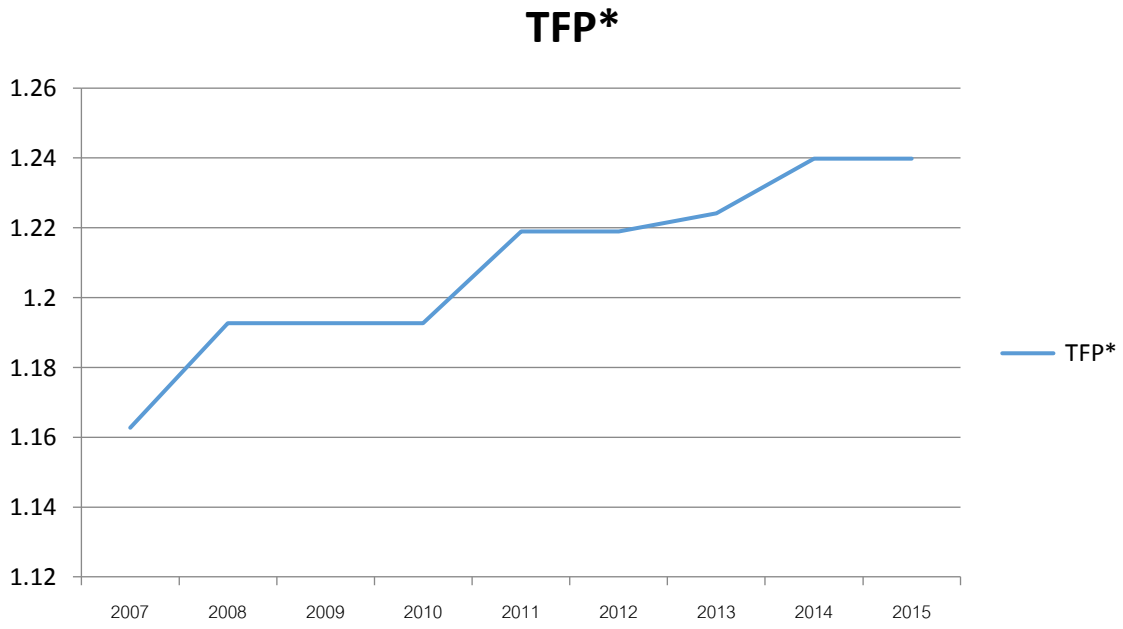
Table 4: Malaysia (Bintulu port)

years	TFP	TFP*	TFP change	TFPE	OTE	OSE	OME	ROSE	OSME
2007	0.3485	1.1627	0.2922	0.2997	1	1	1	0.2997	0.2997
2008	0.3154	1.1927	0.2644	0.2644	1	1	1	0.2644	0.2644
2009	0.3065	1.1927	0.257	0.257	1	1	1	0.257	0.257
2010	0.3241	1.1927	0.2717	0.2717	1	0.9919	1	0.2717	0.2717
2011	0.3383	1.2189	0.2836	0.2775	1	0.9549	1	0.2775	0.2775
2012	0.3386	1.2189	0.2839	0.2778	1	0.9471	1	0.2778	0.2778
2013	0.366	1.2241	0.3069	0.299	1	1	1	0.299	0.299
2014	0.3627	1.2398	0.3041	0.2926	1	1	1	0.2926	0.2926
2015	0.3666	1.2398	0.3074	0.2957	1	1	1	0.2957	0.2957
average	0.3407	1.2091	0.2856	0.2817	1	0.9882	1	0.2817	0.2817

