Regional Disparities in Central Java

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Zusammenfassung

Regional ungleich verteiltes regionales Wachstum führt zu Disparitäten und sozialen Spannungen. Regionalpolitik und -planung müssen darauf reagieren. Dies setzt voraus, dass die Ursachen der zugrunde liegenden Prozesse bekannt sind und die geplanten Maßnahmen daran ansetzen. Im globalen Süden sind die Möglichkeiten einer auf der amtlichen Statistik beruhenden Regionalanalyse gering, daher sind hier angepasste Methoden erforderlich. Die vorliegende Studie entwickelt und testet diese in Zentral-Java/Indonesien.

Hier bilden die Städte Jakarta und Surabaya ein bipolares Entwicklungszentrum in West-Ost-Richtung des Nordküstenkorridors der Insel. Dies führt zu Entwicklungsunterschieden zwischen den Nord- und Südregionen Javas. Die meisten nördlichen Regionen haben eine Veränderung zu einer nichtlandwirtschaftlich geprägten Wirtschaftsstruktur durchlaufen, während die meisten Regionen im Süden dominant landwirtschaftlich geprägt blieben. Dieser Unterschied wurde schon durch die koloniale Erschließung Indonesiens durch die Niederländer begründet, die in Java zentrale Handelswege aufbauten. Die Hafenstädte an der Nordküste dienten als Knotenpunkte für die Ein- und Ausfuhr von Waren von und nach Java. Deshalb hatten die nördlichen Regionen ein stärkeres ökonomisches Wachstum und auch das städtische Wachstum verlagerte sich von den Binnenregionen zu den nördlichen Küstenregionen. In der Folgezeit verfestigten sich die Unterschiede, auch in der Wahrnehmung von nördlichen und südlichen Regionen im Bewusstsein der Menschen, was wiederum zu einer hauptsächlich auf die Nord-Süd-Unterschiede ausgerichteten Regionalpolitik von Lokal- und Zentralregierung geführt hat.

Die primäre Zielsetzung der vorliegenden Studie ist die Analyse der Disparitäten in Zentral-Java sowie Yogyakarta, die als „Transferregion“ zwischen den beiden großen Polen interessant ist. Außerdem sollen die räumlichen Muster von Nord-, Mittel- und Süd-Korridoren in Zentral-Java diskutiert werden. Die Ungleichheit zwischen den Korridoren scheint in strukturellen Veränderungen begründet zu sein. Mit steigender Ungleichheit und neuen Konflikten wurden infolge der Asien-Krise 1997/98 von der Zentralregierung die Maßnahmen der Dezentralisierung intensiviert. Daher umfasst diese Studie Phasen unterschiedlicher regionalpolitischer Prioritäten.

Die Ungleichheit wurde anhand des Williamson-Indexes und der Kuznets-Kurve unter Verwendung von sekundären Daten (ökonomische und soziale Indikatoren auf Regierungs- und Stadtebene zwischen 1990 und 2010) analysiert. Die vorliegende Studie entwickelte zudem eine Methodik zur empirischen Bestimmung der Bewertung des Technologieniveaus in den Untersuchungsregionen, wobei regionale Akteure standardisiert zur Einschätzung von technologischen Fähigkeiten, wie Aspekte der Regierung, von Humankapital, Investitionen und Infrastruktur, bezüglich aller Kreise (Regency) in Zentral-Java befragt wurden.

Infolge des Strukturwandels wachsen der Sektor der Landwirtschaft und die industrielle Produktion in einer Region zwar gleichzeitig, aber aufgrund des wirtschaftlichen Dualismus ungleich. Der Prozess des Strukturwandels war im Zeitverlauf sehr unterschiedlich, so dass sich Städte und Kreise uneinheitlich entwickelten. Dabei verzeichneten einige Sektoren überdurchschnittliches Wachstum. Anhand von Berechnungen mit Hilfe des Location Quotients (LQ) konnte gezeigt werden, dass sich die Arbeitsplatzstruktur in allen Korridoren verändert hat, wenn auch mit unterschiedlichen Intensitäten. Der Übergangsprozess in Kreise innerhalb des Nordkorridors war sehr unterschiedlich, was zu einer großen Kluft zwischen Agrar- und Industriegebieten in diesem „Korridor“ führte. Andererseits erlebte der mittlere Korridor im Zentrum der Insel ähnliche Veränderungen in den meisten Städten und Kreise, während im Südkorridor die auf der Landwirtschaft basierende Wirtschaftsstruktur bestehen blieb. Die Transformati-

on der Wirtschaftsstruktur ist auch als Modernisierungsprozess von ländlich zu städtisch geprägten Regionen zu verstehen. Es wird vermutet, dass die Unterschiede im Beschäftigungsanteil der verarbeitenden Industrie und der Landwirtschaft regionale ökonomische und soziale Disparitäten verursachen.

Mit Hilfe des Williamson Indexes zur Bewertung der Ungleichheit des Wirtschaftswachstums zeigte die Analyse eindeutige Disparitäten zwischen Nord-, Mittel- und Südkorridor. Die alternative Spezialisierung der Kreise im Nordkorridor auf Landwirtschaft oder Industrie führte zu einer großen Disparität innerhalb des Korridors, die aber im Zeitverlauf tendenziell etwas geringer wird. Der höchste Indexwert (V_w) für den Nordkorridor betrug im jahr 2006 0,79. Die Ungleichheiten innerhalb des Mittelkorridors sind nur wenig gestiegen und in den letzten Jahren auch mehrheitlich zurückgegangen. Innerhalb des mittleren Korridors haben geographische Gemeinsamkeiten ähnliche Wachstumsraten in den Kreisen zur Folge. Der mittlere Korridor hat deshalb im Vergleich zu den beiden anderen eine geringe Disparität zu verzeichnen. Demgegenüber war die Disparität innerhalb des Südkorridors sehr hoch. Sie erreichte 2008 einen Höchstwert von 0,92. Damit ist eher ein langsamer ‚catching-up' Prozess in Gang gesetzt worden.

Da die Disparitäten zwischen Städten bzw. Kreise steigen, versuchte die indonesische Zentralregierung, das finanzielle Einnahmedefizit auf Ebene der Provinzregierung, insbesondere aber auch auf subprovinzieller Ebene zu schließen. Ob eine solche Maßnahme der Subvention langfristig geeignet ist, die Disparitäten zu verringern, bleibt unklar. Die Dezentralisierung war in erster Linie in der Unzufriedenheit mit der staatlichen Einnahmeverteilung begründet und zielte auf eine Verringerung der regionalen Unterschiede ab. Die fiskalische Dezentralisierung in Indonesien konzentrierte sich auf die Ausbildung eines Transfersystems von der Zentralregierung zur lokalen Regierung. Der Transferfonds erzeugt jedoch eine große fiskalische Abhängigkeit zwischen den zentralen und lokalen Regierungen. Zudem profitieren die ressourcenreichen Regionen aufgrund ihres hohen Anteils an den Einnahmen der Zentralregierung überdurchschnittlich an den Zuweisungen. Die Transferzahlungen subventionieren hauptsächlich die Löhne von Staatsmitarbeitern. Da Beamte und viele Behörden infolge der Dezentralisierung der lokalen Ebene zugeordnet wurden, hatten sich die Ausgaben der lokalen Ebene verdoppelt und die Abhängigkeiten von diesen Zuweisungen erhöht.

Im Verlauf der wirtschaftlichen Entwicklung Zentral-Javas, wurden "Nord bzw. Süd" -Regionen vor dem Hintergrund von politischen, sozio-ökonomischen und geographischen Gegebenheiten definiert. Da sich der Strukturwandel vor allem im Stadt- und Umlandbereich zeigt, deuten die analysierten Muster in den nördlichen, mittleren und südlichen Korridoren von Zentral-Java und Yogyakarta eher auf regionale Spezialisierungen und nicht auf Disparitäten hin.

Basierend auf einer Analyse des Wachstums der Kreise (und nicht mehr auf Korridorebene) in Fünfjahreszeiträumen seit 1990 zeigt sich, dass das dominierende Muster durch die Beziehung zwischen Stadt und Umgebung bzw. zwischen dem Wachstumspol und seinem Hinterland charakterisiert ist. In einigen Fällen werden Ausstrahlungseffekte ausgehend vom Wachstumspol auf die Umgebung wirksam, vor allem wenn diese einen direkten Verkehrszugang zum Pol haben. Drei große Städte, Semarang, Solo und Yogyakarta, stellen im Verhältnis zu ihrer Umgebung die dominierenden Regionen dar und schaffen dadurch einen „Wachstumskorridor". Die Peripherie mit direkter Verbindung zu ihrem entsprechenden Pol kann vom Wachstum der Pole in Form von räumlichen Polarisierungseffekten profitieren. Andererseits leiden die vom Wachstumspol weiter entfernten Kreise unter geringeren Wachstumsraten.

Deshalb entstanden Regionen mit höherem Wachstum vor allem um Städte bzw. Wachstumspole und weniger entwickelte Regionen konzentrierten sich vor allem in der räumlichen Peripherie. nach den Maßnahmen der Dezentralisierung waren Regionen mit hohen Wachstumsraten insbesondere in den Kreisen des mittleren Korridors verbreitet. Schließlich wurden die Unterschiede im Wirtschaftswachstum zwischen den Regionen ausgeprägter. Folglich kann es nur bezüglich weniger Regionen zu Konvergenzwachstum kommen, im Allgemeinen ist eine divergente räumliche Entwicklung zu beobachten.

Dem Wachstums- und Konvergenzkonzept zufolge ist die Technologie eine wichtige Variable für die Erklärung der regionalen Konvergenz bzw. der Verringerung der Ungleichheit. Entscheidender Faktor für die Standortwahl technologieorientierter Unternehmen ist ihre Bewertung spezieller Indikatoren der Standorteignung. Allerdings sind Daten zum technologischen Niveau und seiner Bewertung nicht vorhanden. Daher wurden die Daten mittels eines empirisch-methodischen Ansatzes erhoben, indem die Wahrnehmung der regionalen Technologie- und Innovationsfähigkeit von Experten in 40 Kreise ermittelt wurde. Diese innovative Methode kann als geeigneter Ansatz zur Bewertung der technologischen Niveaus einzelner Kreise durch die dafür relevanten ökonomischen und staatlichen Akteure bewertet werden. Allerdings ist dieses komplexe standardisierte Erhebungsverfahren arbeitsintensiv und zeitaufwändig. Als neuer Ansatz kann die empirische Methode aber die identifizierte regionale Spezialisierung der vorangegangen Konvergenzanalyse validieren. Es zeigt sich, dass aufgrund der Bewertung durch die Experten die Annahme der Existenz von Nord-Mittel- und Südkorridor entkräftet wird. Dieses Ergebnis wird auch durch die abschließende Clusteranalyse bestätigt.

Die Clusteranalyse führt zum Erkennen eines sehr differenzierten räumlichen Musters, das der anfänglichen Vermutung eines Nord-Mitte-Süd-Gefälles in Zentral-Java und Yogyakarta widerspricht. Es gruppiert, basierend auf verschiedenen Variablen, ähnliche Städte bzw. Kreise, was zu einer Identifizierung von vier Clustern in Zentral-Java und Yogyakarta führt. Die Cluster unterscheiden sich eindeutig in ländliche und städtische bzw. landwirtschaftliche und industrielle Regionen. Die städtischen Gebiete schließlich erhalten eine Funktion als Wachstumspole, indem sie nicht-landwirtschaftliche Sektoren als ökonomische Basis für eine Polarisierung ausbilden und sich das Wachstum auch räumlich in der Umgebung ausbreiten kann. Hierfür ist die räumliche Nähe eines Kreises zum Wachstumspol von entscheidender Bedeutung. Je weiter ein Kreis von einem Wachstumspol entfernt ist, desto langsamer scheint der Strukturwandel fortzuschreiten. Dies unterstützt die These, dass Fühlungsvorteile ein entscheidender Faktor sind. So ist eine regionale Typologie, die auf Clusteranalyse und technologischen Wahrnehmungsmustern basiert, in der Lage, ein konsistentes System der Klassifizierung zu schaffen und die räumlichen Strukturen und Prozesse zu erklären.

Die Clusteranalyse weist auf mindestens zwei verschiedene Entwicklungspfade unter den Kreisen Zentral-Javas und Yogyakarta hin. Der erste Entwicklungspfad wird als Industrialisierung, ausgehend von einer „höheren regionalen Hierarchie“, beschrieben, wobei die Transformation als Teil eines Ausstrahlungseffektes vom Wachstumszentrum zu seiner Umgebung stattfindet. Der zweite Entwicklungspfad könnte als Industrialisierung ausgehend von der „unteren regionalen Hierarchie“ erklärt werden, in der eine Industrialisierung weit vom Wachstumszentrum entfernt auftreten kann. Für die weitere regionale Planung ist es notwendig, auf die tatsächliche regionale Differenzierung auf der Grundlage statistischer Daten und der empirischen Evidenz zu reagieren und gezielt die Ursache-Wirkungs-Beziehungen der räumlichen Prozesse zu adressieren.

Abstract

The regional differences generate the unequal growth that leads to disparities and social tensions. Regional policies and regional planning have to response it in a way that the causes of the underlying processes are identified by planned measures. In many developing countries, it is difficult to conduct a regional analysis based on public statistics. The present study develops and tests these new methods in Central Java and Yogyakarta, Indonesia.

The cities of Jakarta and Surabaya have formed a bipolar development pattern in the west-east direction of the Java Island's north coast corridor. This leads to differences in regional development between northern and southern regions of Java. Most of north regions have evolved into a predominantly non-agriculture economic structure whereas most of south regions are still largely dominated with agriculture. This difference initially was established by the Dutch colonial who created central trade routes in Java. The north coastal region, which was Dutch's domain, served mainly as the port cities that functioned primary outlet and inlet for inland products leaving Java. Consequently, north regions had a stronger economic growth, which affects the shift of urban growth orientation from the inland towards the northern coastal areas. Subsequently, the contest of north-south regions has been perpetuated in public perception, which in turn has prompted the local and central government to pursue a regional policy focused on north-south differences.

The primary objective of this study is to analyze the disparities in Central Java and Yogyakarta provinces, which is interesting due to its role as „transverse region" between the two major poles. At this rate, the spatial patterns of north, middle and south corridors in Central Java are engaging to be discussed. The disparity has occurred mainly because of the structural changes taking place. The Williamson index reassessed with the Kuznets seminal inverted-U curves has been used to measure the disparity based on secondary data of economic and social indicators on regency/city level from 1990 to 2010. In addition to statistical analysis, this study develops methodology for evaluating the technologization level empirically by involving and interviewing regional stakeholders in the study area. Using standardized questions and manners, three dimensions have been assessed, namely government intervention, human resources, investments and infrastructure across all administrative regions of Central Java and Yogyakarta.

The basic fact of economic dualism is the presence of unbalance development. As the structural change takes place, agriculture and manufacture sector grow parallel. However, its process varied greatly over time which eventually generates uneven development among cities/ regencies. Some sectors have lead while other have lagged. Using Location Quotient (LQ), the result shows that all corridors have experienced changes in the labor structure albeit with different intensities. The transition process within the north corridor differed considerably, causing a wide gap between the agrarian and industrial regencies/ cities. On the other hand, the middle corridor experienced similar changes in most cities and regencies while the south corridor concentrated mostly on agriculture. The transformation of the economic structure is comprehended to be the modernization process from predominantly rural to mainly urban. The differences in the employment share of manufacturing industries and agriculture can mainly cause regional disparity.

Using Williamson Index to assess the inequality of economic growth, the results demonstrate a distinct disparity trend between north, middle and south corridors. The specialization of agriculture and non-agriculture within north corridor leads to high disparity but over time, it turns up slightly fall. The highest index (V_w) in the north corridor was 0.79 in 2006. The inequalities within the middle corridor have risen slightly and declined recent years. Within the middle corridor, the similarities of geographical features

simultaneously create an equal growth among regencies/ cities. Middle corridor has enjoyed low disparity compared to the other two. In contrast, the disparity within the south corridor has been considerably high. It reached a high of 0.92 in 2008. Thus, a very slow catching up process occurs and identified.

As disparity arose and conflicts emerged, new policies - namely decentralization – were enacted by the central government after the Asia Crisis. Decentralization has been implemented mainly to address the regional segregation in sub-provincial level as a result of regional discontent on revenue sharing. It is not yet clear, whether the decentralization impact may either reduce or widen disparity, as decentralization is a long-term process. Strategic issues on fiscal decentralization in Indonesia focus on the transfer system from the central government to the local government as an attempt to fill the fiscal gap due to transfer authority to local government. However, the transfer fund generates great fiscal dependency between central and local level governments. On the other side, the rich (resource) regions gain more than average profits and benefits because of high revenue sharing from the central government in the form of Revenue Sharing Funds. The transfer grant namely Grant Allocation Funds is mainly addressed for government employee wages that local spending has doubled because civil servants and thousands of facilities have been re-assigned to local level since the decentralization.

In the context of a developmental unit, the definition of 'north-south' regions has been interpreted with political, socio-economic and geographical realities in mind. As the structural change mostly occurs in urban and its surrounding, the pattern in the north, middle and south corridors of Central Java and Yogyakarta more or less indicates regional specializations rather than disparity. Based on five-year classification of growth since 1990, the dominant pattern is mostly about the relationship between urban and its surrounding: between growth pole and its hinterland. Some cases shows that spread effects from the pole, nevertheless, is effective for its surroundings, which have direct access to the pole. Three major cities, Semarang, Solo, and Yogyakarta, are the dominant/ prime cities toward their surroundings creating a growth corridor or cluster. The surroundings, which have direct links to their perspective poles, gain overflow growth from those cities. On the other side, the regencies and small cities locate away from the pole have suffered from lagging growth. Given that reason, higher growth regions evolved mostly around cities/poles and less-developing regions clustered mostly in regions away from the cities. However, after decentralization of the government, the high growth regions were more likely to spread widely, especially in the middle corridor. Eventually, the differences in economic growth between regencies/ cities became prevalent. Consequently, convergence growth may occur only in some affected regions but in general, divergence takes place.

According to growth and convergence concept, technology is an important variable for explaining regional convergence or reducing disparity. Technology-oriented companies select their location based on special indicators of compatibility site. However, the data representing technology levels are often not available on a regional level or even debatable. Despite all the shortcomings of statistical data deficiency, there are possible ways to obtain the data using other methods from different angles. To attain those data, the empirical methodological approach has been developed to identify the expert's perception of the technology levels and innovation capabilities in 40 regencies/ cities. This new methodology has been developed as a suitable approach to assess the technological capabilities because it involves the assessment of relevant regional stakeholders. However, this approach is labor-intensive and time-consuming with high resources needs because of the complexity and standardized process. As new approach, it validates the regional specialization in earlier analysis. The result shows clearly that the experts invalidate the assumption of north-south corridor, which is further confirmed in cluster analysis as the final assessment.

The cluster analysis expresses that the finding draw a differentiated pattern that eventually also negates the assumption of north-middle-south disparity in Central Java and Yogyakarta. It groups similar regen-

cies based on diverse variables, resulting four clusters in Central Java and Yogyakarta. Those clusters classify urban and rural regions, agriculture and industrial regions. The urban areas eventually functioned as growth poles, creating extended urban areas with non-agricultural sectors as their economic base and spreading out growth toward its surroundings. In this case, the proximity to the pole is crucial. The further from the pole, the slower the socio economic transition process became. Proximity advantages play a decisive role in regional growth. At this rate, the regional typology based on cluster analysis and technological perception patterns seem to establish a more consistent system of classification and a substantial explaining of spatial structures and process.

The cluster solution shows that typology was formed on at least two different paths. The first path is described as industrialization from the higher regional hierarchy, in which the transformation takes place as part of a radial effect from the growth center to its surroundings. The second path could be explained as industrialization from the lower regional hierarchy, in which industrialization might occur far from the growth center. Therefore, in the wake of decentralization, the regencies have equal opportunity to accelerate growth as in the pole. At last, it is essential to response on the actual regional differentiation based on statistical data and the empirical evidence as well as to address specifically the cause-and-effect relations of spatial processes for further regional planning.

Abstrak

Perbedaan wilayah akan menimbulkan ketidakseimbangan pertumbuhan yang pada akhirnya menyebabkan kesenjangan dan ketegangan sosial antar wilayah. Dalam merespon permasalah tersebut, kebijakan regional dan perencanaan wilayah perlu mengidentifikasi proses terjadinya ketimpangan yang dapat digunakan sebagai alat untuk menyusun perencanaan wilayah yang sesuai dengan karakter wilayah tersebut. Di negara yang sedang berkembang, analisis yang berdasarkan perhitungan statistik terkadang sulit dilakukan terutama di level bawah pemerintahan lokal. Studi ini mengembangkan dan menguji metode penelitian untuk mengatasi permasalahan kurangnya data statistik dalam rangka mengevaluasi isu regional ataupun kewilayahan pada kasus ini mengenai permasalahan kesenjangan regional di Propinsi Jawa Tengah dan Yogyakarta.

Kota Jakarta dan Surabaya merupakan dua kutub pertumbuhan ekonomi utama di pulau Jawa. Kedua kutub ini membentuk suatu pola pusat pertumbuhan bipolar dari timur ke barat sepanjang koridor pantai utara Jawa. Pola bipolar ini menimbulkan perbedaan pertumbuhan antara koridor utara dan koridor selatan pulau Jawa. Sebagian besar wilayah di utara Jawa mengalami perubahan pada sektor ekonomi dari ekonomi pertanian ke non-pertanian. Sedangkan wilayah selatan tetap didominasi oleh sektor ekonomi pertanian. Perbedaan pertumbuhan wilayah utara dan selatan Jawa ini berawal dari datangnya kolonial Belanda ke Pulau Jawa untuk berdagang dan mengekploitasi kekayaan alam. Pantai utara yang merupakan wilayah kekuasaan Belanda berfungsi sebagai jalan keluar dan masuk utama bahan mentah dan barang-barang produksi dari dan ke Pulau Jawa. Hal ini menyebabkan wilayah pantai utara Jawa berkembang dramatis dan memiliki pertumbuhan ekonomi yang lebih kuat dari wilayah lainnya. Selanjutnya, pertumbuhan perekonomian wilayah utara mampu menggeser orientasi pertumbuhan urban dari wilayah-wilayah pedalaman ke daerah pesisir utara Jawa. Dalam perkembangannya, adanya perbedaan pertumbuhan antara utara dan selatan menancapkan persepsi di benak masyarakat yang mana pada akhirnya mendorong pemerintah daerah dan pusat untuk mengejar kebijakan regional yang difokuskan pada perbedaan utara-selatan ini.

Tujuan utama dari penelitian ini adalah untuk menganalisis ketimpangan pertumbuhan di propinsi Jawa Tengah dan Yogyakarta yang secara harafiah hanya berfungsi sebagai "daerah transit " antara dua kutub utama. Selain itu, penelitian ini juga mengidentifikasi pola spasial di dalam koridor utara, tengah dan selatan di Jawa Tengah. Sedangkan ketimpangan antar koridor terjadi terutama karena perubahan struktural perekonomian. Ketimpangan dalam studi ini dianalisis dengan menggunakan Indeks-Williamson dan kurva Kuznets berdasarkan data sekunder tentang sosial ekonomi wilayah di tingkat kabupaten dan kota tahun 1990-2010. Penelitian ini mengembangkan metodologi untuk mengevaluasi tingkat teknologi secara empiris dengan melibatkan dan mewancarai para stakeholder untuk menilai kemampuan teknologi di kabupaten dan kota di Jawa Tengah. Aspek yang dinilai adalah dukungan pemerintahan, modal manusia, investasi dan infrastruktur. Para stakeholder yang terpilih berjumlah 40 orang yang tersebar mewakili 40 kota dan kabupaten di propinsi Jawa Tengah dan Yogyakarta.