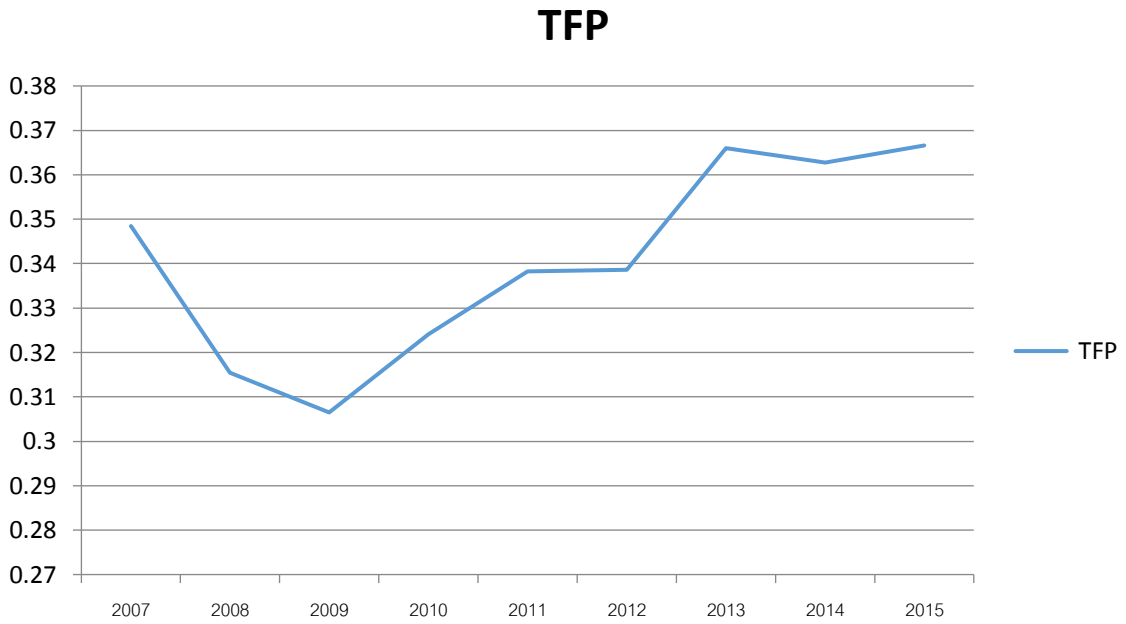
First, take look at TFP efficiency (TFPE) is a measure of overall productive performance in table 4 Indicates that this measure was an average 0.34 which mean that Bintulu port in 2007 – 2015 increase about 0.02 when compare on 2007 with average.



According to graph year 2007 is the highest TFPE almost 0.3 and then TFPE fall until year 2009 about 0.25 percent of efficiency and then after 2009 TFPE move higher 0.0147 in 2010 to 0.2717, in period 2011-2012 TFPE grow higher a little bit but it have growth almost higher equal 2007, the number of change to 0.29



The estimates of the maximum TFP over all states (TFP*) show that the production possibilities changes are primarily responsible for the declining trend in TFP



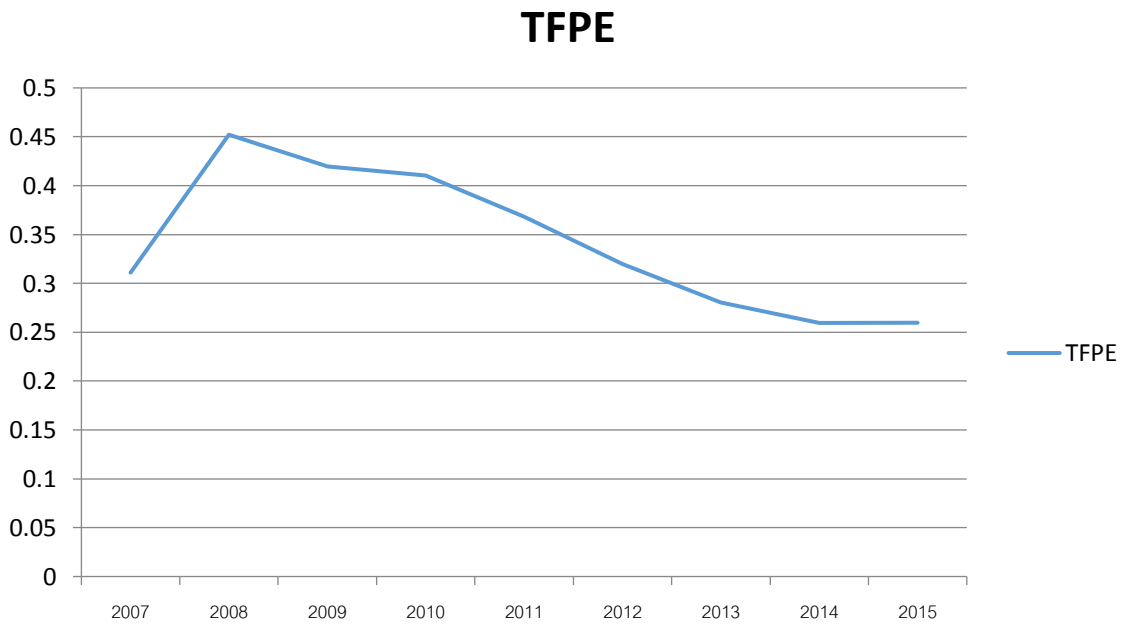
Graph TFP of Bintulu port presents Färe-Primont estimates of TFP of broadacre Bintulu port. This figure reveals few important insights into the Bintulu port throughout the sample period. First, the productivity and efficiency levels in port have fluctuated considerably over the sample periods. It shows an overall increasing pattern of productivity from 2009 to 2012. Then it starts to increase and continues until 2013. then start to fall again