Pada saat berlangsungnya transformasi struktur, sektor pertanian dan industri manufaktur tumbuh bersamaan di suatu wilayah. Akan tetapi, hal penting dari berlangsungnya dualisme ekonomi ini adalah munculnya ketidakseimbangan wilayah dikarenakan proses transformasi struktur bervariasi antara kabupaten dan kota. Ada wilayah yang sektor pertaniannya lebih berkembang daripada sektor manufaktur industri, namun adapula yang sebaliknya. Dengan menggunakan analisis Location Quotients (LQ), hasilnya menunjukkan bahwa semua koridor telah mengalami transformasi struktur tenaga kerja meskipun dengan tingkat intensitas yang berbeda-beda. Di koridor utara, proses transformasi yang berlangsung

sangat berbeda-beda yang menyebabkan perbedaan pertumbuhan antara kota/kabupaten berbasis pertanian dan industri manufaktur. Sebaliknya, kabupaten dan kota di koridor tengah mengalami perubahan struktur dengan intensitas yang sama rata serta koridor selatan yang tetap mempertahankan basis stuktur ekonomi pertanian. Proses transformasi struktur ekonomi ini harus dipahami sebagai proses modernisasi pedesaan menjadi daerah urban. Namun demikian perbedaan dalam struktur pangsa tenaga kerja pertanian dan manufaktur dapat menjadi penyebab utama kesenjanan ekonomi dan sosial daerah.

Indeks Williamson dalam studi digunakan untuk mengevaluasi ketimpangan pertumbuhan ekonomi. Hasilnya jelas menunjukkan bahwa terdapat kesenjangan yang jelas antara koridor utara, tengah dan selatan. Dualisme ekonomi antara pertanian dan industri manufaktur di koridor utara menyebabkan disparitas yang besar di antara kabupaten/kota di koridor utara, namun demikian seiring waktu, ketimpangan tersebut cenderung agak turun. Nilai Indeks Williamson tertinggi (Vw) untuk Koridor Utara adalah 0,79 pada tahun 2006. Sedangkan ketimpangan dalam koridor tengah hanya mengalami sedikit fluktuasi naik dan turun dalam beberapa tahun terakhir. Kesaaman fitur geografi yang menyebabkan wilayah-wilayah koridor tengah memiliki tingkat pertumbuhan yang hampir sama di antara kabupaten/ kota. Oleh karena itu, koridor tengah mencatat disparitas yang rendah dibandingkan dengan dua koridor lainnya. Sebaliknya, disparitas di antara wilayah-wilayah di koridor selatan sangat tinggi yang mencapai puncaknya pada tahun 2008 dengan nilai 0.92. Sehingga proses ‚catching-up' ataupun convergence yang teridentifikasi berlangsung perlahan dan lambat.

Dengan meningkatnya ketimpangan wilayah dan konflik-konflik regional yang muncul akibat ketidakpuasaan terhadap dana bagi hasil antara pemerintah pusat ke pemerintah daerah, pemerintah Indonesia menerbitkan kebijakan desentralisasi yang intensif menyusul krisis Asia dan kekacauan politik tahun 1997-98 yang disusul dengan pergantian rezim pemerintahan. Penelitian ini meliputi tahapan prioritas kebijakan daerah yang berbeda. Akan tetapi hingga penelitian ini diselesaikan, belum jelas apakah dampak decentralisasi akan mengurangi atau semakin menambah lebar jurang ketimpangan wilayah. Perlu diingat, bahwa desentralisasi membutuhkan proses yang panjang untuk dapat dirasakan manfaatnya bagi semua wilayah di Indonesia. Isu strategis dalam desentralisasi fiskal di Indonesia berfokus pada sistem transfer dana dari pemerintah pusat ke pemerintah lokal sebagai upaya untuk menutup kesenjangan fiskal antar wilayah di Indonesia. Hal ini menjadi dilema tersendiri, karena dana transfer ini menimbulkan ketergantungan yang tinggi antara daerah terhadap pusat. Sedangkan di satu sisi, daerah kaya akan mendapatkan keuntungan lebih lantaran tingginya Dana Bagi Hasil (DBH) dari pemerintah pusat terhadap daerah asal pendapatan (origin). Dana transfer dari pusat terutama Dana Alokasi Umum (DAU) ditujukan untuk membayar gaji pegawai negeri yang mana sejak desentralisasi belanja pemerintah daerah menjadi berlipat ganda akibat pegawai negeri daerah dan fasilitas daerah yang dibebankan pembayaran dan penggunannya ke pemerintah daerah.

Di dalam konteks unit ekonomi pembangunan, definisi wilayah „utara“ dan „selatan“ telah diintepretasikan secara nyata dalam bidang politik, sosial ekonomi dan realita geografi. Dikarenakan transformasi struktural ekonomi biasanya banyak berlangsung di daerah urban dan sekitarnya, pola spasial yang terbentuk di koridor utara, tengah dan selatan pada akhirnya menunjukkan adanya spesialisasi sektoral dan bukanlah sebuah ketimpangan wilayah. Berdasarkan klasifikasi pertumbuhan ekonomi lima tahunan, pola yang dominan yang terjadi merupakan pola hubungan antara daerah urban dan sekelilingnya yaitu antara pusat pertumbuhan dan daerah pinggirannya. Dalam beberapa kasus menunjukan bahwa efek penyebaran pertumbuhan dari pusat pertumbuhan ke sekelilingnya adalah strategi yang efektif. Tiga kota besar yaitu Semarang, Solo dan Yogyakarta adalah kota yang dominan terhadap wilayah sekelilingnya menciptkan pertumbuhan klaster ataupun koridor pertumbuhan. Wilayah sekelilingnya yang memiliki akses langsung ke kota memperoleh keuntungan limpahan pertumbuhan dari kota-kota utama tersebut. Sebaliknya kabupaten/ kota yang letaknya jauh dari kota-kota utama mengalami pertumbuhan yang lambat. Dengan demikian, pertumbuhan ekonomi yang tinggi biasanya terjadi di sekeliling

kota-kota utama, sedangkan kabupaten-kabupaten yang mengalami kelambatan pertumbuhan ekonomi letaknya berkelompok jauh dari kota-kota utama. Setelah penerapan desentralisasi, walau belum tampak tegas , pertumbuhan ekonomi menyebar tidak lagi hanya mendekati kota-kota utama, terutama di koridor tengah. Alhasil, perbedaan pertumbuhan ekonomi antara kabupaten/ kota menjadi tersebar luas dan nyata dikarenakan kabupaten yang jauh dari kota-kota utama memiliki kesempatan yang sama untuk tumbuh seperti halnya pusat-pusat pertumbuhan. Akibatnya, konvergensi hanya dapat terjadi di beberapa kabupaten dan kota yang memiliki pertumbuhan yang sama rata dan membentuk suatu klaster akan tetapi bila diukur secara keseluruhan pertumbuhan yang sesungguhnya sedang berlangsung adalah divergen.

Berdasarkan konsep pertumbuhan dan konvergensi, teknologi adalah variabel penting untuk dapat menjelaskan terjadinya konvergensi regional ataupun untuk mengurangi tingkat ketimpangan pembangunan wilayah. Faktor yang menentukan untuk pilihan lokasi sebuah perusahaan berorientasi teknologi adalah kesesuaian terhadap indikator spesifik atas karakter jenis perusahaan tersebut. Permasalahan yang dihadapi dalam penelitian ini adalah data tentang tingkat teknologi ataupun evaluasi mengenai teknologi tidak tersedia serta tidak pasti. Oleh karena itu, untuk mendapatkan data tersebut dilakukan dengan cara pendekatan metodologi empiris berdasarkan persepsi para ahli tentang teknologi dan inovasi regional di 40 kabupaten/ kota. Metode inovativ ini dinilai sebagai pendekatan yang sesuai dalam menilai tingkat teknologi regional karena evaluasi dilakukan senyatanya oleh para pemegang kepentingan di bidang sosial ekonomi dan pemerintahan yang relevan. Namun demikian, standar metode ini relativ rumit dan membutuhkan tenaga kerja yang intensif serta waktu yang relatif panjang. Hasil dari metode pendekatan empiris ini memvalidasi spesialisasi daerah yang telah diidentifikasi pada analisa konvergensi sebelumnya dan meniadakan asumsi awal adanya perbedaan pertumbuhan antara koridor utara, tengah dan selatan di propinsi Jawa Tengah dan Yogyakarta yang diperkuat dengan analisa cluster di akhir penilaian.

Dalam penelitian ini, analisa klaster mengkelompokkan kabupaten/ kota berdasarkan 14 variabel yang menghasilkan empat cluster di propinsi Jawa Tengah dan Yogyakarta. Hasil analisa klaster ini memperjelas klasifikasi wilayah urban dengan dominasi sektor non-pertanian dan rural dengan dominasi sektor perkonomiannya yaitu pertanian. Wilayah urban berfungsi sebagai pusat-pusat pertumbuhan yang memperluas wilayah urban ke sekitarnya dengan sektor non-agraria sebagai basis perekonomiannya. Sehingga dalam hal ini, kedekatan dengan kota-kota utama menjadi sangatlah esensial. Semakin jauh dari pusat pertumbuhan semakin melambat proses transisinya sosial ekonominya dan pertumbuhannya. Pada akhirnya, tipologi regional berdasarkan analisa kluster dan metologi empiris berdasarkan persepsi para stakeholder terhadap tingkat kemampuan teknologi memperlihatkan konsistensi hasil yang menjelaskan struktur tata ruang dan proses.

Hasil analisis cluster menunjukkan setidaknya ada dua jalur pengembangan wilayah yang berbeda antar kabupaten/ kota di propinsi Jawa Tengah dan Yogyakarta. Jalur pertama digambarkan bahwa industrialisasi dimulai dari "hierarki daerah yang lebih tinggi", dimana transformasi berlangsung sebagai bagian dari efek radiasi dari pusat pertumbuhan terhadap wilayah sekitarnya. Sedangkan jalur kedua dapat dijelaskan bahwa industrialisasi berawal dari "hierarki daerah yang lebih rendah" dalam hal ini industrialisasi dapat terjadi jauh dari pusat pertumbuhan. Sehingga untuk perencanaan daerah lebih lanjut perlu untuk menanggapi diferensiasi daerah yang sebenarnya atas dasar data statistik dan bukti empiris, dan secara khusus menangani hubungan sebab-akibat dari proses spasial.

Contents

List of Figures

List of Tables

Abbreviation and Glossary Term

APBN	State Budget (*Anggaran Pendapatan Belanja Negara*)
ASEAN	Association of South East Asian Nations
BPS	Statistic Indonesia (*Badan Pusat Statistik*)
CRADAs	Cooperative Research and Development Agreements
DAK	Special Allocation Funds (*Dana Alokasi Khusus*)
DAU	General Allocation Funds (*Dana Alokasi Umum*)
DBH	Revenue Sharing (*Dana Bagi Hasil*)
DI	Special Region (*Daerah Istimewa*)
DKI	Special Capital Region (*Daerah Khusus Ibukota*)
EC	Economic Corridor
FDI	Foreign Direct Investment
GERD	Gross Expenditure on Research and Development
GDP	Gross Domestic Product
GRDP	Gross Regional Domestic Product
HPAEs	High Performing Asia Economies
ICT	Information and Communication Technology
Kabupaten / Kota	Regency/ City. Regency and city are at the same administration under province. What makes both differences are in demography, size and economic activities. Regency is mostly a rural area larger than a city whereas city is generally a non- agriculture region.
KAPET	Integrated Economic Area (*Kawasan Ekonomi Terpadu*)
KATING	Backward Region (*Kawasan Tertinggal*)
KB	Family Planning (*Keluarga Berencana*)
Kecamatan	The low level of government below *Kabupaten* and City
Kejawen	Mataram Principalities (Yogyakarta and Solo) in inland and central-south Java
Kraton	Principalities Palace
KSP	Production Centers (*Kawasan Sentra Produksi*)

KTI	The eastern regions of Indonesia (Kawasan Indonesia Timur) comprising Nusa Tenggara Timur, Sulawesi island, Maluku islands and Papua
MP3EI	Master Plan for Acceleration and Expansion of Indonesia's Economic Development (*Master Plan Percepatan dan Perluasan Pembangunan Ekonomi Indonesia*)
OECD	Organization for Economic Co-operation and Development
PAD	Local own-revenue (*Pendapatan Asli Daerah*)
PANTURA	Java North Coast Regions (*Pantai Utara Jawa*)
PANSELA	Java South Coast Regions (*Pantai Utara Selatan*)
PARUL	Poverty Alleviation through Rural-Urban Linkage
PELITA	Five-year Development (*Pembangunan Lima Tahun*)
PERDA	Local Regulation (*Peraturan Daerah*)
PERTAMINA	Mining and oil national companies (*Perusahaan Pertambangan Minyak Nasional*)
Pesisir	Coastal Regions
PKN	National Activity Center (*Pusat Kegiatan Nasional*)
R&D	Research and Development
REPELITA	Five-year development Plan (*Rencana Pembangunan Lima Tahun)*
RDTRW	Detailed of Spatial Plans (*Rencana Detil Tata Ruang Wilayah*)
RTRW	Spatial Plans (*Rencana Tata Ruang Wilayah*)
Sawah Lestari	Sustainable Rice Field. It is regulated by local regulations to protect the rice field in regional land use, which may threaten food security.
UNDP	United Nations Development Programm
VOC	Dutch East companies (*Verenigde Oost Indische Compagnie*)

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Ari Rahadini

" OH, East is East, and West is West, and never the twain shall meet,
Till Earth and Sky stand presently at God's great Judgment Seat;
But there is neither East nor West, Border, nor Breed, nor Birth,
When two strong men stand face to face, tho' they come from the ends of the earth!"

Rudyard Kipling from "**The Ballad of East and West**"

1 The Problem of the Uneven Socio-Economic Development

1.1 Regional Differences Do Exist

The topics of how the regions grow, why some regions grow more rapidly than others do and why differences of welfare among regions exist and persist, have drawn the attention of diverse research groups for decades due to fact that spatial imbalance and converging processes fundamentally consist of multidimensional studies. It is a basic fact that every region is individual and distinctive in essential degree. Each region consists of a heterogeneous set of geographical and sociocultural features. Thus, within a given country, one commonly finds some well-developed regions and some lagging regions as well. Differences and variability exist among regions and must be acknowledge. These differences and variation could be institution issues or endowment matters (natural endowments or accumulated human and physical capital). Eventually, by distinguishing these differences, the center point of growth and development in-regions and between-regions is addressed.

Hansen (1965) argued that favored regions are perceptible in the existing differences and variations among regions, especially where capital investment expands greatly and labor markets increase progressively. He found that these favored regions were endowed with policy privileges and provided better infrastructures and networks. They were also highly expected to be the places to improve people's welfare, which in the long run, led to high rural to urban migration and over-urbanization. Subsequently, the industries started to concentrate on these regions, too. It is important to understand that once an area became concentrated, it happened to self-generate concentration on itself (Ullman, 1958). This eventually led to unbalanced regional economic growth instead of even growth between regions.

As regional differences intensify, uneven socio-economic development becomes a fundamental problem and source of concern for decades by many researchers and policymakers in many countries. The cause and measurement of spatial differences are the highlight of many empirical studies of disparity (Williamson, 1965; Rey, 2004; Shorrocks and Wan, 2005; Novotný, 2007). Williamson described that the cause could vary depending on geographically position[1] and accessibility (Wu and Gopinath, 2008; Keeble et al., 1982; Nijkamp and Poot, 1998). Other potential causes could come from historical and political background (Knight and Song, 1993; Zhao and Tong, 2000), labor skill and wages in one given country[2] (Combes et al., 2008). The latter could potentially create rural-urban migration[3] (Hu, 2002; Zhu, 2002; Kundu and Gupta, 1996; Terluin, 2003; Niebuhr et al., 2012) and capital migration (Holland, 1976). Nonetheless, those studies could not indicate decisive description of how the disparity regularly emerges and persists as a cause characterized by the region itself.

It is widely observed that disparity is frequently estimated from the standpoint of growth theory-particularly in gap income. This is because economic development mostly exposes spatial unevenness to a significant extent (Henderson et al., 2001). The difference observed in per capita GDP is one of the most commonly used measurements of regional disparities in welfare despite other viable economic and social indicators, such as poverty, unemployment rates, per capita consumption, labor force rates or public

[1] The often-discussed case is disparity between coastal and inland regions.
[2] Combes et al. (2008)) focuses on spatial wage disparities
[3] Migration could be as either the cause or the effect of spatial differences particularly in labor wages.

service accessibility.[4] Per capita GDP expresses a relative performance of a region. A rise in per capita GDP reflects economic growth and indicates an increase in productivity as well. This relative standard value allows comparison of the existing interregional differences within a country. Economic growth is not the only determinant of disparity, but the initial recognition of disparity comes from identifying the widening differences caused by regional economic growth.

1.2 Regional Disparity: Impact of Regional Growth

The growing interest in regional disparity[5] has been driven by concern over the impacts of the globalization and liberalization leading towards a borderless world with non-barrier tariffs. This borderless world was initiated by economic growth and technology interest over the past three decades. Technological opportunities and the resulting rapid diffusion of information have contributed to the increasing connections between countries. Furthermore, globalization affects regional growth within a nation. Krugman emphasized this argument:

> '' ….one of the best ways to understand how the international economy works is to start by looking at what happens inside nations. If we want to understand differences in national growth rates, a good place to start is by examining differences in regional growth; if we want to understand international specialization, a good place to start is with local specialization. (1993, p. 3)''

Regional specialization demonstrates a pattern whether peculiar regions are able to attract or being turn away by new industries. Subsequently, a location pattern of industries will be appeared reflected in spatial concentration of the specific sectors in regional growth. However, in developing countries, the industries concentration mostly occur in urban areas while rural areas provide the food supply for urban. Trade takes place between regions because no one region produces all goods to meet all of its needs. This urban-rural output difference leads to spatial unevenness. As is evident, this spatial unevenness is not a consequence of the inherent differences among regions but rather of a cumulative process whereby geographic concentration becomes self-reinforcing (Fujita et al., 1999). This could be the reason why many economic activities are concentrated geographically (Krugman, 1999) which in turn attracts workers to follow the manufacturing firm location.

In Kuznets's seminal article, the process of inequality changes is associated with the changes of population structure from the agricultural to the non-agricultural sector (1955). The structural transformation from agriculture to industry is inevitable. This is not only due to global economic challenges but also interregional policy changes (Alonso, 1968). In the early stage of development, inequality increases, reaches an apogee, and then decreases as the population share of the higher-income and non-agricultural sector rises (Kuznets, 1955). This model is described as an inverted U-Pattern with respect to economic development. The importance of this model is its implication of industrialization and urbanization on income distribution.

Most of urban area grow beyond city boundaries thus putting existing agriculture and new manufacturing side by side. At this rate, the rural-urban context is no longer distinguishable. As urbanization[6] proceeds, the central areas develop as larger-sized cities or giant urban centers. At the same time, rural areas grow into medium-sized cities and even into large-sized cities, too (Henderson, 2000). Most of Asian contem-

[4] The United Nation or World Bank commonly used these indicators to compare regional welfare.
[5] The word disparity and inequality for describing unevenness are used interchangeably in this study.
[6] The cities development in the west have different system as in Asian. According to UNESCO in Hauser (1957), over-urbanization in Asian economies has occurred because of excessive in-migration, imposition of economic development from the past in context of a colonial or semi-colonial model, transformation economic structure regarding to industrialization, and primate cities.

porary urbanization have experienced severely this occurrence (Brennan, 1999; Hugo, 2006; Jones, 2002; Jones, 2006). Poor policies are to blame for the lack of controlling urban sprawl and slowing down rural to urban migration (Firman, 2009).

The urban concentration is closely related to the concentration of political power, the inter-regional transportation infrastructure and trade openness (Krugman, 1996, 1999; Henderson, 2000). Furthermore Krugman argued that centralized countries tend to have more concentrated urban centers then decentralized countries that geographically diffuse power. The political centralization is closely related to the effect of the infrastructure adequacy in regions. However, Krugman (1996) and Henderson (2000) mutually disagree about the relation of per capita income to urban concentration measurement. According to Henderson, per capita income is positively related to main city size.

The urban concentration in the early stages of economic development is significantly practical (Hansen, 1990)[7]. Industrialization concentration, often in coastal cities, provides the economic infrastructure – transportation, telecommunication and resources (Hansen, 1990) and knowledge spillover (Lucas, 1988). It establishes a city as the engine of an economy. As development continues and the income rise, the high urban concentration induces a high cost. The urban development eventually spreads to hinterland areas such as economic infrastructure and knowledge resource (Wheaton and Shishido, 1981). This spread-out development eventually leads to regional convergence within countries over time.

Urbanization and uneven regional development are interconnecting processes, which "involve a tension between 'centripetal' forces that tend to pull population and production into agglomeration and the 'centrifugal' processes that tend to break the agglomeration" (Krugman, 1996). Both patterns eventually create an urban system. At any rate, urbanization strongly influences both the efficiency of growth and the extent of income inequality within an economy (Black and Henderson, 1999). In most developing country, regions have formed geographic concentration instead of economic dispersion, creating poor spatial interaction among regions (Kanbur and Zhang, 1999; Dunford, 1995). The dependency toward the economic centers increases and unbalances. At this rate, policy failed to connect the regional economy to the global economy (Ascani et al., 2012).

Rising disparities have different driving forces. Political and social stability also play an important role in disparity issues (Kanbur, S. M. Ravi and Venables, 2005). In some cases, natural geographical aspects generate self-reinforcing agglomeration that have evolved over years or even decades (Krugman, 1999). For example, the historical role of ports explains clearly why most large cities today evolved around ports and as primal cities. Fujita and Mori (1996) asserted that this historical phenomenon does not mean that future cities will also come from ports. They posit that if inland cities were built and supported effectively with adequate infrastructure, they might develop as self-sustaining regions even though its location is not in coastal region. Transportation infrastructure is able to connect more remote regions with those that are developed. However, although the governments have attempted to disperse industry to the periphery, the existing primal cities, which are predominantly port cities, are still growing more than inland non-port cities (Kanbur and Zhang, 1999)[8]. It is an issue in developing countries that non-port cities have a poor comparative advantage.

To sum up, the study of regional disparity in regional development has a strong interdisciplinary relationship between regional economics, sociology, historic and political science (Folmer and Oosterhaven, 1979). It is about the cross-sectional relationships. Regional disparity refers to unevenness of not only income distribution, but also overall dimensions of inequality across spatial location or geographical unit

[7] According to Henderson (2000), Hansen modified the development theorie from Williamson (1965) in urban context

[8] In this case is China.

(Lall and Chakravorty, 2005). It also describes that history, natural resources, human capital, local politics, the economy, and cultural are all contributory factors of disparity within regions.

1.3 Regional Development as Converging Growth Scheme

The main purpose of regional development is to reduce regional disparities by redistributing economic growth (Friedmann, 1979) and generating economic activities (Scott and Storper, 2005) in particular through industrialization and technological change (Martin and Sunley, 1998). However, it is not merely about efficiency in economic policy. Capello and Nijkamp (2010) clearly expressed that regional development is a regional policy with a multidimensional perspective that relates to regional interconnection in term of space and time.

"Balanced development" is an intricate policy with the aim of reducing regional differences in welfare. In the past, to address this objective, regional development policy emphasized massive infrastructure development (Hirschman, 1958; Nijkamp, 1986) to entice inward investment (Rietveld, 1989). However, this policy had an uncertain effect in regional growth (Bröcker and Rietveld, 2010). It has had positive results in developed countries but has produced inconsistent outcomes in developing countries (Del Bo et al., 2010; Button, 1998). This outcome is either the result of the initial phase of development (Del Bo et al., 2010) or the result of misallocating public expenditures in favor of capital expenditure at the expense of current expenditure in developing countries (Devarajan et al., 1996). According to Steiner (1998), to promote balance growth, regions were urged to increase specialization in order to intensify level productivity, growth and employment (as cited in Cumbers and MacKinnon, 2004)

The disparity, inequality and inequity arguments were often based on neoclassical economic growth theory which scrutinizes government policies, accumulation of human capital, technology spillovers effect (Romer, 1986), and capital mobility (Barro et al., 1992). Later, this theory contributed to the initial convergence theory (Barro and Sala-i-Martin, 1992a) which was predominantly concerned with whether or not poor regions can catch up to rich regions in term of economic growth over a period of time. The critical theories from the aforementioned references predict eventually that disparity in economic well-being will persist or even widen in the long term.

Consequently, "converging growth" is a complex term because it indicates the success of regional development and decrease of regional disparities. Thus, the regional differences in welfare would disappear. Convergence hypothesis has been widely accepted and argued in many studies (Sala-i-Martin, 1996a; Barro and Sala-i-Martin, 1992a; Baumol, 1986; Bernard and Durlauf, 1996) mostly as a comparative of static variables. The speed of convergence in most developed countries is similar across data sets (Quah, 1996a, 1996a, Sala-i-Martin, 1996a)[9] but inconsistent in developing countries (Fukuda and Toya, 1995). The variables in convergence studies varied, not only emphasizing economic growth factors - particularly the changes of income distribution over years - but also geographical factors (López-Bazo et al., 1999; Quah, 1996b), socio-culture conditions such as poverty (Das et al., 2010), and institutional policy. The causes of convergence can be different among countries (Caniëls and Verspagen, 2001; Garofalo and Yamarik, 2002; Venables, 1999; López-Bazo et al., 1999)[10]. Recently, the role of knowledge and tech-

[9] Quah (1996a) and Sala-i-Martin (1996a) expressed that the speed of convergence is similar in most developed countries, approximately two percent per year. Sala-I-Martin investigated data across OECD in the United States, Japan, Germany, UK, France, Italy, Spain and Canada.

[10] Venables argued that the free trade agreement between low-income countries could lead to divergence; while on the other hand, agreement between high-income countries and low-income countries tends to lead to convergence. López-Bazo et al. (1999) describes the progress made in the integration process as the highlight of the economic disparities solution at the regional level.

nology has become an important topic in convergence studies. It is assumed that technological progress and knowledge diffusion are the most crucial contributors to regional development (Spence, 2011). Foreign Direct Investment (FDI) is the common practice to contribute knowledge spillover and technological diffusion (Harrison, 1994).

Since 1990, many researches have estimated that developing and developed countries have started to move toward converging growth (Bourguignon, 2015; Milanovic, 2010; Stiglitz, 2013). Nonetheless, the disparity within a given country – and in particular developing countries – has widened. There exists the struggle for decreased interregional disparity. In Asia, the main drivers of rising disparity are technological change, globalization, and market-oriented reform (Spence, 2011). These forces have allowed great opportunities for Asian countries to prosper. However not all Asian people gain these opportunities equally due to the incompetence in governance and social exclusion (Kanbur, S. M. Ravi et al., 2014; Zhuang et al.,2014). In Indonesia, unequal endowment especially in oil and natural gas along with the uneven distribution of industrial centers between regions have aggravated inequality over time. The inclusion of oil and natural gas production in national data sets produced an increase in interregional inequality on per capita production (Tadjoeddin et al., 2001; Venables, 2003; Escobal and Torero, 2005). When Esmara (1975) analyzed the CV's Williamson index of 1972, it was 0.945 including oil and gas. At this rate, without oil and gas, the index declined to 0.522. The index fell further to 0.262 after Riau and East and Central Kalimantan[11] were excluded. In the early 2000's[12], after decentralization was implemented, Hill et al. (2008b) estimated that East Kalimantan per capita income was around 16 times that of the poorest Maluku province and the differences in poverty rates ranged in Indonesia from 3,4% of the population in Jakarta to 42% in Papua[13]. Friedman (2005) stated that regional differences in poverty persist even after controlling for the effects of provincial income and disparity level.

Regional development policy in the 1990's, was biased toward large cities for the benefit of developing investment interest. During this period, the infrastructure in Indonesia's major cities was the focus of development, and this included sanitation, urban roads, water supply, traditional markets and kampong improvement. Silva and Sumarto (2014) asserts that the Indonesia's government is not pro-poor; the poor receives disproportionately fewer benefits than the non-poor

Thus, regional disparity is a particularly crucial issue in Indonesia. It concerns regional gaps between the west and east, Java and outside Java, urban and rural, and within each island. Indonesia still has a long way to go to attain converging growth within the country. In this regard, investigation of regional disparities is still evolving, bringing out more present substantive issues that have arisen over the years.

1.4 Spatial Concentration in Indonesia

According to Kanbur and Zhuang (2013), the major driving force of regional disparity in Indonesia is urbanization, effecting an increase of 54% in national disparity, 42% in urban disparity and 7% in rural disparity.[14] In 2010, 53% of Indonesia's population lived in urban areas causing changes in employment structure, increase of land-use conflict, and rising infrastructure inadequacies. Structural change plays an

[11] Aceh, Riau, Papua, Central and East Kalimantan are rich provinces with oil drilling and mining as their main economy activities.
[12] The significant growth of economic development in nature-resource regions after 2000 is closely related to intergovernmental revenue sharing. In central Indonesia, the uneven distribution of regional revenue sharing has caused much public dissatisfaction. Moreover, it has fueled the vertical conflict between central and regional, especially in the four provinces rich in natural resources: Aceh, Papua, Riau and East Kalimantan
[13] Poverty has been more greatly affected by growth in rural Java and Bali than in the Outer Islands of Kalimantan, Maluku, Irian Jaya, Sumatra and Sulawesi.
[14] In this study, Kanbur and Zhuang 's estimated means and inequalities from 1990-2010 based on per capita household consumption expenditure, an estimation normally lower than per capita household income.

important role in Indonesian urbanization, particularly in labor mobilization from a traditional to a manufacturing economic base. Statistics from the World Bank indicate that manufacturing output growth in Indonesia is the highest of all middle income countries, exceeding other Asian successes such as those of Korea, Thailand and Singapore (Hill, 1990). The level of urbanization is positively associated with economic growth, but the rate change of urbanization is negatively correlated with growth of economic output (Lewis, 2014).

During The Asia Finance Crises, the Indonesia economic downfall caused circular migration, which is the mobility of people from rural to urban areas without any intention to settle in the city (Firman, 2002). Most workers in urban areas shifted to the informal sectors; spending fell but competition increased. Although the impact of the crisis hit mostly in urban areas, the rural populations suffered most because of their economic and labor market links to urban areas (Hugo, 2000).

It is fact that Java and Bali are the most urbanized regions in Indonesia. At this rate, urban-rural disparities in Java are higher than in Outer Islands[15]. However in some cases, the urbanization of the Outer Islands occurs faster than in Java-Bali. This indicates that in the future, Indonesia will face many urbanization problems, which should be anticipated for in policymaking for all regions across the country instead of focusing only on Jakarta and Java-Bali as has occurred up to now[16]. The government so far has been considered "pro-urban" and "pro-Java" (García, 2000; Tirtosudarmo, 2013). García (2000) argued further that in order to raise income per capita, the government needs to protect manufacturing (mostly located in Java) as much as agriculture and forestry have been protected and persists on increased taxing of other primary sectors such as oil, gas and mining. However, government protection of manufacturing negates the government's protection of agriculture, and, as result, agriculture generally loses. Since the Outer Islands contribute to the national output mostly on natural resources production in the primary sector, this policy weakened those regions in terms of growth and poverty reduction. This government intervention favored urban over rural, manufacturing over primary sector and Java over Outer Island. Hence, manufacturing in Indonesia is highly concentrated only in some provinces (Sjöberg and Sjöholm, 2004).

Java has been the most important island in Indonesia since colonialism. Most licensing regulation, commercial and physical infrastructures have been concentrated in Java, attracting more investors to locate in Java (Resosudarmo et al., 2002; Hill et al., 2008a). This in turn has caused more people to migrate to Java for work, leading to overcrowding of the island. Java is the most populated island in Indonesia[17] and the highest contributor[18] to the national GDP. Economic activities dispersion both inside and outside Java has been a major issues in regional development. Based on Indonesian statistics from 2001-2010, Java hosts more than 80% of medium and large manufacturing industries in Indonesia. These are concentrated in metropolitan/ industrial areas of Greater Jakarta, Bandung (West Java) (Hudalah et al., 2013a), Greater Surabaya (East Java) (Resosudarmo et al., 2002) and in Semarang (Henderson, J. Vernon and Ari Kuncoro, 1996). This spatial concentration has induced the agglomeration in the western (Jakarta and Bandung) and eastern (Surabaya) part of Java[19], with those regions having the densest population in Java as a result (Kuncoro, 2002). From 1990-2010, Java itself housed 60% of the total labor force in Indonesia with

[15] The five main Islands in Indonesia are Sumatera, Java, Kalimantan, Bali and Nusa Tenggara, Sulawesi and Maluku, and Papua. Sulawesi, Maluku, Nusa Tenggara and Papua are considered are the eastern Indonesia (*Kawasan Indonesia Timur, KTI*)
[16] This study has interpreted government policy from 1990-2010. Occurrences after 2010 have not been covered in this research.
[17] Based on national census, Java has claimed 64 % (1970), 62% (1980), 60% (1995), 59%(2000), and 58% (2010) of the national population (Statistics Indonesia (2014)).
[18] Java accounted for 59.03 % of Indonesia's GDP from 1990-2010, with DKI Jakarta having the highest share of Java GDP at 15.98% and 6.3% economic growth (Statistics Indonesia from 1990-2010)
[19] Until 2005, Java consisted of six provinces. West Java, Central Java, East Java, DKI Jakarta and DIY Yogyakarta. In 2005, Banten became a new province separate from West Java.

the highest concentration in East Java.[20]. In sum, Java has been the political, economic and cultural core of Indonesia. The regional differences have been clearly noticeable not only between Java and outside Java but also among regions within Java. These differences expose a particular spatial pattern in Java as a result of natural and social processes articulated by government interference in urban and spatial planning[21].

1.5 Spatial Process in Java: Bipolar Pattern and Imaginary Corridors

Despite government attempts to disperse economic activities across region in Indonesia, manufacturing has consistently been located around large cities in Java. The two largest manufacturing concentrations within Indonesia are at two polar ends; Greater Surabaya (Surabaya-Malang corridor) in East Java and Greater Jakarta (Jabotabek) (Rahardja and Kuncoro, 2012). This polar along Java's north cost has formed over 200 years as the region was connected with asphalt roads[22] and railways. Although this spatial pattern is a result from of historical factors, this corridor continues to exist as the major economic national hub connecting Jakarta and Surabaya

The spatial process of urban areas in Java has been observed as the formation of the massive urban belt connecting the cities surrounding Jakarta – Bandung, Yogyakarta – Semarang and Surabaya – Malang. The peripheries of major cities are experiencing high urban population growth while the cities themselves continue to have slow growth. This trend obscures the distinction between 'rural' and 'urban' (Firman, 2002).

Jakarta (Greater Jakarta), West Java (Bandung) and East Java (Greater Surabaya) provinces have been contributing approximately 65 % of the total employment and 71 % of the total production (excluding gas and oil) in Java.[23] These regions are evidence of substantial industrial spill over. Hill (1987) and Garcia and Soelistianingsih (1998) define this as 'bipolar' industrial development of western and eastern Java.

Bipolar development has created an invisible axis from Jakarta to Surabaya, connecting the west and east Java in the north coastal region. It can be said that it is the manifestation of De Grote Post Weg[24] (known

[20] It is calculated from various raw data of National Socio Economic Report and National Labor data from 1990-2010 (see appendix 5)

[21] Indonesian has a three-tier governance system. Under this system, three bodies operate vertically dependent, although regional autonomy is implemented. Spatial planning in Indonesia is divided into general spatial planning (known as *Rencana Tata Ruang Wilayah, RTRW)* and detail spatial planning (known as *Rencana Detail Tata Ruang Wilayah, RDTRW)*. The spatial plan is translated to National-, Provincial-, and City/ Regency spatial plan. After independence, Indonesia stipulated only two Spatial Plans. Law 24/1992 on Spatial Planning was created out of necessity to coordinate natural resource management. The most recent was in 2007 in response to the new decentralization policy and problem of government effectiveness particularly regarding the flexible spatial plans at the local government level (Rukmana (2015)). Before 1992, the government acted only on the legal framework of spatial planning for particular area such as Greater Jakarta, Batam Island and the Puncak area promoting for agriculture area (rice field), industrial area and housing. The Spatial Plan of 1992 had a top – down character. Under the centralized government, Indonesia applied a single structure of planning system with generalized approaches and standards in many regional planning requirements. The spatial diversity was negligible, so the adjustment were only made for technical problems (Hudalah and Woltjer (2007)). In contrast, the Spatial Plan of 2007 takes into account public participation and spatial diversity in each local government. The lack of coordination between government boards within a system causes uncertainty in urban development. Eventually it develops an inconsistent and fragmented system of regional development that may lead to conflict among the government agencies. Poor coordination can be seen in the Greater Jakarta Area. This area is a megapolitan area as two or more adjoining metropolitan area that shares functional interconnection. However. Hudalah and Woltjer (2007) criticized the ineffectiveness in directing sustainable urban development in Greater Jakarta because of the negligence of institutional-cultural forces.

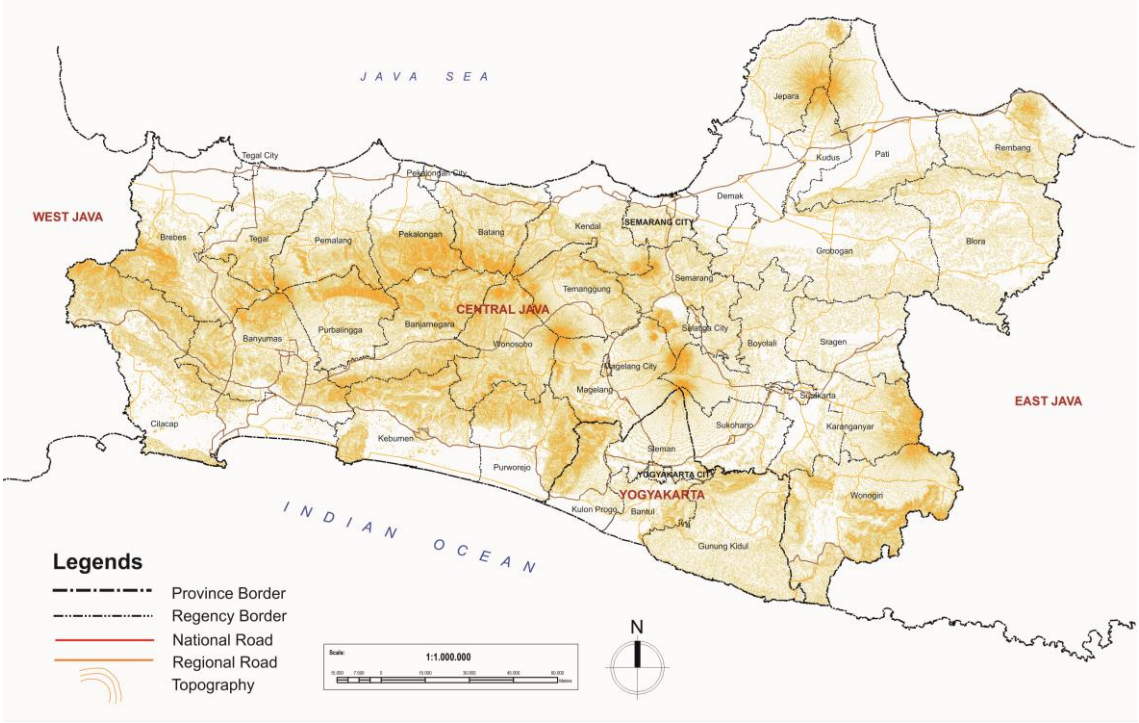
[22] The Trans-Java toll road now connects the north coastal regions leading to sustained rural-urban population mobility (Tirtosudarmo (2013)).

[23] It is calculated from various raw data of National Socio Economic Report and National Labor data from 1990-2010 (see appendix 5)

[24] Grote Post Weg (Dutch language) means the great post road.

as PANTURA[25] road) built by Daendels in north coast Java. This road transports a significant amount of goods and services from West to East Java (Nas and Pratiwo, 2002). From East Java, the goods further will be distributed to Eastern Indonesia. By the goods and services flow, Central Java is only a traversed region. Jakarta, Bandung and Surabaya and their surrounding regions developed into large industrial centers, leading West Java and East Java as the industrial-manufacturing areas. The Central Java manufacturing sector grew modestly (Rietveld et al., 1994).

With Jakarta-Surabaya bipolar development, the assumption of the north regions grew dynamically compare to the middle and south regions has risen. The nature is also responsible to this assumption of greater north. The land features differences (Figure 1.1) in Central Java have divided the regions into three different characteristic. The North - South corridor[26] dominates the flat coastal land with the Middle Corridor lying in the mountainous region. The Java Sea in North is a shallow sea while the Indian Ocean in south is a deep sea. High mobility for trade and shipping was established for north coast corridor.



Source: Central Java and Yogyakarta Spatial Plan 2009-2029

Figure 1. 1: Relief and Border in Central Java

Another reason the South region has slow development is because of its location, which is away from the capital city in Java north coast. It seemed that southern areas faced the empty world since shipping activities were concentrated in north. To balance development with north regions, the national and regional spatial plan gives infrastructure development priority to the South[27] (Central Java Province, 2011;

[25] PANTURA is abbreviation from Pantai Utara Jawa (the north coast of Java, Indonesian, red)
[26] The corridor initially refers to the route of the Great Post Road later related to the regions along the corridor as well. In term of spatial as the geographical unit, the corridor in this paper is interchangeably called the region.
[27] It is because that south region has more underdeveloped regencies than north has. National Strategy of Underdeveloped Regions, registers Indonesia as having 22 underdeveloped regions State Ministry for the Development of Disadvantaged Regions (2005). The South region of Java has nine underdeveloped regencies; three regencies are located in Central Java (Wonogiri) and Yogyakarta

Coordinating Ministry for Economic Affairs, 2011). At this rate, regional development policy has approached Java into north-south corridor differentiation. These spatial differences of north-south corridors develop into central issue of disparity within Java Island. These spatial differences may have varied effects on regional growth and regional policy in Central Java or lead to clustering in Central Java as has already occurred in West[28] and East Java[29]. This study focuses on disparity at the regional level due to fact that disparity in Indonesia was driven primarily by within provincial disparity (Yusuf et al., 2014)

1.6 Conclusion

This chapter sets out the background and context of the paper. It briefly discusses the issues of regional differences and spatial concentration pattern, setting the groundwork of this paper.

The basic fact that regions are different could not be eliminated. How to adjust the differences into beneficial factor instead of widened disparity is worth investigating. Regional development's main goal is to diminish disparity. It attempts to converge growth among regions upon a single structural model. However, converging growth is a long-term process for lagging regions able to exceed well-developed regions.

In the sense of regional difference, the favored regions with equipped infrastructures could be distinguished and further, spatial concentration takes place in its surroundings. Urbanization, labor migration, economic growth, historic factors, and natural characteristics are a few of several factors creating spatial concentration.

Indonesia has been experiencing differences in socio-economic development among regions and among several groups of regions particularly between west and east Indonesia, Java and outside Java and within each island. As all the activities have been concentrated in Java, and in particular in the big cities, urban growth in Java creates a line pattern that connects regions from west to east along north coastal area to transport goods inside and outside of Java. This Java north cost corridor was built as the main road during colonialism and it has developed until now as the most important road in Java. Over time, the transformation of the agricultural sector to non-agriculture has speeded up in north corridor. This has intensified regional differences between north and south regions. The bipolar pattern between west and east in Java's north coastal highlight the issue that Central Java is only a transit region.

To sum up, as the north corridor connects Java's major cities and has served as the main distribution channel for goods in Java, a disparity between the North and South regions has assumed to takes place. It is such a serious misfortune of position leading to unevenness. In this argument, Central Java confronts the disparity with West and East Java and the disparity within Central Java between the North and South regions. However, as a unit development, Central Java and Yogyakarta consists of relatively homogenous socio-economic characteristics, equal spatial planning and similar governance systems. It is essential to determine to what extent the differences in Central Java and Yogyakarta is observed as regional disparity. Thus, the basic question of how to measure disparity, as it is related to multidimensional facts needs to be identified.

Province (Kulonprogo and Gunung Kidul); whereas North regions has only two underdeveloped regencies, one of which one (Rembang) is located in Central Java.

[28] Jakarta Metropolitan Area develop extended to Bandung Metropolitan area forming an urban belt about 200 km from Jakarta to Bandung (see Firman (2009); Hudalah et al. (2013a); Firman (1998))

[29] The economic agglomeration has concentrated in North-South Corridor from Surabaya-Malang (Gresik-Surabaya- Sidoarjo-Mojokerto-Pasuruan-Malang-Blitar, Batu) (Dick (1995))

2 Regional Disparities Measurement: Structural Change, Decentralization and Converging Process

2.1 How to measure Regional Disparities?

As disparity is linked and interrelated to many crucial dimension, many studies have focused on which technique is the most relevant to measure regional disparity. This is frequently the case, since there are many disparity indicators, so analyzing one specific dimension is not sufficient to describe the disparity as whole. As regional disparity is an interdisciplinary topic, to understand the nature and the causes of regional disparity is the most basic challenge in regional development. It can be understood that disparity may imply individual differences of income or opportunities in several dimensions of regional development such as economic, social, infrastructural and political. Disparity in welfare at the national level is intricately related to spatial interaction and impacted by history, culture, technology, demography and policy (Kanbur and Zhuang, 2013).

For decades, regional disparity has been a central issue in the literature on regional development and growth theories. Many diverse groups of scholars and researchers have attempted to address the main issues of whether the disparities have narrowed or widened between rich and poor regions and why the various social-economic indicators across regions exist and persist. Research on disparities in regional development is useful for comparisons and support in determining policies regarding economic activity distribution (Knapp and Kim, 1992). Furthermore, Knapp and Kim (1992) argue that even if such support fail to foster economic development and growth, the dispersal of economic distribution grows as a regional concerns.

Regional disparity is no longer driven solely by climate or disease, or any factor of geography. Prosperity and poverty are determined by the incentives created by institutions and how politics determine what institutions a nation has (Acemoglu et al., 2002; Acemoglu and Robinson, 2013). Different institutional patterns today are deeply rooted in the past. While economic institutions are crucial for determining the prosperity of a country, political institutions are what determine the economic institutions that exist within a country (Acemoglu and Robinson, 2013). The roots from the past persist and shape the present. Former colonies must adopt and apply the right economic system for their country despite the permanent effects inherited from colonialism. In addition, local social norms, which are related to local culture, support institutional differences. Furthermore Spence (2011) argues that growth in a developing country is influenced by the interaction between leadership, governance, institutions, politic and subsequently processes with economic outcomes.

Disparity is frequently estimated by the extent of differences in prosperity of its people. It is regularly interpreted by differences of economic growth, political instability and socio-economic cohesion (Thorbecke and Charumilind, 2002). Furthermore, the relation between those indicators is not clearly explained in many empirical studies (Giskemo, 2012). These disparity investigations have such different finding

depend on which indicators are selected and how the indicators are measured. The best method usually involves different indicators to measure one dimension. If those indicators lead to the same direction, the result is considered reliable.

2.1.1 Inequality as the Determinant of Economic Growth

Essentially growth differs from the term development. The principal purpose of growth and development is to increase the quality and the quantity of all features in any region. However many researchers frequently misinterpret growth and development as a synonymous term which both have been measured in aggregate assessments. In much of the literatures, development and growth are used interchangeably. However, economic growth is defined as the *quantitative* measure in national income[1], output per capita or real total output over time (Chaudhuri, 1989) whereas development focuses on *qualitative* changes in non-economic variables (Brinkman, 1995, Myrdal, 1974) such as education and health facilities, class stratification, the distribution of power in society, and generally, institutions (Myrdal, 1974) and attitude (Brinkman, 1995). Seers (1969) explained development in relation to social variables, particularly poverty, unemployment and inequality. To fully understand the dynamic process of economic transformation, other non-economic variables must be considered, including the structural sector, demographics, geographic composition, as well as the entire social and institutional structures of politics (Kuznets, 1966; Bernstein, 1971) and culture (Goulet, 1971). Lastly, Meier (1984) argues that development covers a rise in productivity, social and economic equalization, modern knowledge, improved institution and attitudes. It is indeed a multi-faceted, intricate and lengthy process.