TFP change and its components technological change and efficiency change start at years 2007 about 29 percent of efficiency and then decreasing until 2009 according to world economy in lowest point is 25.7.After that port improve efficiency, So TFP in 2010 to 2015 continue increasing and then reach the highest point at year 2015 about 30.74

Table 5: Leamchabang port

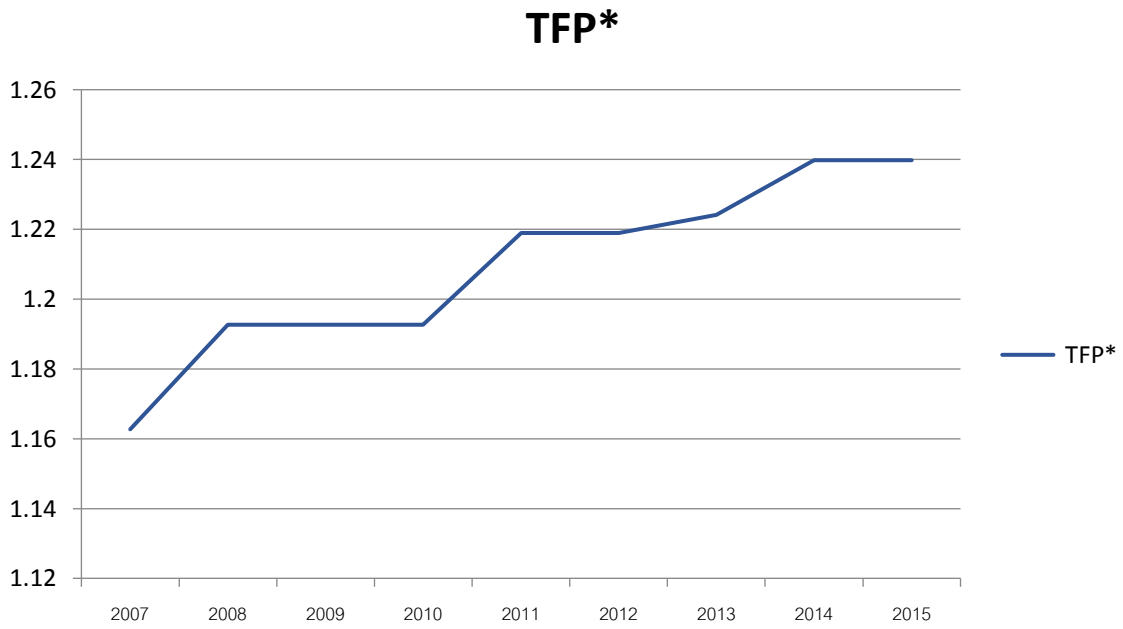
years	TFP	TFP*	TFP change	TFPE	OTE	OSE	OME	ROSE	OSME
2007	0.3618	1.1627	0.3033	0.3112	1	1	1	0.3112	0.3112
2008	0.5392	1.1927	0.4521	0.4521	1	1	1	0.4521	0.4521
2009	0.5005	1.1927	0.4196	0.4196	1	1	1	0.4196	0.4196
2010	0.4893	1.1927	0.4102	0.4102	0.9732	1	1	0.4215	0.4215
2011	0.4491	1.2189	0.3765	0.3685	1	1	1	0.3685	0.3685
2012	0.3899	1.2189	0.3269	0.3199	0.8403	1	1	0.3807	0.3807
2013	0.3434	1.2241	0.2879	0.2805	0.7085	1	1	0.3959	0.3959
2014	0.3217	1.2398	0.2697	0.2595	0.6442	1	1	0.4028	0.4028
2015	0.3222	1.2398	0.2701	0.2599	0.6989	0.987	1	0.3719	0.3719
average	0.4130	1.2091	0.3463	0.3424	0.8739	0.9986	1.0000	0.3916	0.3916