The development literature proposes that the process of economic development may be inherently disorderly. It is related to industrialization in several ways: by mobilizing surplus labor from the agriculture to the manufacturing and services sectors; capital (physical and human) accumulation, and shifts in the composition of demand, production, government revenue, exports, and unemployment. (Lewis, 1954; Naqvi, Syed Nawab Haider, 1995). When laborers earn an increase in wages at an early stage of development, this transformation increases the degree of inequality, particularly in income distribution. As the size of the agriculture sector diminishes and urbanization continues, more workers migrate to the industrial sectors. These forces combined may reduce the overall inequality. Eventually, at the later stages of development, the relation between the per capita production and inequality tends to be negative (Barro, 2000). This implies that a rapid rise in the industrial share of GDP with a corresponding decrease of the agricultural share is the central of the development process (Kuznets, 1966). U. Thant, the Secretary-General of United Nations, simplified the formula of that development as ''development = economic growth + social change'' (Goulet, 1971). This formula indicates that growth and development may be in a cyclical process (Hirschman, 1958; Flammang, 1979). Economic development and growth are alternating processes. Development measured through quantified structural change results from growth. On another side, economic growth is interesting to observe because it correlates with levels of income and wealth. In addition, political changes such as decentralization, political participation and policy change is also factor into economic growth (Ingham, 1993).

In sum, development is concerned mainly with socio-economic changes that are accompanied by a decrease in inequality and poverty. This is the ultimate development goals of most developing countries. Structural change will eventually promote an increase in growth. However, growth of GRDP is not the main objective of development. This does not mean income per capita is meaningless. If per-capita income falls, poverty and unemployment cannot be reduced. By distinguishing the differences between

[1] National income is mostly estimated using GDP. Economic growth can be estimated as $[(GDP_t - GDP_{t-1})/GDP_{t-1}]x\ 100$. Per capita income = total national income/ number of population.

economic growth and development clearly, this study begins to sort out the indicators of spatial disparity in term of socio-economic factors and focuses thoroughly on their relation to disparity.

To identify the relationship between income disparity and economic growth, most studies referred to the "inverted-U" curve hypothesis (Kuznets, 1955, 1963). Kuznets suggests that in the early stages of development, labor is concentrated in agriculture. As industrialization expands, labor shifts from agriculture to industry. This labor migration thus induces unequal income distribution, as wages in the industrial sector are usually higher. Furthermore, the adverse growth of agriculture and increase of industry supports the transformation from agriculture to manufacturing (Robinson, 1976)[2] which later leads a decrease of disparity. Since Kuznets's research, a number of studies have debated and examined this hypothesis to confirm and expand it through inter-country cross-section study or to argue against it.

Most studies about income and disparity have greatly followed the Kuznets hypothesis and used growth-income data to assess the empirical status of inter-country in order to model intra-country disparity. A regression model of quadratic and semi-log quadratic using to estimate the relationships of income and income inequality for 36 less-developed countries identified the existence of the inverted-U curve (Dawson, 1997). This model supported Kuznets's hypothesis. However, the Kuznets curve does not explain most of the variations in inequality across countries or over time (Barro, 2000; Thornton, 2001). It does not always exist in income-inequality studies either. Deininger and Squire (1998) failed to confirm a cross-country 'Kuznets-curve' due to time spanned. In that study, cross-sectional country evidence was used to make assumptions about inter-temporal variation in individual countries. This was concluded as invalid because of 'short' periods in the research (Mollick, 2012). Another study resulting in an un-inverted-U curve was based on the time series data during 1947-1988 in the US (Ram, 1991). From this study, it was argued that the Kuznets-paradigm is an expression of long run growth. Therefore, the experience of Kuznets curve might not yet be present in most developing countries but the first stage of economic growth that associated with structural change might have occurred.

2.1.2 Structural Change

As development is a process aimed at reaching specific goals, structural change[3] and modernization are part of the development process through economic growth. Structural change is the transition process whereby the agricultural sector declines relative to the non-agriculture (manufacturing and service) in total employment and GDP (Kuznets, 1966). Kuznets (1966) identifies this transformation as modernization of economic growth even though there may be a cost in term of change such as unemployment and loss of traditional living.

´´…. when a people occupy an undeveloped country and establish an isolated economics system. At first an agricultural stratum forms to produce the necessary means of subsistence. The settled area with its agricultural populations serves then as the geographical foundation for all other strata. It determines in the first instance the locus (places) of consumption for the second stratum, namely, the primary industrial stratum, which produces for the agricultural stratum. In turn, the primary industrial stratums serves as the geographical sphere of consumption for the third stratum, namely, the secondary industrial stratum. This third actually consists of numerous substrata, each of which is oriented to and is smaller than the preceding one, the first being the only one directly oriented to the primary industrial'' (Isard, 1949)

[2] Robinson (1976) developed a simply model of economic assumptions that observe two sector models that shows the population shift from agriculture to industry. In this model, the rural agricultural sector initially accounts for the bulk of the economy. However, this sector contributes low per capita income and slight inequality within the sector. Meanwhile the urban industrial sector is setup from the bottom and contributes higher per capita income with relatively high inequality within the sector.

[3] Structural transformation and structural change will be used interchangeably in this study. Structural change is also known as the two sector model and labor surplus model

The Classic Growth indicates that agriculture is the preparation stage for industrialization. Dualism theory describes it as the early stages of development in underdeveloped regions (Boeke, 1953)[4]. This theory refers mainly to economic and social divisions such as differences in technology level between regions or sectors, differences in geographic development, and differing social attitudes between indigenous and foreign-adopted customs. Furthermore Boeke argues that in dualism, the agriculture sector, representing the "traditional" sector and the industrial sector, representing the "modern" sectors, grow parallel. The transformation that occurs is accompanied by the shift in employment structure and the level of education jobs require. It increases the urban population, employment opportunities, disparity of income distribution between urban and rural, and also reduces poverty (Todaro and Smith, 2011). This dualism theory characterizes how traditional agriculture is transformed into advanced development and determines to what extent the linkage between the agricultural sector and manufacturing industry form forward and backward[5].

The structural change described by Lewis and likewise the dualism theory from Boeke are based on a two sectors model: the traditional subsistence sector (agriculture with surplus of labor, low capital intensity and low marginal labor productivity) and the modern sector (industry with high productivity, capital intensive mode, rapid growth and elastic supply labor with higher wages). Labor migration from the traditional to modern sector is inevitable and leads to urban concentration, urban-rural disparity, unemployment in urban areas and a decrease of agriculture production. At this rate, urbanization, the so-called demographic transition, is a substantial component of the structural change in the direction of industrialization (Landes, 1969). Furthermore, the cities expand outward and onward, generating agglomeration and urban sprawl. This city diffusion establishes new cities as growth center and the surroundings as hinterland. However, as the tax rise, land price increase, and the labor wage doubles, causing industrial production in urban areas to stagnate. When cities are no longer a cost-effective location, manufacturers move to their surroundings.

Much international evidence shows that many high growth countries have drawn extensively on surplus labor from the rural sector (Naqvi, Syed Nawab Haider, 1995). In addition, capital and labor move unidirectional from low-productivity agriculture to high-productivity industry (Naqvi, Syed Nawab Haider, 1996). The transformation from primarily agrarian into modern industry eventually gives rise to disparity (Lewis, 1954). Furthermore Lewis argued that urban-rural disparity rises because the production per worker in the agricultural sector is difficult to grow without any additional outside demand. As the population grows in rural areas, the labor supply will be large and elastic. Consequently, labor productivity and employment for the rural population remains poor until it is changed to other sectors and people migrate to other place.

As regional differences widen, regional conflicts might easily arise. Thus, the development of effective political, legal and regulatory institutions along with good governance is crucially important in order to promote converging growth and welfare (Spence, 2011).

[4] Boeke's dualism theory is based on Indonesian experience and is considered relevant especially in underdeveloped countries. This theory is a synthesis of two earlier studies about Indonesia's economy. As this theory is largely based on Indonesia, dualism for Boeke practically synonymous with ''Eastern''. Dualism comes from friction between "East" and "West"- terms used in Rudyard Kipling's famous phrase, "East is East and West is West and never the twain shall meet". East represents as the pre-capitalistic and West depicts as the capitalists.

[5] This is corresponding to Rostow, W. W. (1959), the growth stages is indicated with the transformation of traditional society as the leading sector to modern society, which in between those stages, there is transition as the pre-condition to take-off.

2.1.3 Fiscal Decentralization and Regional Disparity

In a decentralized system, the autonomy of sub-national governance[6] plays a significant role. The expectation is that sub-central governments respond more efficiently to local needs and enact suitable policies for regions thus creating effective governance. Kyriacou et al. (2015) argue that increasing the fiscal capacity of sub-central governance promotes converging growth by increasing the tax base in order to compete with prosperous regions. Fiscal decentralization is the intergovernmental transfer of authority from central to sub-central governments in order to meet the responsibilities of providing public goods and services. This transfer process has created many debates about the benefits and cost of fiscal decentralization. Benefits include potentially improved efficiency in public expenditure (Oates, 1999). On the other hand, fiscal decentralization may widen regional disparities due to the reduction of the central government's role in the sub-central government. Wealthier regions will always be superior regions in term of fiscal resources (Kyriacou et al., 2015) which may cause a regional conflict and political instability (Prud'homme, 1995).

Decentralization is a long-term process. Thus, the relation between decentralization and decreasing disparity may not be clear over a short period (Torrisi et al., 2015). However, identifying how fiscal decentralization affects converging growth would tell a region whether disparity is increasing or diminishing.

As fiscal capacity varies among regions within a country, budget constraints arise in some regions. The sub-national government must take responsibility for their expenditure decisions. How a sub-central government manages to meet its needs with its budget is the fundamental problem of fiscal decentralization. Kornai (1979) mentions soft budget constraints on the behavior of state-owned enterprises in socialist economies that could rely on increased subsidies when the deficit increases. Maskin (1996) gives an appropriate definition: "A soft budget constraint arises whenever a funding source finds it impossible to keep an enterprise to a fixed budget, i.e., whenever the enterprise can extract ex post a bigger subsidy or loan than would have been considered efficient ex ante". This term has come to refer to financial grant that a central government provides to sub-central government when the lower level government is unable to perform public services (Rodden et al., 2003; Maskin, 1996). Public goods and services such as infrastructure play a powerful role in explaining levels and changes in regional disparities (Escobal and Torero, 2005).

This fiscal assistance[7] may come in various forms, but the most frequently implemented is intergovernmental grants or transfers (Innman, 2003). The vertical imbalance becomes great problem when the dependency of sub-central government toward intergovernmental transfer is higher (Rattsø, 2003). Another problem in fiscal decentralization is the imbalance of fiscal capacity across regions due to natural resource differences. However, regions rich in natural resources could end up less fortunate[8] instead of wealthier because of mismanagement. On the other side, there is much evidence that countries with poor natural resources still experience high growth by establishing competent human resources and developing technology.

[6] In this chapter, the term 'sub-national government', 'sub-central government' and local government are used interchangeably to indicate city or regency

[7] This word may be called fiscal rescue or bailouts in some literature.

[8] It was known as the curse of natural resource abundance in many literatures, see Sachs and Warner (1995, 2001); Murshed (2004); Lederman and Maloney (2007).

2.2 Technological Level and Convergence

It is clear that over time, poor countries have the opportunity to attain the standard of living as rich countries by accelerating growth rates through population growth and technology change. As a result, poor countries grow at higher speed relative to rich countries (Döring and Schnellenbach, 2006). Inter-regional inequality narrows and Solow's (1956) notion of convergence based on the neoclassical growth models is realized (Fukuda and Toya, 1995; Loewy and Papell, 1996).

Technology often has uncertain meaning or value. According to Schumpeter (1934), innovation disrupts equilibrium but it enables further development continually. It is often argued that the process of economic development can be predicted by technological advances (Brinkman, 1995). Technological change in many empirical studies has been shown to emerge from the vantage of structural change and technique choice (Thomas, 1975). It can be said that structural change is an indication of technological advancement. Technology reduces the cost of production. Capital formation and technical progress result not in raising wages but in raising the share of profits in the national income (Lewis, 1954). In this transition process, the main problem in technological progress is that, although developing countries have a surplus labor supply, they are lacking in the capital factor and technological innovation. As such, the connection between growth and development theories is technology change.

Technological progress, globalization and market-oriented reform have been the key factors of rapid growth in several developing countries in Asia, for the last two decades (Spence, 2011). These factors have several consequences, especially in labor and production location. They have preferred skilled over unskilled labor, city over urban and coastal over inland regions. Much empirical evidence expresses that the high performing growth in Asia (known as HPAEs) regarding to technological progress is partly due to of great investment in education (Campos, José Edgardo L and Root, 2001; Bloom and Williamson, 1998). On the contrary, Booth (1999) expresses in regards to southeast Asian, the governments have not been successful in planning educational development to meet the demands of the fast-changing labor market. In several cases, these failures in educational and skills development have forced governments to rely on foreign labor for high skilled occupations, and in some cases, it has retarded economic growth.

2.2.1 Technological Capabilities and Catching up Concept

Technology transfer is a process of moving technological innovation into use, from domestic or foreign R&D laboratories (often by a university research center, a corporate unit, or by a government laboratory) to commercialization (often carried out by a private company or industry) and from advanced-technological manufactures to their subsidiaries (Archibugi and Pietrobelli, 2003). Technology transfer is often a disorderly process involving groups and individuals with different perceptions and views about implementation. Gibson and Smilor (1991) purposes that technology transfer can be described as a solution looking problem (technology pull), choice opportunities and problem looking for a solution (technology push). There is recognition that innovation processes and national economic growth dynamics are substantially integrated in spatial nature (Cheshire and Malecki, 2003). However, in many developing countries, technological aspect is disparate elements resulting from a lack of a common conception of technological change in the context of regional development (Westphal and Evenson, 1993). Furthermore, Westphal and Evenson argue that innovation and technology is mostly expanded in developed countries and then flows to developing countries in the forms either assimilating imported technology or adopting and developing imported knowledge. Built upon this assumption, there is no space for investment in creating technology due to the limited space for developing countries to improve or to modify the imported technology. In order to build national competitiveness and create value in the global economy,

technological capabilities are not only derived from transfer technology but also need to be developed as network competence linked with other alliances (Chien et al., 2011, Ritter and Gemünden, 2004).

The effectiveness of technology transfer is indicated by its impact on the market, politics and personnel involved along with resources for other purposes such as scientific and technical objectives (Bozeman, 2000). Nevertheless Bozeman (2000) argues that the impacts of technology transfer is difficult to distinguish and proving its effectiveness becomes intimidating. Foreign firms do not automatically cultivate or improve technological capabilities. It is not a linear process and an increment toward productive capacity does not necessarily imply an increment toward technological capability (Mytelka, 1985). The mechanisms of technology transfer occur through several modes, namely; spin-off, licensing, publication, meeting and cooperative R&D agreements (CRADAs) (Rogers et al., 2001).

Technology transfer is typically a packaged bundle of information, rights and services that influences the development of indigenous technological capability (Contractor and Sagafi-Nejad, 1981; Kumar et al., 1999) . There are three types of technological transfer: process-embodied, product-embodied or person-embodied (Hall and Johnson, 1970). As transfer technology is not just a borrowing and imitating[9] technology, Kedia and Bhagat (1988) argue that process-embodied and person-embodied technologies are considerably difficult to move across nations because of recipients' cultural differences and societal preferences and because of strategic management issues surrounding technology absorption capability. Product-embodied technology transfer is the full transfer of technological innovation sold in the market directly to recipient (Rogers et al., 2001). Moreover, product-embodied transfer is more controlled since there is little room for persistent discourse between involved suppliers and recipients institutions (Kedia and Bhagat, 1988).

In many developing countries, technological capabilities have been established by adopting innovation from developed countries through technology transfer, which, in many ways; FDI regards as the main channel. They frequently rely on successful diffusion of foreign technology to achieve indigenous technological development (Glass and Saggi, 1998). In general, FDI facilitates technology spillover into the domestic sector. The role a domestic firm as the host economic partner is to restrict foreign influences in the local market and to acquire technology diffusion from multinational corporation proprietary knowledge. However, Blomström and Sjöholm (1999) have different hypotheses. They argue that labor productivity is higher with establishing a foreign equity rather than in a domestic firm. Consequently, the quantity of local ownership in FDI does not cause an increase in productivity of foreign establishment or even a degree of spillover to the domestic sector. The spillovers are found mostly in export firms oriented by competitive pressure in the world market. This suggests that technology spillovers are more a result of the increased competition that follows FDI than ownership sharing of the multinational affiliates.

Eventually, technological capability is determined by investment capabilities, operational capabilities, dynamic learning (Kumar et al., 1999) (in particular R&D), government support and technology infrastructure (Madanmohan et al., 2004). On the other side, Chien et al. (2011)[10] purposes two outputs of technology efficiency and effectiveness, patents/ licenses and technology exports, along with three inputs, information and communication technology, R&D and governance capability[11].

[9] However, the transfer technologies in Japan made progress from borrowing, modifying and successfully commercializing foreign technologies to operating at the technological frontier (see Mowery and Teece (1993))
[10] This study was conducted in ASEAN countries
[11] Many empirical studies demonstrate that research universities play a substantial role in technological innovation development and are relatively more effective compared to government R&D laboratories. The linkage between university and industry has been developed in many successful Asian countries such as Singapore, Korea and Japan (Lee and Win (2004)),

2.2.1.1 From Government Intervention to Technological Capability

The challenges of technological development are of great interest to governments in promoting economic growth. They are responsible for policies that advance technological efficiency and effectiveness through higher education levels, improved physical capital (e.g. ICTs, higher R&D expenditure), general management capability (Westphal and Evenson, 1993) and promoting better socio-economic environment (Ulrich and Lake, 1991). As technological capability is a significantly strategic variable, it must be integrated into a national development plan (Madu, 1989) and into global network link (Ritter and Gemünden, 2004). These are critical issues for researchers, industry and the government.

The government plays a significant role in cultivating the technological capabilities of local firms through two instruments. First is through policy instruments such as reforming laws, bureaucratic rules, procedures, organizational cultures, improving public institution, promoting programs that link local and foreign technology institutions, providing information and expertise to help 'bundle' the technology package and facilitating the inflow of technology via tax incentives (Contractor and Sagafi-Nejad, 1981; Kumar et al., 1999). Secondly is through programs that upgrade S&T infrastructure and raise R&D spending.

Technological change is an intentional process (Keilbach, 2000) that need support from government and regulation. Nevertheless, the forces shaping the diffusion of technology are still poorly understood. It is well recognized that technology differences across nations, regions, industries and firms are the main sources of productivity differences. In the end, sustainable growth is ultimately built on people, human capital and knowledge, on continued structural change in the economy and on political organization of an country or region that permits the productive deployment of those assets (Spence, 2011). Further effects from technological diffusion are knowledge spillover, industrial spillover and growth spillover. The latter it causes spatial spillover (Capello, 2009) which is similar to the growth pole concept.

2.2.1.2 Technological Capabilities gaps and Converging Growth

Technological gaps within industries in the same country not only indicate a significant economic efficiency differential but also tend to be persistent over time (Thomas, 1975). To eradicate the technological gaps, many developing countries approach foreign investment to plant industrial technology in their country. However, the technology transfer process occurs over time and is not without cost, particularly for updated technology. The cost declines with the age of the technology being transferred (Glass and Saggi, 1998). International technology transfer is an investment process when technology is localized rather than generic (Radošević, 1999). Most of the supplier prefers to transfer the low capability or out of date technology at the highest price to the recipient in order to maximize their return (Contractor and Sagafi-Nejad, 1981) and to retain their predominance against future competition (Madu, 1989; Madu and Jacob, 1989; Glass and Saggi, 1998). On the other side, the recipients want to import technology most suited to their needs at the lowest cost (Ozawa, 1985; Contractor, 1985). They also want updated technology yet many packaged technologies that the recipients get vary in industrial type, capability of the recipient, and the life cycle stage of the technology. Therefore, the effectiveness of the technology transfer depends not only on technological elements such as diffusion capabilities and technology development level of the recipient (Baranson, 1970; Kumar et al., 1999) but also on the differences of cultural preferences (Kedia and Bhagat, 1988) and the policy environment in which the multinationals operate (Blomström and Sjöholm, 1999). Furthermore Blomström and Sjöholm (1999) argue that technology spillovers may not be possible if the technology gap between foreign and local is wide because this gap leaves little opportunity for learning.

With the presence of cultural-constraints in technology diffusion, technological innovation is an attempt to get the desired technology that meets local need. It is often described as a continue linear process, from

basic research to applied research, from development to commercialization, and from diffusion and to the consequences of the innovation (Rogers et al., 2001). Further, Rogers et al. (2001) argue that this linear model may not consider external environmental factors, such as market demand and policy changes which can affect technological innovation. In this respect of cultural constraints and societal preferences, Chien et al. (2011) suggest that countries explores suitable strategies for enhancing technology efficiency in line with their benchmarking.

The principle of catching up refers to the tendency of regions with relatively low income and high-sustained growth exceeding high-income regions due to technology spillover (Verspagen, 1991). Developing regions will use technology transfer as a mechanism for fostering growth. Technology transfer has been a substantial factor in the 'catching up' process in developing countries over the last 30 years (Radošević, 1999). Furthermore, Kumar et al. (1999) build a framework that shows that technology transfer is a major element to upgrading the technological capability of a country that eventually improves economic performance.

2.2.2 Convergence

The concept of convergence is the implication of the neoclassical growth theory developed in the early 1950s. This theory exposed an important question regarding income disparity: Does a poor region remain poor while a rich region increases its wealth thus widening the gap more and more between it and the poor? It was revealed in empirical evidence on the 1990s that developing countries were growing faster than developed countries and generating a trend toward convergence. Subsequently, the debate about convergence was becoming more intense as estimating the speed of convergence uncovered information on the key parameters of growth theory and the share of capital in production function (Sala-i-Martin, 1996b). Moreover, international data sets, in particular related to GDP level in many countries, were becoming available.

Converging growth is a slow and discontinuous process (Martin and Sunley, 1998). Solow (1957) argues that in the long term, after increasing output by deepening capital, the output growth will grow constantly. It approaches a steady state of equilibrium of which technology is a crucial factor. The Solow growth model considers technological progress as exogenous. This is because without technological change, the output per worker through the accumulation of capital will be severely limited by the interaction between the diminishing return, the willingness of people to save, the population growth rate, and the rate of capital depreciation. Some technology reduces labor yet produces more output. Technological change improves growth of output. When total factor productivity changes in a market economy, it is mainly the outcome of innovation and technological progress.

If technology (A_t) progresses over time, the model can be explained as $Y_t = F(A_{t,}K_t, L_t)$ with K_t representing capital stock and L_t representing growth of labor force. It shows that the main factors of regional disparity are the variation between regions in terms of technical progress (A), growth of capital stock (K) and growth of labor force (L). This model attempts to use the principle cumulative causation for defining the process of regional growth disparity. Once disparity exists, it tends to persist.

The convergence model considers initial income to be the explanatory variable. It is divided into absolute/unconditional and conditional convergence (Sala-i-Martin, 1996b). Absolute σ-convergence refers to a decrease of the income dispersion between poor and rich regions over time. Absolute β-convergence indicates poor regions' growth exceed that of rich regions toward the same steady state and conditional β-convergence describes the growth toward different steady states. The β-convergence is a necessary condition for narrowing the dispersion of (σ-convergence) per capita income at a given point in time (Petrakos and Artelaris, 2009).