Table 5 presents the meta-technology Färe-Primont productivity change index and its components in each year during 2007-2015 of leamchabang port

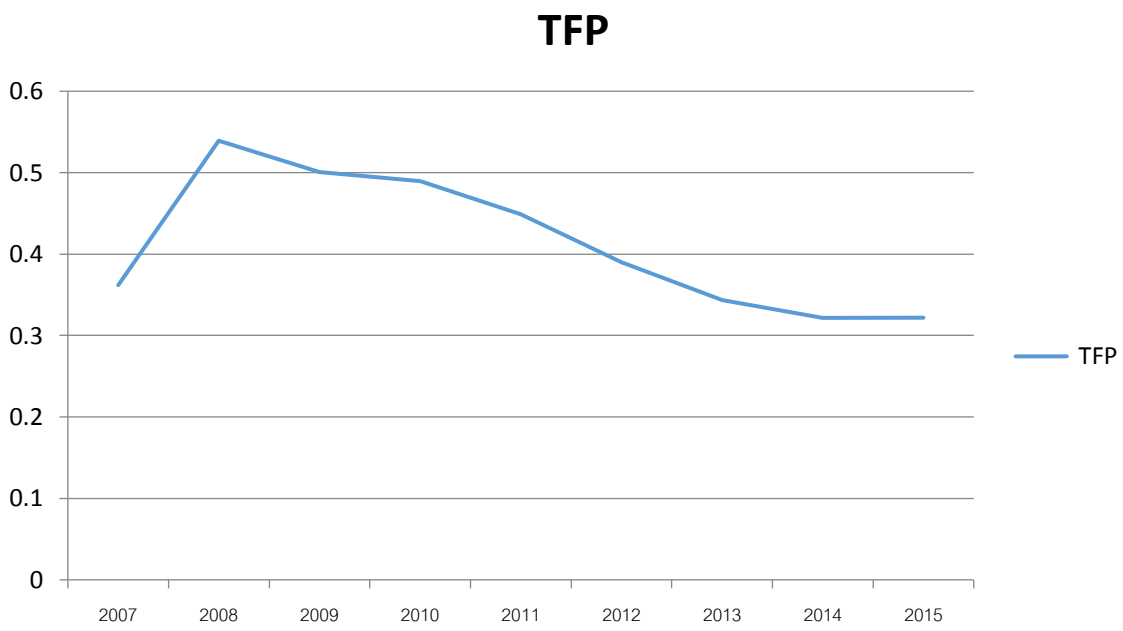


Using these efficiency measures, one can define TFP efficiency (TFPE), which is the ratio between observed productivity and maximum productivity in Table showing output efficiency, at the first year in table is 2007 start at 0.3112 percent then move in highest point