However, the main concern of disparity in many studies is an increase of disparity within high performance growth countries particularly in developing countries. Those countries may have high growth exceeding what developed countries may have but it does not mean the income disparity within a country automatically diminishes. Most developing countries[12] have not yet accomplished closing the income gap as the developed countries did.

2.3 Developmental Disparities in Developing Countries

The stages of interregional convergence in developing countries generally go through three simplified phases. Firstly, in initial development, regional divergence occurs because the concentration of development and industry takes place only in restricted regions (Williamson, 1965). In this phase, structural changes and agglomeration occur. Secondly, those limitations and concentrations of growth preserve insufficient economic infrastructure outside the concentration of growth increasing disparity to a high peak (Hansen, 1990). As development proceeds, the land rent and wages increase, and eventually the original regions become overcrowded. This leads to diminished return, which are the main subject for future investment. Thirdly, the government develops new regions, usually in hinterlands, offering infrastructure, institutions, and human resources as the investment requisite. This leads to industrial deconcentration in the original regions and a movement toward convergence among regions within an individual country. Thus, since regional development in developing countries is more likely to create concentrated growth center, what are the consequences of the remote regions away from existing growth center? Will remoteness cause divergence? Will connectivity reduce disparity? Is the current disparity a cyclical phenomenon or part of a long-term trend?

2.3.1 Growth pole and Hinterland

In developing countries, development mostly focuses on certain regions or major cities. This is the departure of the growth pole theory. The growth pole was initially accepted as euphoria (Lasuen, 1969) because it indicated generality development in previous stages of industrialization (Parr, 1999b) even though there are neglected aspects in spatial configuration of the poles (Parr, 1999a). The growth pole idea suggests that strategic sectors in a pole generate self-sustained economic performance and spread the effect to surrounding. Perroux as cited in Hansen (1967, p.710) argued that "the fundamental fact of special, as well as sectoral, development is that ' growth does not appear everywhere and all at once; it appears in points or development poles, with varied intensities; it spreads along diverse channels and with varying terminal effects for the whole of the economy". The growth pole later creates urban-rural polarization, caused by the transfer of surplus from the rural to urban through net capital flow, brain drain and natural resources. It was formulated as the backwash effect. Lipton (1976) introduced the term "urban-biased" referring to a reversed role indicating agglomeration in major cities. Rural areas in many ways support and serve urban areas both socially and economically.

The idea of the growth pole is an established core characterized as key industries based on supply and demand. The intention is variation of industries over an entire region. The core provides key industries with surrounding industries linked to key industries, mainly through direct and indirect effect. The expansion of the core evolves output, employment, investment and technologies and leads to unbalanced regional development. However, it leads to a backwash effect instead of a spread effect particularly in

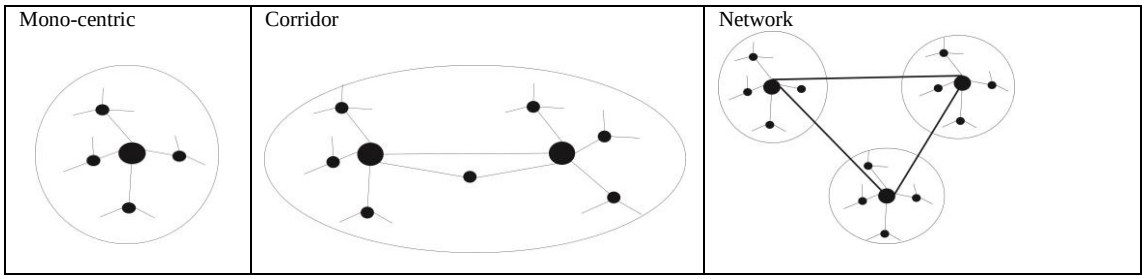
[12] See China and India case. Both have high growth but the income gap within country increases. For China, see Fleisher and Chen (1997) about coastal and non-coastal gap despite the high investment in non-coastal regions and see Kanbur and Zhang (1999)) that argue about the evolution of urban and rural disparity. Another case of uneven growth in China and India, see also Chaudhuri and Ravallion (2006)

most of developing countries (van Oort and Mccain, 2009). At this rate, the growth pole creates inter-regional inequality or urban-rural inequality on supply side.

Rural as the agricultural region and urban as the non-agriculture have been conventionally separated which leads to the dichotomy of urban-rural perspective. The formal definition regarding rural development in Indonesia in Law No. 26 of 2007 on spatial planning indicates that rural is solely the development of agriculture and natural resources. Basically, rural development will not be comprehensively reached unless the non-agriculture improves and develops (Rustiadi, 2007). Currently, the connectivity of urban-rural is directed to mutual relationship and inseparable linkages. Friedmann (1968) argued that periphery (hinterland) improvement and development can anticipate over-agglomeration in large cities.

As a result of extending metropolitan regions, urban rural functions were distinguished separately. Being firstly identified in Indonesia, the term *desakota*[13] was introduced to refer to the corridor around large urban cores with an intense mixture of agriculture and non-agriculture activities (McGee, 1991). The radius of the corridor *desakota* is 100 km (McGee, 1987, 1991; Tacoli, 1998). Further, Hudalah et al. (2013b) argues that the continuity of rural-urban corridors has created urban extended regions. The urban-rural gap continues to widen because of the declining need for natural resource supply and the need for creative activity and accessible innovation (Batten, 1995).

Other than that, (Fishman, 1990 in Batten, 1995) establishes several combination of urban pattern (Figure 2.1). According to Fishman, the mono-centric city with the terminology 'suburb' and 'central city' derived from the era of the industrial metropolis is out of date. Moreover, Fishman created the term 'New Cities' for the sprawling regions in 'growth corridor' stretching 50-100 miles from the basic unit. This new urban configuration induces a multi-center core whereby the linkage relation tends to be horizontal rather than hierarchal. Further, these elaborate webs of corridor cities' functional and locational relationships promote their holistic competitive advantages over some other mono-centric regions with a dominate single core. Domination occurs when one or two core-spaces controls and influences on other economic space either in a permanent and structural manner or in an accidental fashion (Hansen, 1967)



Source: Batten (1995, p. 316), redrawn

Figure 2. 1: Urban Configuration

Hudalah et al. (2007) argue that urban-rural corridor development minimizes spatial cohesion by means of intensive mixture and growing integration of urban and rural economies (Lin, 2001). This integration creates the urban-rural dichotomy unnoticed by local governmental (McGee, 1991), increasing environmental degradation and widening regional differences.

[13] Indonesian term for rural-urban. McGee in Tacoli (1998) pronounced it as *kotadesasi* which has same meaning with *desakota*.

2.3.2 Interregional Divergence Growth

The convergence concept was initially estimated in several developed countries such as the U.S., Australia and Japan (Baumol, 1986). Barro and Sala-i-Martin (1992a, 1992b) who also examine convergence across the U.S. and Japan observed convergence with the assumption of similar steady states, homogeneity in preferences, structure, culture, technology and similar authority/ institutional arrangements within the country. It is arguable whether this assumption can be applied to different regions, in particular developing countries because of their differences that tend to dissimilar steady state and stages of development. These varieties are reflected in several indicators such demographics, rates of investment, economic structures, urbanization and the prevalence of government policy within individual countries.

The convergence definition is not always clearly explained, in particular when there are high-income regions growing slower or low-income regions growing faster and the income dispersed across regions does not narrow over time. By far, within an individual country, regions tend to converge toward other regions at the same level of per-capita or homogenous development inducing widened disparity between groups of regions such as urban-rural regions (Kanbur and Zhang, 1999), inland-coastland regions (Fleisher and Chen, 1997), and growth poles-hinterland regions (van Oort and Mccain, 2009), and so on.

2.4 Assessing Regional Disparity in Central Java and Yogyakarta: Problems, Methodologies and Framework

Regional disparity is long-drawn issues in Indonesia. Disparity relates to regional development within individual country. The Indonesian development aimed to pursue high economic growth instead of equity since Five-Year Development 1 (PELITA 1, 1969-1974). As Java has a sizeable manufacture base particularly in polar ends, Central Java and Yogyakarta province have not attracted much domestic or foreign investment compare to other part of Java. Central Java and Yogyakarta are two of the lowest in per capita income compare to other province in Java. Within Central Java, the number of FDI approved and realized has sizeable differences (Pambudi and Smyth, 2008).

In the other hand, Yogyakarta province has contrast regarding socio-economic development. Despite insignificant economic outcome performance, high poverty, and an increased index Gini[14], Yogyakarta province has a higher Human Development Index and Life Expectancy (BPS, 2014). For historical reasons, Yogyakarta province is the only region in Indonesia where the governor and Sultan are concurrently inherited positions. As the Yogyakarta Sultanate has continuously ruled the region, the traditional culture in Yogyakarta has been conserved and preserved up to today. Nevertheless, as socioeconomics change and urban areas experience major transformation, such as acquiring many large-scale hotels and shopping malls. The historic areas have been constructed for economic interests. It is not surprisingly the land and house prices are higher in urban area. Consequently, Yogyakarta city grows and absorbs neighboring region creating what is called spatial diffusion[15].

This study is based on the spatial dichotomy of north – south regions. The term north corridor came from the growth of north coastal region during Java colonial. The assumption of south and middle regions came from the location of Yogyakarta and Surakarta principalities. As many literatures have illustrated

[14] According to BPS (2013), the poverty rate is 15% and the Gini index has been equal to or above 0.4 since 2010. UN-Habitat highlights a Gini Index above 0.4 as the critical line for risk of social unrest (UN-Habitat (2008); UN-DESA (2013))
[15] Greater Yogyakarta is adjusted for the regional plan of Yogyakarta spatial diffusion or agglomeration.

that the ancient Yogyakarta principality as the 'Southern-Central Court' facing the Indian Ocean[16] and Surakarta was explained frequently as 'inland principality' of Central Java.[17] The present administrative of Yogyakarta province is not reflected thoroughly the region of old Yogyakarta principality.

The pattern of the north-middle-south corridor has existed as a general perspective in Central Java. The bipolar development pattern and the Great Road built during colonialism in the north corridor allegedly confirm that north as a more developed region. In present day, the Great Road has strategic benefits for distributing goods in the north corridor. This is a departure from the north - (interior[18])-south classification. Thus, this study explores the regional process pattern of socio-economic distribution and technological levels in region related to regional disparity.

This study's primary objectives are to research whether disparity across regions in Central Java and Yogyakarta fall or increase over time and to revisit the presence of spatial growth patterns in the north, middle and south corridors. Therefore, it aims to answer a set of associated questions:

1. As the disparities arise, are the spatially pattern identified and presented as North, Middle and South regions?

2. How does the government respond to minimize the disparity?

3. To what extent, do the technological capabilities disperse and affect the regional disparity?

4. Can the catching-up process be identified?

5. How does the regional growth process occur in Central Java and Yogyakarta?

A common problem faced by studies in developing countries is the lack of accurate data at the regional level and the data that does exist is mixed and inconclusive. In order to identify the presence of convergence, technology data is needed but it is unavailable at the regional level (cities/ regencies) in Indonesia. However, technology capability is an accumulation of embedded knowledge, not just in people but also in institutions, processes and mutual interaction between them. The measure of technology is supposed to be comprehensive, not only the output estimation but also the whole process, until it is confirmable. Education, investment, government interference and infrastructure are the basic factors of how technology in one region is acquired. This study offers a new methodology in how to measure technological capabilities level based on reflection of three dimensions, namely government, human resources, investments and infrastructure. It is more as a compilation of regional stakeholders' perceptions about their region and other regions regarding technological capability levels.

Building upon the formulated problem, the framework of this study is established in correspondence to the logic of the regional disparity context (Figure 2.2). The first logic is that inequality has occurred because of the structural changes taking place. Each region may experience structural transformation differently. To represent north-south differentiation, the structural change and the inequality index are estimated by the aggregate amount of economic activities in each corridor.

As inequality arose and conflicts emerged, new policies - namely decentralization – were enacted by the central government after Asia Crisis. In this regard, the question of whether decentralization reduces

[16] For some cultural and ritual orientation, the Yogyakarta court is oriented toward Merapi Mountain and Indian Ocean.
[17] See Claver (2014) for about the cultivation system and agriculture trade during Dutch colonialism, Knight (2013) for about the development of Sugar industry in colonial Java, Dick (2002) for about the economic growth during colonialism period, Kwee (2006) for about urban growth in Java northeast coast.
[18] In this study, interior and middle regions are used interchangeably

disparity or worsens disparity was formulated. The inequality measurement in this section uses the Williamson index reassessed with the Kuznets seminal inverted-U curves.

Over time, as the growth rate improves, inequality is expected to fall and regional economies converge. Some of the less developing regions may have a faster growth rate exceeding the developing regions, which represents the catching up effect; some may not. Thus, the third logic leads to the question about whether convergence or divergence occurs. The highlight of this study is to analyze technological capabilities corresponding to converging growth. The limited secondary data creates the new methodology to collect the primary data through the reflection of stakeholders' perceptions. Lastly, the final logic is to conclude the regional growth pattern related to disparity in Central Java and Yogyakarta.

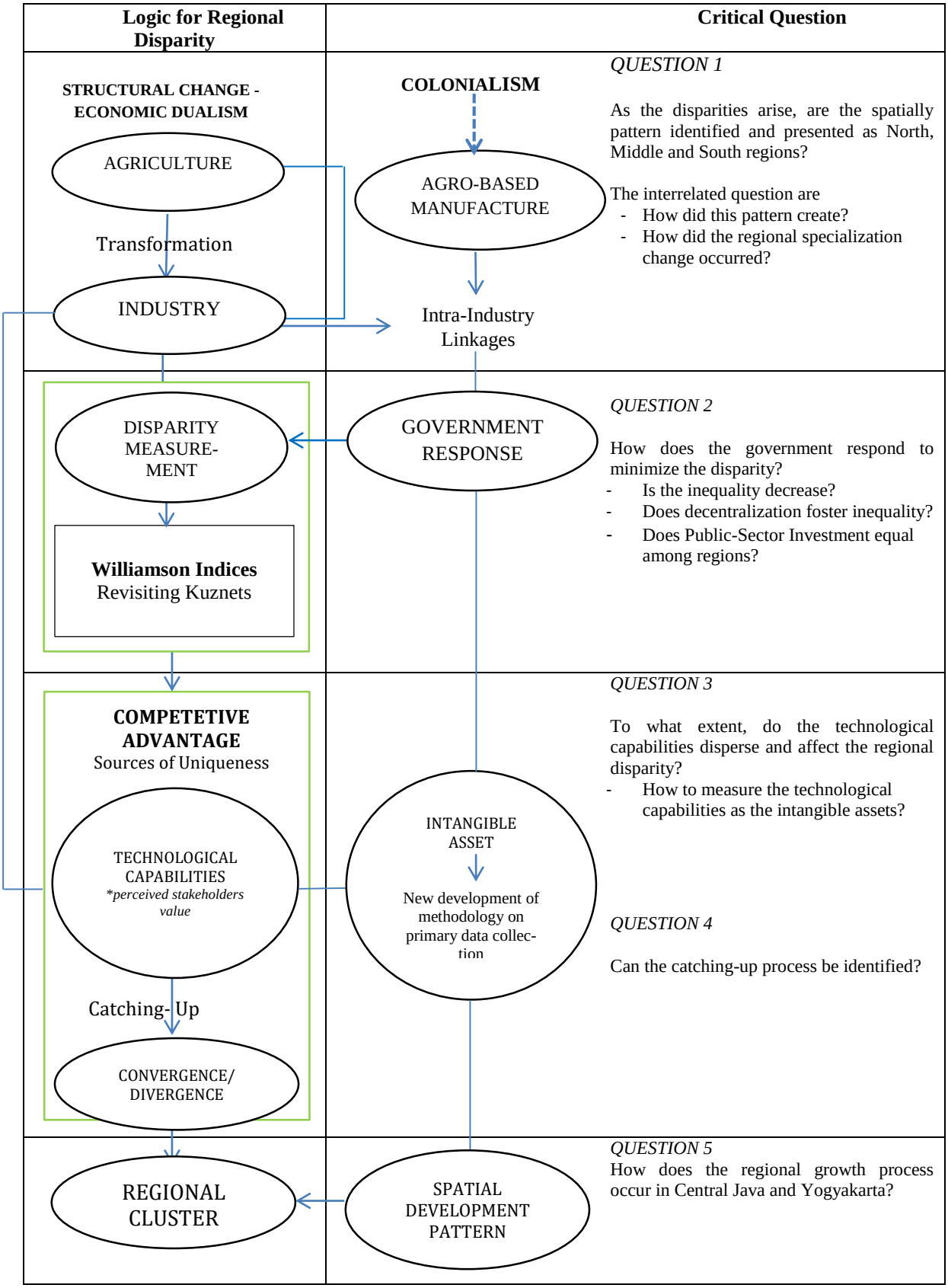


Figure 2. 2: Framework of Study

2.5 Conclusion

The traditional perspective towards regional disparity is mostly about the differences in geographical aspects (natural resources and strategic location) and historical aspects. Colonialism played a significant role in building the future national system. Acemoglu and Robinson (2013) argue that a deeply-rooted patterns from the past, in particular how political and economic institution interact, would persist into the present and future. In essence, political and policy choices influence and constrain economic outcomes or vice versa. Disparity is a structural problem caused by long-term systemic issues that occur within an individual country. Therefore, once disparity occurs, it proves to be cumulative and self-perpetuating over time.

It is clear that a difference in economic structure is the initial factor that affects regional growth. As the economy modernizes, structural changes take place. This transformation is an inevitable part of development, which pushes laborers to migrate from agriculture to industry, from rural to urban. The implication is a decline in agriculture's share of the GDP and a corresponding increase in non-agriculture sectors, particularly industry-manufacturing. Economic dualism in many former agricultural regions does exist and in which traditional agricultural and modern capitalistic industries meet and grow alongside. However, the structural changes have a deep impact on inequality.

Technological progress is widely recognized as a crucial factor of converging growth. It is a structural driver of inequality. Foreign trade and technological progress have been suspected as the causes of uneven development. It is necessary to recognize that technology not only as the manifestation of result but also the comprehensive process of development and innovation. Eventually, technological capabilities are related to comprehensive processes not only about outcome but also about people and institutions. Government plays a significant role in technology development through policy and infrastructure provisions. Promoting massive R&D and providing infrastructure are fundamental responses to a variety of regional differences in technological progress. On the other hand, regions must be aware of globalization and integration of economies all over the world which include, most significantly, the increased pace of knowledge. Thus, technological capabilities are more likely as regions respond toward globalization.

The development of technology in Indonesia began with the operation of plantation system during the colonial period. The agro-industrial was firmly established and flourished back then in respect to technological progress, the prominent agriculture output, low wage labor, and fertile soil. Like or dislike, the colonial government left many legacies in developmental policies, and several were continued by Indonesian present governments. Thus, it is necessary to assess the colonial past during which disparity might have initially increased

3 The Central Java and Yogyakarta Context[1]

3.1 Colonialism and the Process of Divergence

Colonialism is a form of governance that exploits the resources of one country and allocates that resources to the industrialized imperialist. Colonization involves full or partial political control over another country. In many less developed countries, the social and economic inequality from colonial times has been preserved or expanded into even greater inequality (Myrdal, 1970; Acemoglu and Robinson, 2013). However, there have surely been some changes in the colonialized countries, as indicated by advancements in mobility infrastructure and technology such as trains, automobiles, electricity and telephone.

Colonialism played a role in the history of many current developing countries. There was no nation called Indonesia in pre-colonial times. Indonesia was an archipelago in the Indian Ocean with several principalities ruled in different regions. During Dutch colonialism, Indonesia was defined as the Netherlands (East) Indies (Nederlandsch-Indie) (Dick, 2002). In this study, the discussion about colonialism focuses on Dutch colonialism despite the fact that there were other colonizers before the Dutch arrived and in-between Dutch rule.[2] The main reason is that regardless of the heavy losses and suffering of Indonesian people during colonization, the Dutch provided an administrative and foundation for the modern state, economic, legal system, labor relations, urban development and many other aspects that are still in place today (Vickers, 2005).

As Java was the most fertile and populous of this Dutch colony, it was the keystone of the Netherlands' commercial empire in the Indies (McCabe Elliot, 2013). The Javanese outcome was mainly a rice-based economy with high 'natural' population densities. By 1930, Java was overpopulated. Nearly 70 percent of the population living in Java and Madura, particularly in Central Java and East Java, was concentrated in urban areas creating (structured and concealed) underemployment due to labor migration (Ricklefs, 1993). Furthermore, Ricklefs argues that contrary to the success of providing food production by experimenting with new seeds, spreading new products through dissemination of scientific research, general regulation, encouraging the use of fertilizers and so on, the food production was not sufficient to meet the population growth. This was because the plantation system was mainly exploited for profitable crops and exporting goods not oriented for daily consumption.

3.1.1 Agriculture Exploitation

In the mid-nineteen century, the Cultivation System[3] was established by the government for the development of an agricultural production system in Java. It contributed to a deep-rooted pre-capitalist social structure, depriving private land-ownership, native entrepreneurship and agriculture land use (Geertz, 1956). Furthermore, Geertz asserts that the process of plantation production from upstream to downstream was controlled in order to hinder the development of independent agricultural entrepreneurs.

[1] The discussion about Central Java and Yogyakarta in this chapter is mostly parallel and interrelated with the illustration of Java as a whole.
[2] The Portuguese are the first Europeans to have arrived in the archipelago. British colonialized Java in 1811-1816. Japan arrived in Indonesia and exploited during World War II (1942-1945).
[3] It is known as *Cultuurstelsel* in Dutch.

The Cultivation System forced peasants to grow export crops, which was normally based on rice production, in order to raise sufficient funds for meeting their land-tax commitment. Profitable export crops such as coffee, sugar, indigo, tea, cinnamon, pepper, tobacco, cotton, silk, and cochineal were sold to the government at fixed prices. This system aimed to establish a balance between rice productions and export crops, which benefited both the peasants and the colonial economy. However, some historians argue that there was not a 'system' but instead colonial exploitation (Fasseur and Elson, 1992). In other word, it was a system of forced crop deliveries with low-wage labor and quotas. Villagers were forced to allocate 20% of village land for specified commercial crops (Robison, 2009). The lowland plantations eventually produced sugar, which dominated total export value up to 78% in the mid-nineteenth century. Robison argues that in the nineteenth century, the colonial state minimized their interfere in production and operation of trade monopolies in order to establish new political and economic conditions such as regulation, complex infrastructure, and provision of fiscal and welfare policies in the Indies for the expansion of the massive capital either coming from the Netherlands or other Western countries.

From 1815 to 1860, the population in Java increased and doubled by 1900 (McCabe Elliot, 2013). The plantation system began to grow rubber and nut palm (McCabe Elliot, 2013). The discovery of petroleum in Indonesia [4] in the early twentieth century brought vast new wealth to the Netherlands and changed sugar, coffee and rubber[5] to the significant exports. Table 1 explains that sugar was the main profitable good and agriculture investment in Indies, whereby Java attracted the heaviest investment during Dutch liberal policies[6].

Table 1: Agriculture Investment (f.mil*) in the three Culture Areas, 1929

Nationality	Culture Area			Total	Total Invested in	
	Java	East Sumatra	South Sumatra		Sugar	Other Crops
Dutch	1118.0	360.7	57.2	1535.9	778.6	756.3
British	142.0	124.7	11.2	277.9	10.1	267.8
Franco-Belg.	35.9	72.5	3.2	111.6	-	111.6
U.S. America	-	53.0	-	53.0	-	53.0
Japanese	5.9	13.7	-	19.6	3.7	15.9
German	5.7	8.1	4.0	17.8	-	17.8
Swiss	-	4.4	0.7	5.1	-	2.1
Italian	2.1	-	-	2.1	-	2.1
Other, known and unknown	22.3	4.9	13.8	41.0	-	41.0
Total	1332.4	642.2	90.4	2065.0	793.5	1271.5
Percentage of foreign cap.	16.1	44.1	36.8	25.7	1.7	40.5

1 guilder (or florin, f.) =100 cents N.-I. = at gold par is. *Sd.* Brit, or U.S. $. 0-40.
Source: Furnivall (1967, p. 312)

Onghokham (1975) explains that the regency in the north coast of Java enjoyed greater income from the cultivation of sugar and rice, in particularly in Central Java's north coast (Knight, 2013).

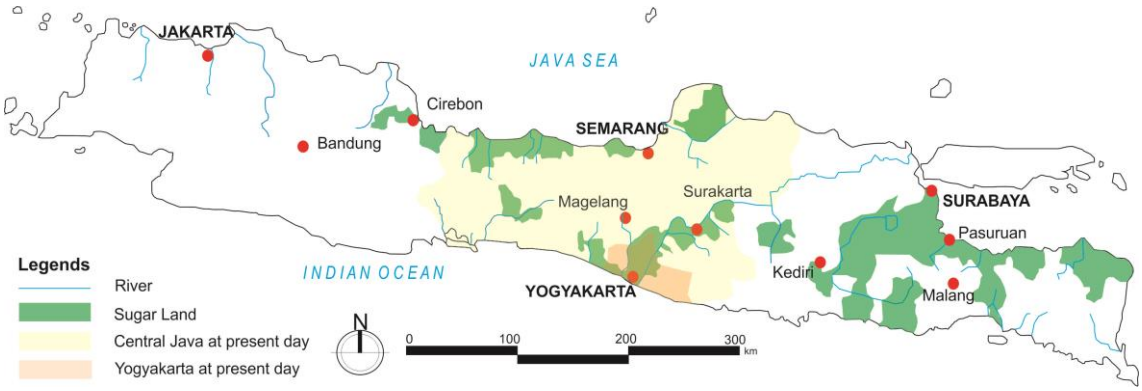
[4] There were some fifty oil companies at work in Sumatra (along the east coast from Aceh to Palembang), Java (at Semarang, Rembang and Surabaya) and Kalimantan (on the east coast) (Ricklefs (1993))
[5] Rubber was a profitable product, which was used as the raw material of wheel manufacture during the initial car industry. The rubber seed *Hevea brasiliensis* was imported in 1900.
[6] The liberal Dutch era (after cultivation system) gave the private sector the authority to build the railway. However, private railways could not provide the expected return of investment (even NIS. *Nederlandsch-Indische Spoorweg Maatschappij*/ Netherlands East Indies Railway Company, required some financial assistance from the government), and the Dutch Ministry of Colonies finally approved the establishment of a state railway system, the *Staatsspoorwegen* (State Railway).

3.1.2 Trade, Manufacture and Industry

3.1.2.1 Java Sugar as an Industrially Manufactured Commodity (1810s-1940s)

Sugar was a profitable commodity back then similar to oil today. The colonial sugar industry operated exclusively on Java, which had fertile soil and a dense population. Java was foremost for having the lowest paid labor and abundance of production among the international sugar producers at that time. It was a singular industrial project in respect to its scale, output and technological-scientific[7] advancement (Knight, 2013). As the sugar industry bolstered, with the foremost technological progress in the sugar industry at that time, Knight (2013) argues that Java became a major international sugar producer, larger than the cane sugar industry in Cuba, and the trio of northern European beet sugar producers: Imperial Germany, Austria-Hungary and France. Knight (2013) argues further that the most important factor of the colonial sugar industry was direct farming in which sugar factories had full control of the cultivation of raw materials.

The sugar industry had developed several new-built sugar factories under the Cultivation System located mostly along the great river or along the coast. It scattered across the lowlands of the north coast of Java and the inland areas of Java, particularly in the principalities[8] (Knight, 2013), outside the sugar plantations mostly in east Java[9] (see Figure 3.1). However, Knight claims that the largest Java sugar producer was in Semarang, Central Java.



Source: Knight (2014, p. 12), edited.

Figure 3.1: The Main Sugar Growing Areas in Java

The development of the sugar cane industry in colonial Java began in the 1810s by establishing the self-made vacuum pan as the heart of the sugar industry (Knight, 2013, 2014). Knight expressed that by 1850, Java was close behind sugar's international leader Cuba in respect to the number of steam-operated installations in its factories' boiling houses. During the 1870s, sugar manufacturing was fully industrialized, bolstered by the installation of a fully-fledged version of a multiple effect apparatus. By the mid-1880s, Java's industry had become progressive in term of technological capabilities and managed to survive the global commercial crisis of the international sugar industry at that time. Despite many obstacles to sustaining growth in the 1910s, by 1920, the industry flourished more than ever. After the First World War, the sugar industry rose and Java was in a position to benefit greatly. Java dominated the East

[7] Knight also describes that the central features of sugar industry progress were major innovations in metallurgy (cheap steel), transportation (mass, low-cost freight) and motive power (electricity and the internal combustion engine).
[8] In the Yogyakarta and Surakarta applied different system of exploiting both land and labor. The colonial sugar companies lease land and labor from the aristocrat as the legal holder of land. It was called Vorstenlanden
[9] In Pasuruan (East Java), there was *Proefstation Oost-Java* (POJ, East Java Sugar Research Institute)

Asia (China and Japan) and Indian subcontinent in sugar production. However, the sugar industry experienced a downfall in 1931 due to the market failure in Asia and the rapid industrialization of India.

By the 1930s, the Dutch were trading a substantial amount of Javanese sugar to Japan. In return, the Japanese wanted cotton production kept out of the Indies (Knight, 2013). This agreement eventual failed because the Dutch colonial government decided to promote production of cotton goods in the Indies as part of their industrialization program. However, in the end, the Dutch failed to establish an international textile industry in the Indies (Eng, Pierre van der, 2013).

As colonial Indonesian society was organized with the Dutch in the first class, Chinese and Arab (foreign oriental) as the second class, and indigenous peoples in the lower class (Dick, 2002), most of the sugar manufacturing and other economic activities in colonial Java were controlled by the Dutch, Chinese and Arabs. Indigenous merchants were unable to compete with the Chinese and Dutch who mechanized and expanded their production to operate large-scale estates in the importing and manufacturing sectors. Thus, indigenous peoples moved into agriculture trade and manufacturing, such as producing traditional batik cloth that was difficult to imitate because of its local nature, *kretek*[10], food products, beverages and furniture, and services such as those in the transport sector (Robison, 2009). These commodities, particularly *kretek* and textile, are the flagship products of Central Java and Yogyakarta even today.

3.1.2.2 Textile Industry

The textile industry is arguably one of the most important manufacturing industries in Java (Robison, 2009). Despite the fact that Java was the most populated island with abundant labor and low wages that could have expanded its textile industry further, colonial Java failed to establish international textile manufacturing during the nineteenth and early twentieth centuries (Eng, Pierre van der, 2013). Some literature suggests that this was largely due to a de-industrialization impact of Dutch colonial rule in Indonesia (Eng, Pierre van der, 1998, 2013; Furnivall, 2010). Dick (1993) and Eng (2013) assert that apart from the sugar industry, there was no other significant sectors in which to promote industrialization in colonial Java. Furthermore, Eng (2013) argues that this happened for two main reasons: first, indigenous spinning and weaving[11] was too labor intensive to be competitive with the production of international fabric and yarn; secondly, local raw cotton production was insufficient and the quality was poor. Given these reasons, trying to build a textile industry with imported technology was unproductive. On the other side, the international textile market fluctuated with many competitors while the domestic market for local cotton textiles was sizeable and integrated. In table 2 shows the number of textile produced in 1940-1941. The largest production occured in Priangan (West Java), Pekalongan (Central Java) and Surabaya (East Java), with the largest weaving ventures being NV Preanger Bontweverij (Garut, 1932) and the NV Java Textiel Maatschappij (Tegal, 1936).

[10] Kretek are cigarettes made with a blend of tobacco, cloves and other flavors. The word "kretek" refers to the crackling sound of burning cloves. Indigenous people mostly owned this type of manufacturing. In the 1930s, this industry performed stronger with increased labor. Kretek was invented and first manufactured in Kudus, fueling the economy of Kudus that still prospers today.

[11] Local domestic industry of dyed and batik cloth made production manually since batik is a handmade product. However fabric and yarn were mostly imported from China, Japan, India and Dutch (Eng, Pierre van der (2013)).

Table 2: Number of Licensed Looms in Indonesia, 1940-1941

Region	Residency	Handlooms		Power looms	
		Number	%	Number	%
West Java	Priangan	15,088	34	2,655	33
	Cirebon	3,180	7	306	4
	Bogor	1,019	2	599	8
Central Java	Pekalongan	8,219	18	948	12
	Solo	4,131	9	380	5
East Java	Surabaya	5,377	12	1,701	21
	Kediri	1,965	4	24	0
	Malang	1,361	3	676	9
Not Specified		2,834	6	490	6
Total Java		43,174	97	7,779	98
Other Island		1,381	3	158	2
Indonesia		44,555	100	7,937	100

Source: Kroese (1946) in Eng, Pierre van der (2013,p. 1046)

Batik[12] cloth was a successful indigenous textile trade in Central Java (Robison, 2009). The unique pattern was mainly developed in the principalities of Yogyakarta and Solo. However, Robison (2009) asserts that domestic manufactures were largely dependent on imported cloth and yarn. As consequence, the largest textile manufacturers were mostly in port cities. The inland functioned mostly as the cultivation of products with the port cities serving as the outlets to the world market and inlets from the world supply. Given to that, the interregional connection within island for transporting people and goods in colonial Java greatly impacted to the manufacturing progress.

3.1.3 Infrastructure

3.1.3.1 The Railway

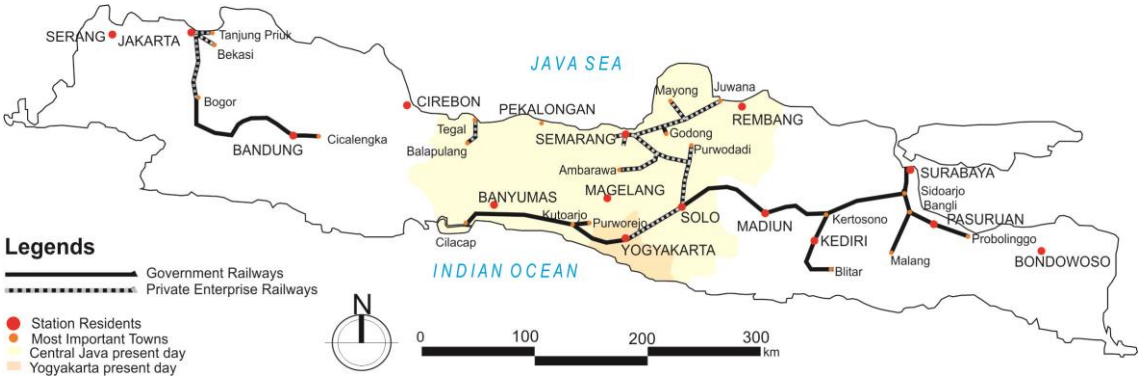
The concern of economic growth was mainly linked to improving infrastructure, particularly the transportation system (railways, tramways, road, telephone and shipping). The need for a more mobile infrastructure was urgent due to the increased output of the Culture System in colonial Java. In order to transport products such as chocolate, rubber, coffee, spices and other commodities in and out the regions, the rail system was established. This occurred relatively late[13] due to fact that Indonesia was (and still is) predominantly maritime, connecting the Indies archipelago (Knight, 2014). However, the development of the railway in colonial Java was parallel to the progress of sugar industry

The first railway built in Indonesia, even in South East Asia, was in Kemijen Village, Semarang Central Java[14]. It began operating on 1867, connecting 25 km to Tanggung, and in 1873, it was extended to Solo and later to Yogyakarta. The track was purposed to connect sugar and coffee lands in principalities of Solo and Yogyakarta to the port city of Semarang (Owen, 2014) (see figure 3.2) and was financed privately by the planters in those regions

[12] Batik is an Indonesian word, and refers to a generic wax-resistant dyeing technique used on textiles. The word originates from the Javanese word *amba*, meaning ”to write,” and the Javanese word for dot or point, *titik (http://www.newworldencyclopedia.org/entry/Batik).*

[13] Compared to Cuba, also a major producer of the sugar industry, the railway grew along with sugar industry that began in 1850.

[14] This was cited from a variety of general knowledge. This information was also obtained when the author worked for the Indonesian Railway at Central Java Operational Area (DAOP IV).



Source: Dirk Teeuwen collection, Holland, Rendez-vous-Batavia.nl – The Netherlands 2011 from book "Staatspoor en Tramwegen in Nederlandsch-Indie 1875", 6 April 1925, redrawn

Figure 3.2: Java and Madura Railways in 1873

There was a distinction between state railways as the main system and private railways or tramways (Figure 3.2). The tramways were the branches/feeder rails of the main railway system connecting the sugar plantations to factories and the tobacco and rubber plantations to harbors. As is shown in table 3, the development of private tramways, which were mostly light railways connected to the main railway system, was greater than state development. In contrast to private railways that were established for economic interests, the state railway was constructed for the purpose of political strategic development in Java (Owen, 2014). From the 1880s onward, the development of railways as the mode of transportation for goods and people grew extensively.

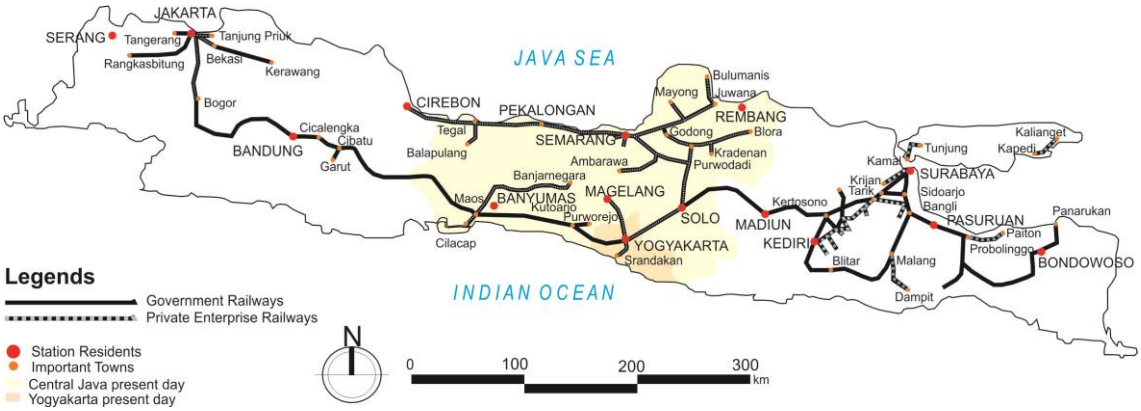
Table 3: The Development of Railways

Year	**Railways**					**Tramways**		Total
	State			Private		State	Private	
	Java		Sumatra	Java	Sumatera	Sumatra	Java	
	(a)	(b)	(a)					
1867	-	-	-	25	-	-	-	25
1873	-	-	-	261	-	-	-	261
1891	945	-	141	261	103	39	238	1727
1900	1653	-	210	261	103	78	1326	3631
1913	2145	83	245	206	92	465	2196	5432
1920	2427	83	245	210	271	511	2395	6142
1930	2917	79	1335	863	496	-	1689	7425

Source: Furnivall (1967, p. 329)
Notes (a) normal gauge
(b) light gauge

The important private railway enterprise was line stretching along the north Central Java Coast between Semarang-Cirebon (present in west Java) under *Semarang-Cheribon Stoomtram Maatschappij* (Knight, 2014, 2013). It served 27 sugar mills and serviced the great majority of sugar factories located along the north (Figure 3.3). However, during 1810-1890, the strategic inter-regional state railway was established from the west in Batavia to South-Central Java (the principalities region), which had been the center of a

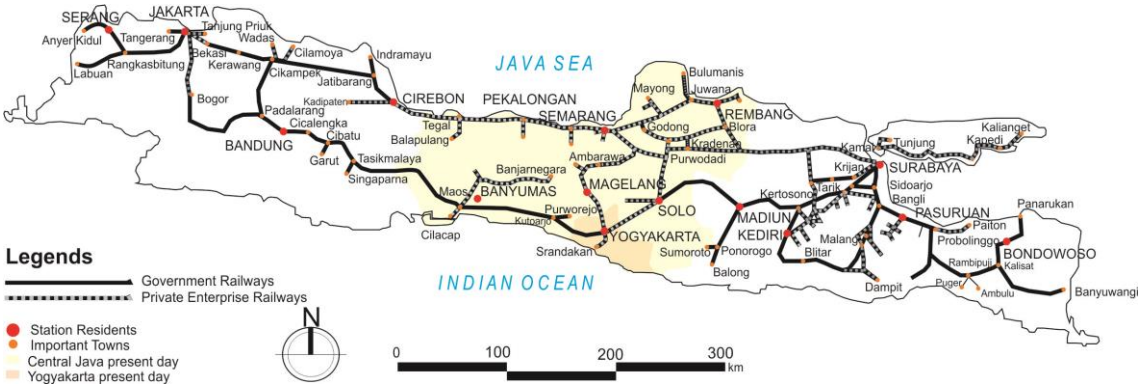
considerable number of plantations since several decades earlier and contained advanced sugar factories[15] (Knight, 2014, 2013).



Source: Dirk Teeuwen collection, Holland, Rendez-vous-Batavia.nl – The Netherlands 2011 from book "Staatspoor en Tramwegen in Nederlandsch-Indie 1875", 6 April 1925, redrawn

Figure 3. 3: Java and railways in 1889

By 1913, state railways provided almost all of the connecting lines between the important regions for economic and strategic reasons. The first state railway line was through mountainous areas on the southern part of Java instead of the flat regions of the north, clearly for political reasons (Knight, 2014, 2013). On the north coast, the state railway in Java connected Anyer in the west to Banyuwangi on the eastern coast (Figure 3.4). The entire island has been encircled by the railway ever since.



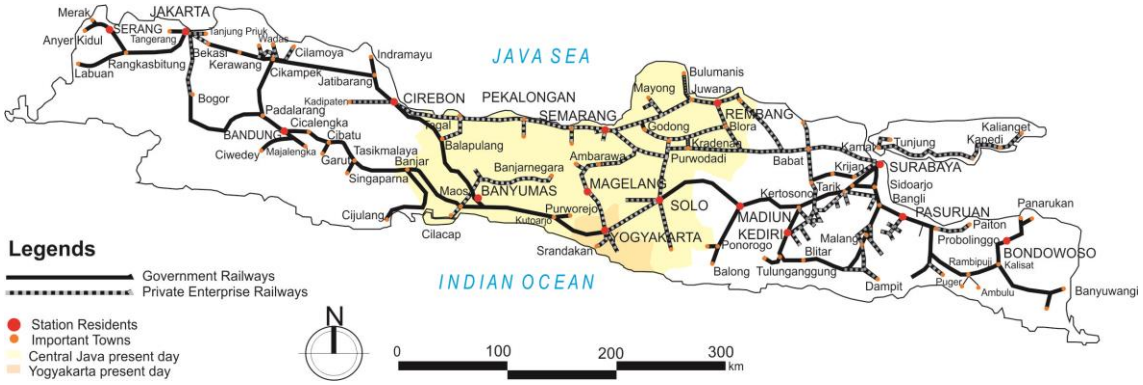
Source: Dirk Teeuwen collection, Holland, Rendez-vous-Batavia.nl – The Netherlands 2011 from book "Staatspoor en Tramwegen in Nederlandsch-Indie 1875", 6 April 1925, redrawn

Figure 3.4 : Java and Madura Railways in 1913

In the 1920s, the railway system in Java reached its greatest extent, with most towns and cities connected by rail. The branches and tramways still connected sugar plantations to factories (Figure 3.5). The railway development in colonial Java eventually united and strengthened control over the favorable regions, which were the backbone of Dutch colonialism economy. Thus, the connection within and between

[15] The Colomadu sugar factory near Surakarta in South-Central Java c.1885 was one of the most technologically advance Java factories. It was the only factory operating in Java colonial that was owned by a Javanese (Prince Mangkunegara IV, fourth ruler of Mangkunegaran, a small Principality based in Surakarta)

islands was important to facilitate the logistics of goods and agricultural products. Java in 1900 was a far more integrated in terms of economy than before. Today, many railways are still in use, but quite a few have also closed down.



Source: Dirk Teeuwen collection, Holland, Rendez-vous-Batavia.nl – The Netherlands 2011 from book "Staatspoor en Tramwegen in Nederlandsch-Indie 1875", 6 April 1925, edited

Figure 3. 5: Java and Madura Railways in 1925

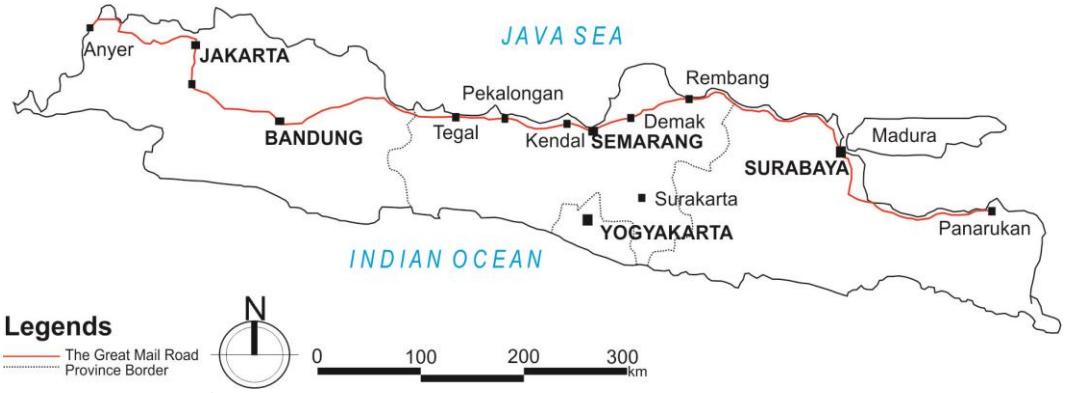
Besides the railway, the Dutch also built the inter-regional road along the north coast. This construction was permanent and massive, replacing the existing road paths that were not easy to travel as heavy tropical rainfall frequently destroyed them (Nas and Pratiwo, 2002).

3.1.3.2 The Great Mail Road (built 1808-1811)

Inspired by the victorious French Revolution, in 1808, Marshal Herman Willem Daendels, the Dutch East Indies 36th Governor General, ordered the construction of the Great Mail Road (Grote Postweg) stretching from Anyer in western Java to Panarukan in eastern Java and along Java's northern coast (Figure 3.6). It was built with unpaid and coerced labor. The road was constructed to connect the major cities on the north coast, namely, Jakarta, Bogor, Bandung, Cirebon, Semarang, Rembang, Lasem and Surabaya (Luiten van Zanden, Jan, 2010).

The road was initially a military road built to defend Java against the British invasion when then British ruled in Malay Peninsula. Daendels needed to link the most important settlements in Java to ease the transportation of the soldiers (Nas and Pratiwo, 2002). He pointed out that the Grote Postweg would lead to increased profits in the future for the local populations through expanding trade and industry (Nas and Pratiwo, 2002). The Road was an improvement of existing path and roads linking Batavia-Semarang, and Semarang-Surabaya (Stevens, 1991; Nas and Pratiwo, 2002).

The road was a catalyst in changing feudal traditions (Nas and Pratiwo, 2002). Daendels attempted to abolish feudalism in traditional Indonesian society from the kings of Yogyakarta and Surakarta in the interior and south-central of Java (Tim Tempo, 2015; Geertz, 1956). Furthermore Nas and Pratiwo (2002) assert that the road actually changed Java's North Coast urban development by shifting its urban orthogonality, creating ribbon city, changing Java cosmology from mountain (Merapi) and river to this road and adjusting the indigenous orientation towards trading activities. It even stimulated a new market for rice in the interior as well as new industrial activities, too.



Source : Interpretation from Nas and Pratiwo (2002)

Figure 3. 6: The great mail road

The road route of today is a bit different from that of the past. During colonialism, some important inland regions in West Java such as Cianjur, Bandung and Sumedang were passed by Daendels's trade road. Currently, the road runs completely through the coastal regions and extends to Banyuwangi (Figure 3.7). Daendels was right; the road become the main artery of Java for distributing goods up today.