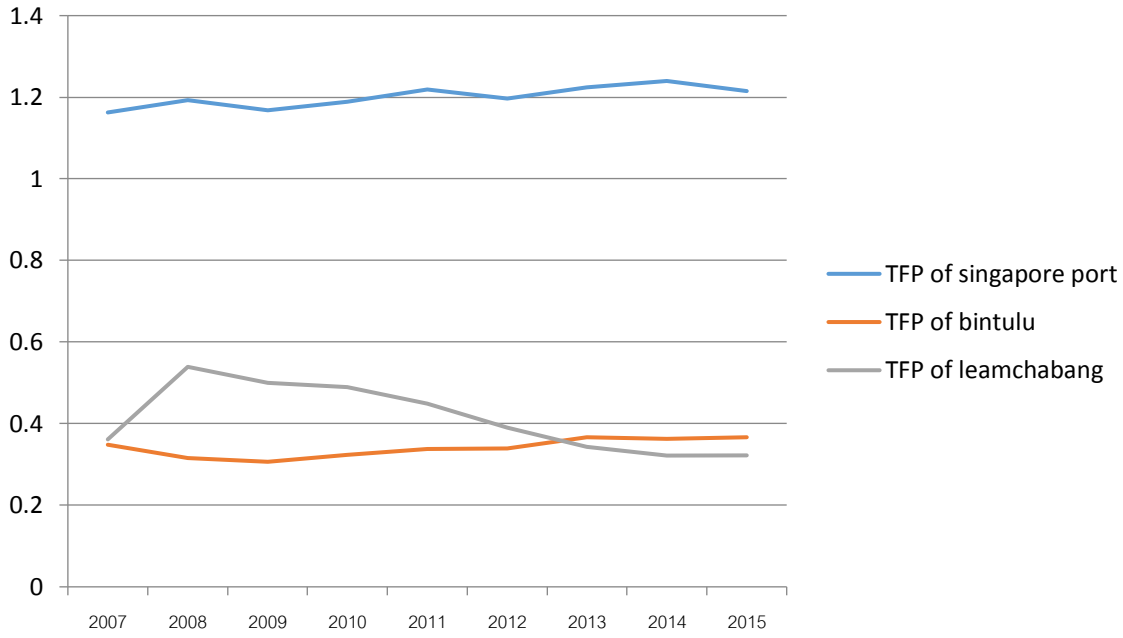
in next year is 0.4521 percent after that number of TFPE showing that efficiency of TFP decrease gradually every years and reach lowest point at about 0.26 in 2014 and 2015



The estimates of the maximum TFP over all states (TFP*) show that the production possibilities changes are primarily responsible for the declining trend in TFP



The measurement of TFP growth is performed using F€are-Primont Productivity Index developed by O'Donnell (2010, 2012). This is a relatively new index-based method for measuring productivity change. O'Donnell (2012) proposes a measurement approach which meets all the required axioms of productivity index measurement so that the F€are-Primont Productivity Index of O'Donnell (2012) is categorized as a 'multiplicatively complete' productivity index. Then the result of TFP in port of Leamchabang start at 0.303 percent in 2007 and then increase to highest point in 2008 about 0.4521 percent and then percent of TFP decrease gradually every years



When compare TFP of three ports that we concern over the study period in 2007 to 2015. The changes of TFP of three ports are the difference but Singapore has a huge difference between Bintulu ports and Leamchabang port in Total factor productivity by measuring in efficiency. The TFP of bintuluport and leamchabang port change in gap between 0.45 and 0.25 but in Singapore port on average of TFP is almost 1 that a lot of difference of TFP. Efficiency that table show TFP is calculated using the Färe-Primont index and decomposing it into various measures of efficiency change (technical, scale and mix efficiency) and technical change of Singapore and the rest is difference a lot in measuring efficiency

4.2 Discussion

This part will Start at Singapore port outcome that show in graph and table that Singapore port does business very efficiency and constantly. Look back in the first place Singapore has come in long way possibility to get to its change starting with a small fishing village on today's worldwide center Port And universal oceanic focus throughout the span from claiming its urban advancement journey. The Frameworks placed to set up permitted the sea industry to weather storms, for example, the global financial crisis and rival starting with regional ports. The timely development of port infrastructure Also transportation networks on backing those businesses spurred for perusing containerization might have been a key contributing factor. In 2015, those improvements of the country's port and associated transport

infrastructure were supported were backed by heavy economic considerations and needed substantial effects on the city's improvement.