Source: Ministry of Transportation, 2010

*) The toll road in North Coast has been constructed to connect Jakarta-Surabaya

Figure 3. 7: Java North Coast Road (Pantura) at present day

3.1.3.3 Telephone and Electricity

The late 1800s are considered the time of the initial apogee of sugar industry achievement in colonial Java. Rapid development was parallel with infrastructure improvements that facilitated better transportation and communicating between regions. The development of the telegraph in 1871 and telephone in 1880, first installed in Jakarta, Semarang and Surabaya, reduced economic distance inducing the capital flow from Dutch into Java (Dick, 2002). Moreover, Dick notes that in 1899, Jakarta became one of the first cities in the world to build an electric tramway. This progress reduced the cost of transportation and communication over land.

By the 1890s, Java was the most modern in terms of technology because it had integrated the economy between Bengal and Japan (Dick, 2002). Furthermore, Dick points out the benefit of modern transportation and communication technology for the export and import sugar industries, irrigation systems for ancillary metal-working and heavy engineering industries, and gas and electricity for household consumer goods industries.

Despite the development of technologies for infrastructure improvement that eventually reduced the distance between inland and coastal areas for the export and import of goods, there were clearly distinctions between the north coast of Java as a bazaar town and inland of south-central Java as the principality town (Geertz, 1956). Furthermore, Geertz argues that in the modern stage, the north coast ports served as the political and commercial center for Java island and developed as the 'great cities`. Inland regions were their hinterlands and became secondary towns with specialized economies through long process.

3.1.4 Java Northeast Coast as Historical and Political Development Unit

As Geertz argues, in the earlier stages of urbanization, Java was identified by the growth of two characterized regions: the principalities of the interior and the bazar towns of north coast regions. In that time, the center of Java initially was developed in the river valley inland where the kingdom was located. As the kingdom achieved its glory with abundant agricultural products supported by greater technological skill in irrigation, the principality and the people enjoyed well-being and wealth. However, the seclusion inland formed a homogenous and self-contained culture, which contrasted with the heterogeneous and open culture of the coastal area. Later, the Majapahit[16] moved the kingdom orientation toward the sea due to trade interests. The shifting of the economic center from inland toward the north coast was decisive in increasing wealth in a non-agriculture form: international maritime trade.

The port-town on the north coast of Java is the main trading point for export-import goods due to fact that the South Ocean has a strong current and is surrounded by mountain and steep cliffs. The trading goods from inland to the north coastal port in Semarang and Tegal were mainly transported via Solo and Brantas Rivers.

After the downfall of Majapahit in east Java, the coastal rulers lost the political rivalry with to the inland polities in Java south-central court (Kwee, 2006). The tension between the coastal regions and inland region was very deep[17], and later the competition between those two regions was provoked further when the Dutch entered Java's northeast coast and Chinese traders got into conflict with the indigenous people.

In the late 1500s, the Dutch came to Indonesia initially as a trade company, the Dutch East Indies Company (VOC-*Vereenigde Oostindische Compagnie*). VOC arrived for the first time in Banten, the major port of Java. However, the Dutch received strong resistance from the indigenous peoples and the Portuguese who were already in Java. The Dutch retreated and continued their journey towards the east, passing through the north coast of Java (Kwee, 2006).

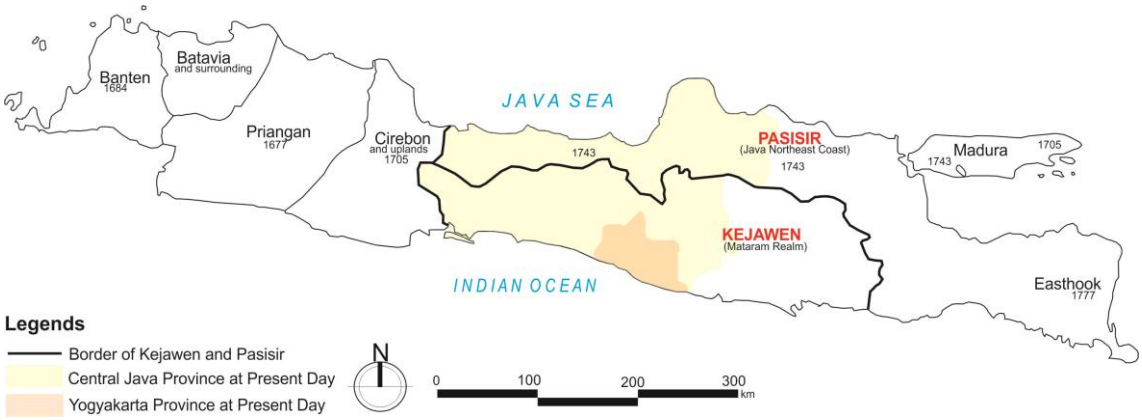
After successful trade from 1680-1743, the VOC gradually increased its control over the northeast coast of Java (Nagtegaal, 1996) and had a strong position after the Chinese War in 1741 (Kwee, 2006). Furthermore, Kwee argues that to gain utmost control over Java's northeast coast, the Dutch were entrenched with the Chinese economically on the coast and starting conflicts between inland and coastal rulers in Java northeast coast. The Dutch were restrained politically on exploiting the agricultural crops inland due to fact that the region in inland and south-central Java was the center of the Java Kingdom (Mataram) and most of the north coastal region was in the realm of that kingdom (Mataram). From 1740-1790s, the Dutch ruled of coastal regions after the Mataram principalities gave up the authority of the northeast

[16] Majapahit (1223-1520s) was one of the greatest empires of the region and most powerful empires in the history of Indonesia and Southeast Asia. It is assumed that Majapahit territory was mostly within Indonesia's modern boundaries (Ooi (2004)).

[17] Geertz (1956) argues that after the downfall of Majapahit, several port kingdoms (Surabaya, Demak, Tuban etc) in the north coast rose. The Demak kingdom in the north coast (Central Java) rose and struggled to control the inland rice basin to strengthen its political domination along the coast. In 1752, Mataram, the interior province centered in Surakarta turned into a greater principality and the center of the economy and society exceeding the Demak kingdom. Mataram developed to take entire control of the northeast coast.

coastal regions due to internal conflicts. Later, the Dutch promoted Semarang (in Central Java) as the colonial provincial, capital and port city of Java's northeast coast (Knaap, 2015). Afterward, Java's northeast coast was apart from the Mataram realm. Dutch cut off Mataram's authority and restricted its trade from the sea in Java's northeast coast.

Java's northeast coastal plain region (*Pasisir*[18]) was one of the five VOC provinces on the island together with Batavia, Banten (was Bantem), Priangan (was Preanger) and Cirebon (was Cheribon) (Figure 3.8). It was the largest and most important province comprised of the entire north coast of Central and East Java including Madura Island. It eventually extended from the eastern border of the Cirebon-Priangan region, through the north-central coast and continued to eastern, ending in the so-called East-Hook (R. R.Van Niel, 2012). The northeast coastal region had a strategic position because of its proximity to the Java Sea which gave it a more developed economy (Dick, 2002). The northeast coast was further more urbanized than other inland regions of Central Java (Houben, 2002) and migration from rural area to coastal cities did occur.



Source: Kwee (2006,p.xxv), Jacobs in Zwart (2016, p.33),redrawn and edited*
**) There is a slight difference in the border of Cirebon and Priangan between Kwee and Jacobs. This figure's border above was redrawn based on Kwee and completed with the year of subjection from Jacobs.*

Figure 3. 8: Java in 1740-1800

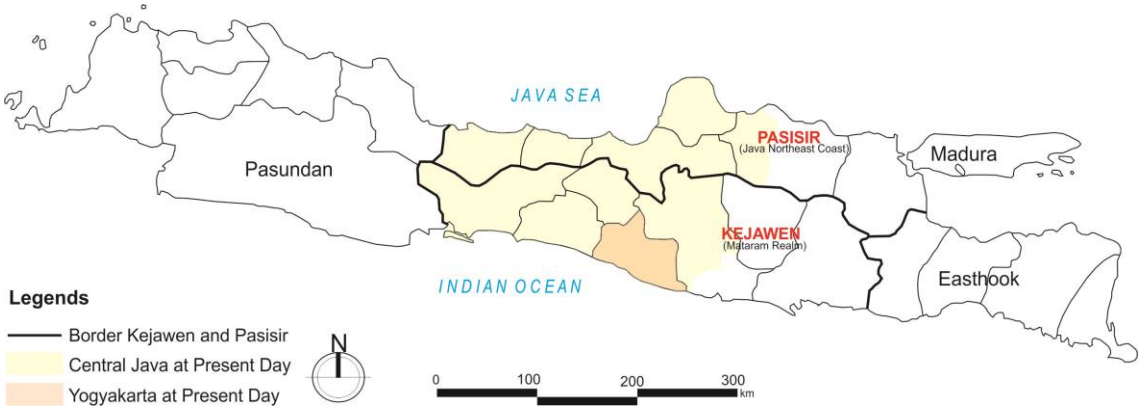
However, by the end of the 18th century , bankruptcy of the VOC led to the transfer of authority of Java to the Dutch state (Dick, 2002; Kwee, 2006). This take-over marked the beginning of centralized policy and Java-centric economic practices in Indonesian. Dick argues that this policy of Java centric began with Governor-General Daendels (1808-1811), followed the British Governor Raffles (1811-1816) and brought forward after 1901 under the Ethical Policy.

3.1.4.1 Inland and Coastal Region in Central Java Colonial (late 1800s-1900s)

Entering Dutch Liberal Policy[19] in the 1870s, the northeast coast was no longer focused solely on rice and timber catering to the consumption needs of Batavia and other VOC branch offices in Asia. Nagtegaal asserts that the *Pasisir* (northeast coast) was gradually incorporated as a profitable region to cultivate crops oriented to the export market particularly sugar. In 19th century, as the infrastructure improved and

[18] *Pasisir* is local word for coastal region
[19] During Dutch colonialism, the policy had been divided into three period; the formal Dutch that ensued the Cultivation System as the first phase in the economic exploitation of the Javanese agricultural potential, the Liberal Policy (c. 1870-1900) that issued open investment and lastly, Ethical Policy (c. 1900-1930) that was an ethical responsibility policy for thewelfare of the colonial subject

interregional connection increased, the north coastal plain region was divided into *Pasisir* and Easthook provinces, and within those provinces, the region was divided into smaller authorities (Figure 3. 9).



Source: Houben (2002, p.63), redrawn and edited

Figure 3. 9: Java Provinces in the 19th century

In Java, there were two Western system operations in production for the world market after 1830 - one was the formal Dutch Cultivation System and the other was made up of private Western entrepreneurs associated with trading agencies in the northern coast port towns (Houben, 2002). Houben asserts that the cultivation system was focused on Central Java and Easthook (East Java). The private plantations [20] were mostly in West Java and the principalities of south-central Java. This resulted from the background of the northeast coast being divided into Pasisir and East Hook (see figure 3.9). However according to Houben, in the 1900s, after the VOC bankruptcy, the private estates were bought back and directly managed by the Dutch government starting to plant the profitable crops, sugar, rubber and tobacco.

The tension between inland and coastal regions were caused by political competition to seize the utmost sovereignty in Central and East Java (Kwee, 2006). Many north coast rulers wanted to be independent from Mataram while the wealth of Mataram was mostly obtained from trade in the north coast regions. The disintegration of the north coast would clearly lead to a decrease of income. Given to this, the inland regions were likely to be the hinterlands for the ports regions, where the actual cultivate of agricultural products took place (Kwee, 2006; Geertz).

The spatial differentiated process in Java's north coast and inland region that benefited from political drama and economic development was continuous from pre-colonialism to Java's colonial period. The differences were intensified by how Dutch policies differed from other development units in colonial Java and how the Dutch prioritized the inter-regional transportation improvement in the more profitable and strategic regions. Throughout post-colonialism, coastal cities from Jakarta to Surabaya have continued to be the focus of interregional linkages (Douglass, 1991).

[20] In the principalities, the private entrepreneur began to lease the appanage land from the principalities. In this process, there were conflict between the nobility and Dutch when the Dutch colonial government banned the leasing system and increased renting land, which later caused the Java War (1825-1830). The Dutch suffered a heavy loss. Thus, the cultivation system was implemented to cover the high cost of colonial administration in Java and bolster Dutch finances.

3.2 Post-Colonialism and the Process of Divergence

In post colonialism, establishment government policies were mostly influenced by the colonial legacies of government interventions, import quotas, minimum price regulation and legal barriers to entry (Bevan et al., 1999). Under the New Order Government, they made a 25-year long-term plan and within the long-term plan composed a five-year Plan and Development (*Rencana Pembangunan Lima Tahun*, REPELITA)[21] which took place from 1969-1999. It was complied of five stages of growth as Rostow (1959) formulated, namely: traditional, pre-condition for take-off, take-off, maturity and high mass consumption. It is the concept of the downstream effect that links agriculture with manufacturing industries (Harriss, 1987). Harriss argues that the linkage can be further broken down into three type: backward linkage or agriculture demand linkages for capital goods, forward linkages or the result of agriculture supply to agro-based industry and consumption linkage or derived from income expenditure of market surplus.

3.2.1 Agro-based Industry

History narrates that agriculture has been one of the key sectors in Central Java. In spite of the decline in agriculture's contribution to the GDP, it still provides income for the majority of Central Java households. The agriculture outcome, in particular the agro-based industry in Central Java, takes its root in the time of the colonial Dutch East Indies. It has been growing steadily for many decades and contributes to the major industries in Central Java, namely food, beverages and tobacco (Statistics Indonesia, 2016). The availability of raw material and the absorption of the products by the local market is significant

In agro-processing industries in Central Java, beside large-scale firms, there are many small-scale firms run by farmers, and these firms manufacture a wide variety of agricultural products: food and processed food; textiles and garments; leather and footwear; wood products and furniture, rubber and plastic products; structural clay products; and ceramic and glass products (Burger et al., 2000). The main problems with empowering these agro-processing industries are scattered locations, inadequate investments, lack of quality raw materials, poor marketing, insufficient infrastructures and facilities, low quality of workers which lowers the quality of products, inefficiency of production, and low hygienic practices (Burger et al., 2000). The data shows that, even under the fierce competition induced by globalization and liberalized markets, small firms have been more resilient than large firms in the recent Asian market troubles (Tambunan, 2000). Burger et al. argue that this is because small firms are more likely to cluster themselves while larger urban and export firms in buyer-driven markets prefer to subcontract with clustered small firms to cut costs

Agriculture and industry have traditionally been considered two distinguishable sectors of economic growth. Moreover, growth is indicated by the gradual transformation from agriculture to industry. There are two opposing views on regional development and industrialization (Titus and Van der Wouden, A. A., 1993). In the first view, industrialization serves as a necessity for regional development by establishing

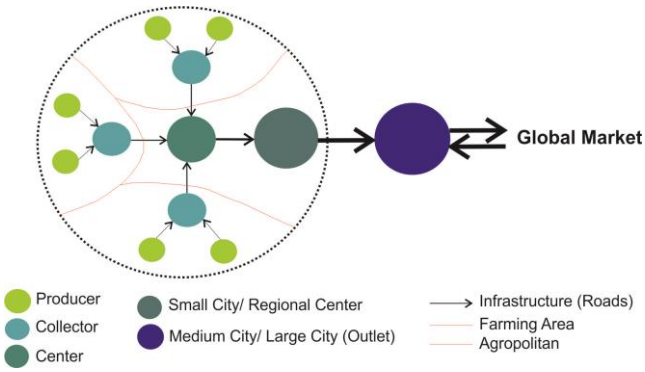
[21] The first REPELITA in 1969 pointed to the agriculture sector as the economic basis of a nation to achieve food self-sufficiency and the infrastructure that supports it. In 1970, Indonesian revenues quadrupled from oil owing to the Arab-Israeli conflicts and also to the improvements in agricultural development (Booth (1989a)). To reduce unemployment and inequality, REPELITA II (1974-1979) focused on development outside of Java, Bali and Madura through settlement. In the mid-80s, Indonesia reached food sufficiency – an achievement of the New Order Government who took pride in it. As the oil prices went down in the mid-80's, the focus changed from agriculture to non-oil industry export commodities. Therefore this industry development was the third REPELITA objective (Amir (2012)). REPELITA III linked the agriculture and industry sectors. REPELITA IV (1984-1989) concentrated on creating various employments and Industry development. REPELITA V (1989-1994) addressed in the development of communication, transportation and education improvements (Booth (1989b)). REPELITA VI was focused on the economic sectors related to industry and agriculture and improving the quality of human resources (Booth (1994)). The last REPELITA was REPELITA VI (1994-1999) before the New Order fell in mid-1998 due to the economic distress of the Asian Financial Crisis that led to serious political chaos

large scale industrially complexes mainly in traditional and rural economies and performs as growth poles (Rondinelli and Ruddle, 1978). The second view argues that regional development comes from regionally-oriented activities, which provide the basic needs of the hinterland populations and further develop the hinterland by cultivating raw materials and supplying agricultural input and tools (Hardoy and Satterthwaite, 1986). This latter view is closely related to agropolitan development (Friedmann and Douglass, 1978)

Agropolitan and Minapolitan: City in the Rural. Agropolitan [22] and minapolitan[23] are the strategies for closing the urban-rural gap and minimizing the urban-rural dichotomy by empowering poor, rural people, and thus reducing urbanization. As a counterbalance of agglomeration and industrialization in an urban area, these strategies attempt to protect the rural area from a decrease or loss of value because of the backwash effect from the growth pole policy. This main function is the focal point of agriculture-based productivity that contributes to the global market.

Industrialization in many ways has induced a higher dependency of the agricultural-rural sector to the urban economy. Land conversion and migration of labor to urban areas contribute to the failure of lasting self-sufficiency in food production. During the Asian financial crises, many industries collapsed which led to a high rate of unemployment in Indonesia. However, the agriculture and informal sectors remain important because they support living for the workers. There is great potential for Indonesia to serve as an agrarian leader, but government policy favors industrialization as the primary economic driving force.

An agropolitan consists of one or several centers in rural areas that are connected through agricultural production and natural resource management (Figure 3.10). Regional network strategies for reciprocal urban-rural relationships are the main focus in agropolitan policy. Thus accessibility and sufficient infrastructure are important considerations in agropolitan implementation. As the main focus is to minimize migration to urban centers by creating decent rural regions, rural areas must offer sufficient job opportunities. Rural areas that transform into a mixed form are called agropolis or city in the rural.



Source: Rustiadi and Pranoto (2007, p. 91)

Figure 3. 10: Agropolitan and Minapolitan schematic

[22] Agropolitan is basically a concept of rural development which is concentrated as a spatial closure in the rural area with population between 50.000 until 150.000 (Lo and Kamal Salih (1978); Rondinelli (1985)). This concept was based on Mao Tse Tsung rural approach development in 1960's (Pradhan (2003)). However, Leeds in Rondinelli (1985) said that a region could not thoroughly close, because its existence based on specialization and specialization need exchange and interaction to promote the flows of goods, services or other values from one to other locality. Thus a new linkage to higher region can create a new opportunities for the poor in the hinterland or small and medium cities (Rondinelli (1985)).

[23] According to Marine and Fisheries Decree No. 41 / Men / 2009 minapolitan was developed in fish farming usually in coastal area.

Central Java has fourteen agropolitans in fourteen regencies and two minapolitans in two regencies; in Yogykarta, there are ten agropolitans in four regencies and one minapolitan in one regency. It is more likely for inland regions to be centers of agriculture due to the fertile soil in the uplands (Figures 3.12).[24]

Agropolitan and minapolitan are two of the many concepts trying to connect the rural and urban areas. Nevertheless, flow in the agropolitan and minapolitan schematic (Figure 3.10) is a one-sided flow instead of reciprocal flow that is more likely based on supply and demand from the rural to urban growth pole. Most empirical study approaches have tended to focus on either urban or rural spaces (Tacoli, 1998; Lynch, 2005). It is necessary to reconsider connecting both spaces by way of network and flows, of agriculture and non-agriculture sectors and of people moving from one place to another instead of separated sectorial development

3.2.2 The Sequel of Java-Centric

Regional development is generally designated based on regional functioning characteristics such as natural resources, human resources, man-made resources and social resources. It is the strategy based on regional specialty and distinction (Ananta et al., 2011). Some of the programs in Indonesia have been developed cross-sectorial agencies [25] that have intended to reduce disparities between the east and west regions of Indonesia. Most of them was emphasized creating growth poles, which policymakers referred to during the New Order Era.

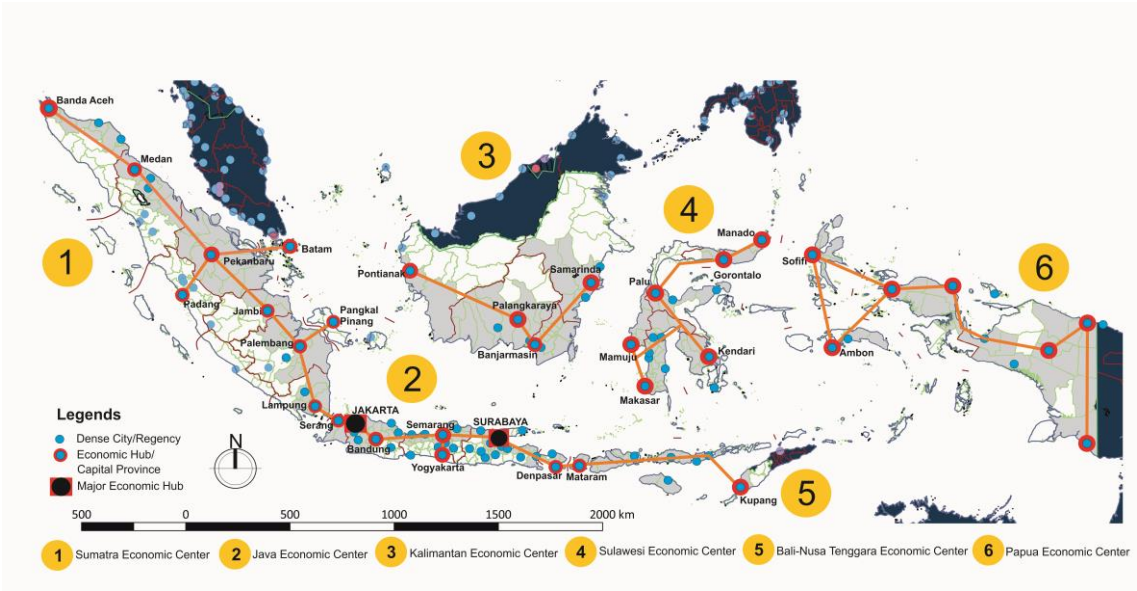
Despite the fact that growth poles might generate a backwash effect to the hinterland areas, it is nevertheless still a popular policy strategy in Indonesian. The latest policy is the Master Plan for Acceleration and Expansion of Indonesia's Economic Development[26] (MP3EI) that focuses on accelerating and expanding economic growth and reducing inter-regional inequality particularly between western and eastern Indonesia. Furthermore, MP3EI maps out six growth centers and economic corridors (Figure 3.11) that are meant to boost economic development in their region and spread out into other regions, namely Sumatra, Java, Kalimantan, Sulawesi, Bali-Nusa Tenggara and Papua-Maluku Islands (CMEA, 2011). MP3EI creates intra-connectivity between major growth poles in each province, intra-island corridor, and the international trade gate. In decentralized Indonesia, however, local governments depend on intergovernmental balance funds and experience insufficient infrastructure in most regions, making it difficult for the local governments to support MP3EI further.

This plan confirms Java as the center of all economic hub in Jakarta and Surabaya (Figure 3.11). Hence, keeping Java as the major economic hub may widen the gap, and increase regional disparity.