However, as containerizations condensed of age warehouses and offices about facilities use, there might have been a great deal. The coordinated effort between the port power and urban organizers together with the private segment will redevelop these ranges for more stupendous livability outcomes, which were seen over territories along the Singapore River. The port will proceed with a chance to be a major part of Singapore's economy. The challenge setting off ahead may be how will support its constant growth. Previously, a Singapore the place the contending utilization of those restricted add up from claiming land will be getting tighter, and the call for a liveable city stronger. But Singapore has planned to build the third and fourth phases of the Pasir Panjang terminal were opened at completely operational by end-2017. The terminal will permit Singapore on handle 50m TEUs yearly. Those longer-term wants will be on shift port exercises far from Tanjong Pagar and Pasir Panjang, will Tuas. The Tuas ports will a chance to be produced on four periods through 30 quite some time. At completed, it will have those abilities will handle 65m TEUs from claiming holders annually, alternately more than twice measure from claiming TEUs took care in 2015. Singapore arrangements move constantly on its port exercises on Tuas from 2027. And only the government's arranging will be on allowed up prime sea-facing land to Tanjong Pagar and Pasir Panjang to private and business developments.

Bintulu port and Leamchabang port are not different on efficiency in port and handle activity but Leamchabang port is more efficiency than Bintulu port a tiny proportion because Bintulu port in Geographically arranged halfway the middle of Kuching, Sarawak and Kota Kinabalu, Sabah along those occupied ocean lanes for Intra Asia exchange for A profound ocean harbor. Bintulu port is the import and fare passage to Sarawak and the Brunei, Indonesia, Malaysia, Philippines east ASEAN development region (BIMP-EAGA) locale. Today, it is east Malaysia's biggest compartment port and the nation's sole condensed characteristic gas (LNG) fare passage and it may be noted as at present a standout amongst those biggest LNG fare terminal in the reality. Freight produced from its hinterland is anticipated should expansion Likewise the Sarawak hall for renewable vitality (SCORE) activities would implement, for extra shipment for aluminum, mash and paper, silicon, manganese, fertilizer, downstream timber and agro produce Also result settling on its route of the dock. That is why when a subprime crisis happens to have an effect on a price of oil and LNG that made the efficiency of port falling down in that year and this port are near an Oil rig in Bintulu town; it made a port

to be very sensitive to gas price situation. However, this port locates at busy sea lanes of Intra-Asia Trade with a deep sea harbor and the only deep sea harbor in Borneo island; then they can improve an efficiency of a port by improving technology and the new strategy.

Also, Leamchabang port, The geological area from claiming Thailand is fortified with neighboring nations, for example, Myanmar, Laos, Cambodia, moreover Malaysia and likewise need the entry on China and Vietnam. It is concerning about illustration a passage on south East Asia location. It needs favorable element for its substantial hinterland; therefore, those port need those helter-skelter ability on creating to make a passage port neighboring nations on making its hinterland. Laemchabang port needs the current state-of-art foundation and hi-technology offices should back at administrations. It may be fit of taking care of biggest vessels (Post-Panamax). It needs addition supporting ranges to docking operations and related exercises. Moreover, those ports are nerved Eventually Tom's perusing those organize of highways, railways, Also waterways; interfacing both the places and neighboring countries. Additionally, Laemchabang port needs addition regions on augmenting related benefits of the business such truck couch terminals, appropriation center, organized commerce area, Also and so forth. This also incorporates other vital offices for example, such that unsafe bulks warehouse and shoot harm aversion focal point. These offices need aid affirmed to the worldwide standard with being prepared with furnish constantly on benefits. Then port can handle a lot of vessels, cargo and cargo throughout and technology is still the key to development

Overall, the best port in this work is Singapore port. Second and third cannot identify clearly because on average in TFP Leamchabang port more than Bintulu port but if take a look on the trend of TFP, Bintulu port trend are increase nevertheless while the trend of Leamchabang was decreasing in year that concern 2007 to 2015 and all the reasons above support result of investigation in each ports activity though situation, plan, and organization.