[24] Recently to protect agriculture land on conversing to industrial land and housing, the government has established Law no 41/ 2009 about *Sawah Lestari* (Sustainable Rice Field). However, the implementation faces challenges in local level because the authority to regulate and to determine the land use is in the regional level in which several regions have delayed the establishment of local regulation on protecting agriculture land. Given to that, those rice fields in *Sawah Lestari* protection cannot be transformed into non-agriculture.

[25] The foremost inter-governmental agency program are Integrated Economic Development Region (known as KAPET, *Kawasan Pengembangan Ekonomi Terpadu) i*n mid 1990s, Mainstay Region (known as KADAL, *Kawasan Andalan*), Poverty Alleviation through Rural-Urban Linkages Program (PARUL), Production Centers (KSP, *Kawasan Sentra Produksi),* Development of Disadvantaged Regions (KATING, *Kawasan Tertinggal*) and Agropolitans.

[26] The primary programs aim at the development of agriculture, mining, energy, industrial, marine, tourism, telecommunications and other strategic sectors. MP3EI encourages large-scale investment in twenty-two primary activities: shipping, textiles, food and beverages, steel, defense equipment, palm, oil, rubber, cocoa, animal husbandry, timber, oil and gas, nickel, copper, bauxite, fisheries, tourism, food and agriculture, the Jabodetabek area, the Sunda straits area, transportation equipment, and information and communication technology.



Source: CMEA (2011, p. 46) redrawn and edited

Figure 3. 11: Economic Corridor (EC) in Indonesia

Inside Java Island, the economic corridor is placed along north coastal region. The connection from south region to north regions is built, from Yogyakarta to Semarang. The economic corridor give north coastal region a priority as the growth center and interior a complementary as the hinterland. Eventually, this master plan reflects a contest between those two regions.

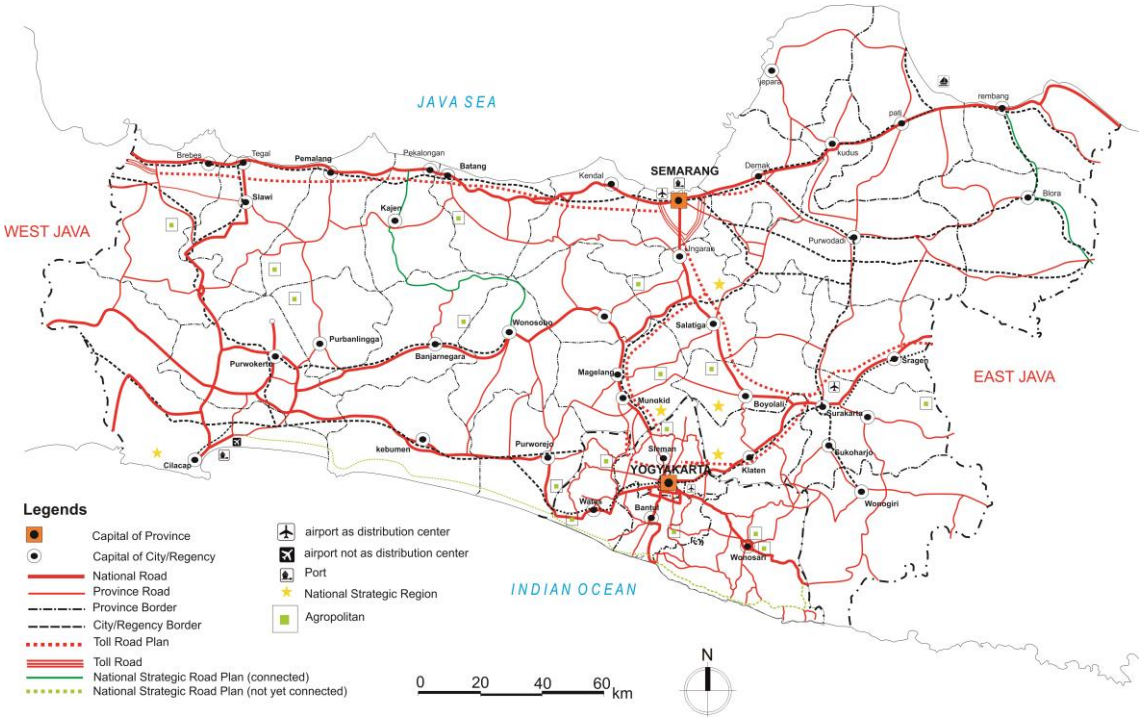
3.2.3 Central Java North Coast vs. Southern-Central Java Inland Recur

For two thousand years, Java's north coast was a lucrative trade area, luring merchants from all over the world (McCabe Elliot, 2013). It was the realm of principalities, and in future stages it was more oriented toward the outside world rather than toward principalities in the interior regions. The kingdom gradually lost influence over the north coast due the north moving away from inland crop areas and toward international trade. As a result, the north coastal region has developed as the center of political and commercial interests in Indonesia.

As the perspective of north-south differences has been alive since colonialism, some policies have since responded to and reaffirmed that perspective. MP3EI asserts that Jakarta and Surabaya have greater positions than Semarang and Yogyakarta. Figure 3.12 illustrated the inter-regional connectivity that is concentrated mainly in the north corridor as the growth center whereby only the Cilacap port serves for transporting oil and gas directing to Jakarta via Bandung. As it is concentrated in the north corridor, it is not clear how and to what extent the south corridor plays into this constellation of economic accelerating programs. This is contrary to its primary goal of creating a diverse and dispersed economic concentration. At any rate, the differentiation of north coast regions and south regions is a perpetual development policy in Indonesia

As the north coast focused on trade and industries bolstered with adequate infrastructure and economic activities, the north is regularly considered an advance region than inland region in south- central Java.

3.2.3.1 Infrastructure and Technological Capabilities



Source: Ministry of Public Works, 2011, edited
**note: The toll road from Jakarta to Brebes was completed in 2016. It was planned for connecting Jakarta-Semarang-Surabaya.*

Figure 3. 12: Infrastructure in Central Java and Yogyakarta Province

Road are the basic infrastructure for connecting regions within a country. North coast regions is connected by the national road while south coast regions is not yet connected as of 2011 (Figure 3.12). Connecting the south to the north is concentrated along the line of Yogyakarta-Solo-Semarang. However, a north-south connection is substantively available from Tegal to Cilacap and from Pekalongan to Wonosobo.

The present railway line was mostly built during Dutch colonialism to connect the long-established agricultural plantations. There were not many additional railway lines built post-colonialism, especially in the middle regions and most likely due to the mountainous geography. It is a challenging and costly component of the infrastructure.

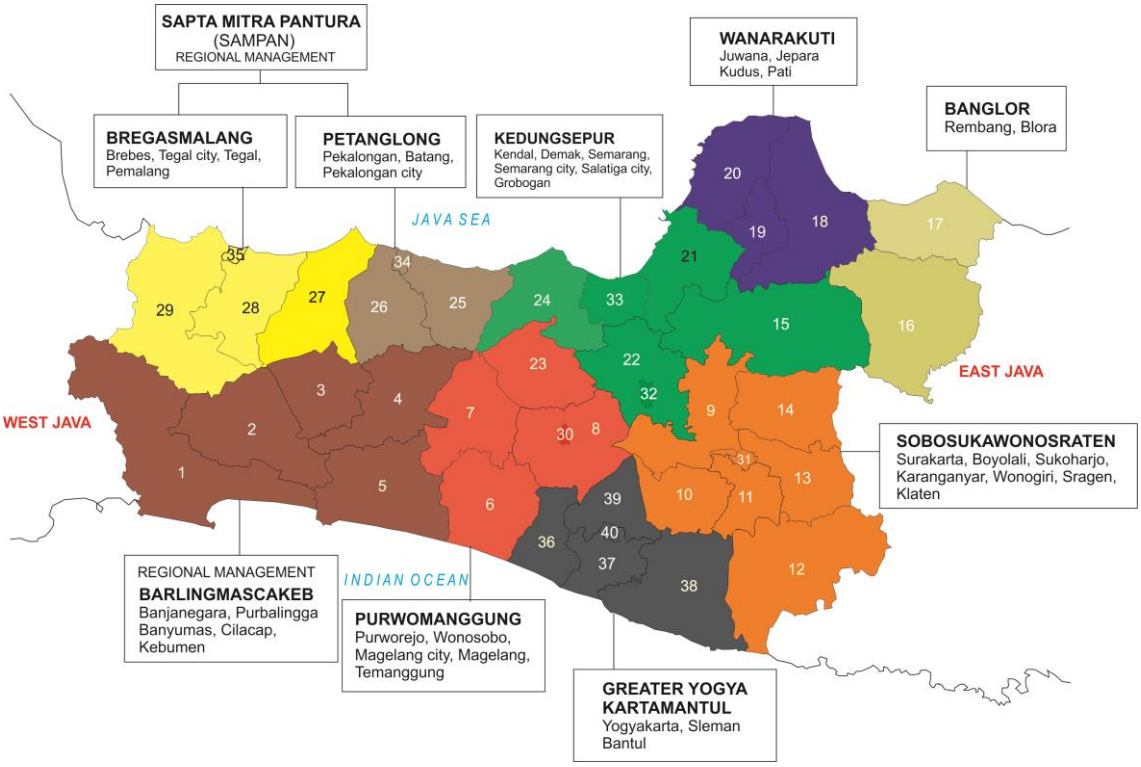
There is not much empirical evidence of technological development in Central Java and Yogyakarta. Despite several electronic and chemical manufacturers built in the north coast region, most of the technological development in Central Java and Yogyakarta concerns agriculture (Sulaiman, 2013) and disaster management. According to Central Java spatial planning, imported high-technology serves as the strategic development plan for geothermal and nuclear power plants, the oil and gas industry, and the cluster industries in urban areas.

At any rate, infrastructure improvements in Central Java are intended to connect the north region to the south region and to disperse the economic growth. Nonetheless, the perspective on differentiation of north-south region has rooted in public opinion, eventually affecting regional development and policy implementation.

3.2.3.2 Regional Management in Central Java: The North-South Competition Preserved

Regional management is based on the inter-regional network focusing on the improvement of regional competitive advantage. Its aims are many and varied: to create economic scale; to empower local economic potential; to expand the regional market; to create effectiveness and efficiency of infrastructure development such as power plants, ports, and telecommunications networks; and to create investment localization and investment policy platforms. Based on mutual and equal management systems, these regional systems are expected to reduce regional conflicts and disparity particularly in their surroundings.

The Regional Management concept in Central Java is oriented to the coastal regions. Nevertheless, it has polarized Central Java toward the north and south with one growth center in each cluster. According to the Central Java spatial plan of 2009-2020, there are nine regional system representing Central Java (Figure 3.13).



Source: Central Java Spatial Plan 2009-2029 and Yogyakarta plan, modified

Figure 3. 13: Regional Management in Central Java and Agglomeration in Yogyakarta

Yogyakarta has different case. Its urban growth is centralized that has led to agglomeration in Yogyakarta city and its surroundings. In this case, urban and rural areas in Yogyakarta are no longer distinguishable. The urban-rural connections have become obscure. Yogyakarta developed as if one center crawled away from its original center.

3.2.3.3 Agglomeration in Yogyakarta: the continuity of mono-centric development

Yogyakarta is a distinctive province. Before Indonesia existed, Yogyakarta was the dominant principality over Java. In post-colonialism, the Sultan who is also the governor of Yogyakarta, carries out the responsibilities authorized from the central government to rule the region. The vice governor come from the Yogyakarta royal family as well, Prince of Pakualaman. The Indonesian government granted this privi-

lege after the Yogyakarta Kingdom proved its devotion to Indonesian independence. According to Ginsburg (1955) that most of the largest city in Southeast Asia were in a state of rapid social change, associated with the granting of political autonomy to the former colonial nations, with the accelerated rise of nationalism, and the increasing centralization of political functions in the national capitals

Yogyakarta City is its urban core. Similar to other large cities in developing country, all urban socio-economics functions are concentrated and focused here. The spatial growth in Yogyakarta City diffuses in all direction from *kraton* (the palace), the traditional core, while the modern city core grows towards the north in Sleman. The spatial extension known as Greater Yogyakarta[27] is the largest extended monocentric urban agglomeration in south-central Java (Hudalah et al., 2013b). It consists of Yogyakarta City and several sub-regencies in Sleman and Bantul. As Figure 3.14 shows, Yogyakarta City grows extensively outward to its neighboring regions that formerly functioned as the city's rural hinterland. Yogyakarta urban extended initially toward Sleman in the north as a result of the development of education, housing and services. The extension also went south to Bantul (Sontosudarmo, 1987). The land conversion from agriculture to non-agriculture, especially in the suburban areas of Greater Yogyakarta, was inevitably. In many cases of metropolitan expansion, housing moves to suburban areas pushed by city crowding, traffic congestion, transportation improvement, and the negative effects of higher crime and water and air pollution. Approximately 85% of the population do not live in Yogyakarta City (Yunus, 1987). This population chooses to commute to the city while living in its surroundings.

[27] According to the Regional Regulation of Yogyakarta Province (*Perda*) No. 10 of 2005, Article 41C, Greater Yogyakarta is the National Activity Centers (PKN, *Pusat Kawasan Nasional*) which covers Yogyakarta City and some districts in the Bantul (Pleret, Piyungan, Timbulharjo, Pendowoharjo, Dawen/ Sedayu) and Sleman (Sleman, Ngemplak, Ngaglik, Sariharjo, Mlati, Godean and Kalasan).

Source: Yogyakarta Spatial Planning 2009-2029, edited

Figure 3. 14: Greater Yogyakarta

Yogyakarta city, Sleman and Bantul, known as Kartamantul[28] (the acronym of those three region names), have worked jointly on improving regional infrastructure services, anticipating extended urbanization, and protecting the environment of the rural hinterland. This collaboration is similar to regional management in Central Java. What makes a difference might be the goal, which is not solely about promoting investment but more about controlling urbanization in Yogyakarta. Greater Yogyakarta is considered the success story for effective rural-urban cooperation strategies which are rarely found in Indonesia (Firman, 2008).

3.3 Conclusion

In this chapter, the discussion attempts to address the interrelation of the colonial legacy as the historical context for regional disparity. The socio-economic differences from colonial times have been preserved, and in post-colonialism, development moved toward greater disparity.

There were two identified urbanization centers in ancient Java: the port cities of the north coastal region and the principalities of the inland (south-central) regions. As Java's northeast coast was the primary

[28] Kartamantul was established in 2001 through a mutual decree between the regents of Bantul and Sleman and the mayor of Yogyakarta No. 04/Perj/RT/2001.

outlet and inlet for inland product leaving Java, many principalities have competed for exclusive domination of this area since pre-colonialism. Tension and competition rose between the rulers in both regions, provoked by the downfall of Majapahit, followed by the rise of inland Mataram, and further perpetuated by the Dutch arrival in Java.

The explicit dichotomy of north-south regions in Central Java initially formed when the Mataram Kingdom in Surakarta-Yogyakarta gave full control over Java's northeast coast to the Dutch after the principalities' internal conflict and the Chinese War. The Dutch greatly benefited by dominating trade and plantation production in northeastern cities during colonial rule. At the same time, the kingdom's inland regions became less influential and more incapable of trading directly with port cities in the north. Under Dutch colonial rule, the northeast coast eventually developed into bazaar towns for exporting and importing goods while the principalities remained hinterland areas in which raw products were based. The north-south dichotomy in Central Java-Yogyakarta continues today as is reflected in many government policies at present.

During the Java colonial period, the mobility infrastructure was established to lessen the gap for raising the economic level of agriculture production on the entire island. Technology was imported from outside Java to progress the agricultural industry and seize more profit. However, the Dutch failed to produce policies that might have further diversified the manufacturing industry. This was due to political reasons rather than low economic profits. The Dutch maintained Java as the producer of export crops because in case the industrial market was established and stimulated an increase of British and Japan influences in Java. As a result, the agricultural sector was the continuous core of economic development in Central Java until Dutch colonialism end.

4 Pattern of Structural Change and Regional Disparity

4.1 Demographic Distribution and Regional Growth

Over the last century, Java has been the most populated in Indonesia. It is not surprising that a family planning program[1] was started and concentrated on Java. Most post-colonialism studies have pointed to the problem of the high population in Java as the cause of present poverty and the hinderer of future development (White, 1976). However, there is no simple relationship between population rates and per capita income growth (Figure 4.1) in the case of Central Java and Yogyakarta province. Many regions have experienced either high population growth with negative changes in per capita income or the other way around. It is clear that to achieving an increase in the per capita income rate is something more important to do that just slowing population growth. High rates of population growth do not necessarily imply low rates of growth in per capita GDRP.

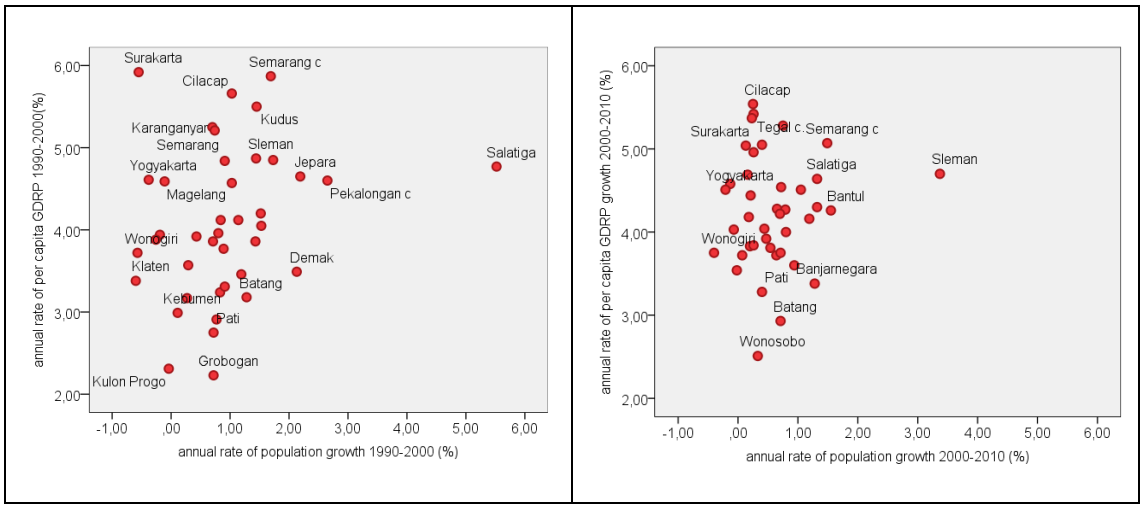


Figure 4. 1: Scatter chart of Population Growth Rates and Per Capita Income Growth Rates 1990-2000 and 2000-2010 (see Appendixes 1)

The ethnic groups in Central Java and Yogyakarta are nearly homogeneous Javanese except in the large cities such as Semarang, Surakarta and Yogyakarta where many migrants from outside Java have settled. Still, the distribution of population is varied between regions. The population in some regions has increased but some others have declined. In addition to a high crude birth rate, the increase in population may be caused by the high demand of labor in the industrial regions, creating high in-migration flows from surroundings.

[1] The Family Planning Program called *Keluarga Berencana* (KB) was very popular in Indonesia. KB was a program from the Indonesian government to encourage people to establish a healthy family by limiting and preventing births. This program was promoted so intensively by the Indonesian government back then that the ideal number of children in a family is two. This program was firstly campaigned in late 70s. Nonetheless, this program is becoming less popular among Indonesians post-reformation.

On the other side, the decrease in population can be explained by the decline of crude birth rate impacted mostly by the national family planning program and the increase of out-migration. Theoretically, when the population decreases, the economic growth is high; it improves economic and social development, which leads to two consequences. First, it means that the region is better off with the improved per capita income. Secondly, the industrial sector has diversified and labor-intensive manufacturing has lessened which correlates to an improved technological capability. Subsequently, the great changes in employment structure take place in the urban surroundings where many labor-intensive manufacturers grow. Jones and Mamas (1996) define this process as metropolitan turnaround. It reflects that various socio-economic sectors' growth shift continues from cores to peripheries.

Over-urbanization (rural-urban migration), superimposed colonial economies, dual economy (Hauser, 1957), strong centralized government (Berry, 1961; Hauser, 1957; Berry, 1961) and sustainable urban transport (Dimitriou, 2006) are the main reasons for the growth of many prime cities in Asia. It is reported that primate cities in Asian have paralyzed the development of smaller urban region. As industrial, commercial and service development concentrate in a primate city, consequently the small urban regions around it are more likely to be parasitic in relation to the remainder of the national economy (Hauser, 1957). This obstructs the growth potential of other regions. Moreover, the primate city may harbor most of the national expense and may drain the resources of its hinterland (Mehta, 1964). According to Jefferson (1939), the primate city is commonly at least twice as large as the next largest city and more than twice as significant. Regarding to Zipf'law, the distribution size is further formulated in simple form:

$$P_x = \frac{P_1}{x}$$

Where x is the rank of the city's population, P_x is the population size of the city ranked x, and $P_1$is the population size of the largest city and x is the rank. The assumption is that the first ranked has the highest population and second ranked city will have half the population of the first ranked and so on. The rank-size rule describes the relationship between population sizes and population ranks of regions based on statistical census data[2]. There are several type of city size distribution. However, the curve that convex to its origin is the best-fitting explanation for this model.

In this assessment, the population per km^2 is estimated as the population size in each region based on the fact that the region sizes in Central Java and Yogyakarta vary greatly depending on their form. City size is often less than the regency size, and most of southern regencies are larger than northern ones. Thus, it is fair to estimate the region size into the calculation of the population size. This theoretical assumption is further formulated into the real data as follows:

$$P_x = \frac{A}{x^b}$$

Where A and b are constants, which do not necessarily correspond to P_1 and one (1) respectively. x^b indicates the multiplicative relation between regions.

$$\log(P_x) = \log(\frac{A}{x^b})$$

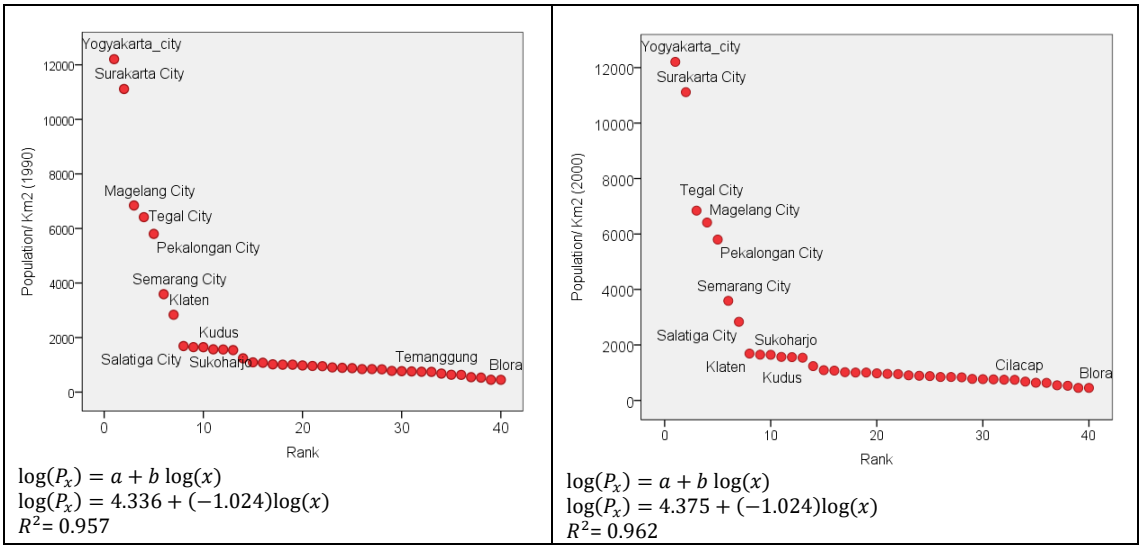
and

$$\log(P_x) = a + b\log(x)$$

[2] The national population census in Indonesia is held every 10 years. In this case, the data in 1990, 2000 and 2010 population census are used for this analysis.

When $a > 0$ and $b < 0$, and if $b = -1$, the model will conform it as the rank size rule (distribution). An alternative model was explained in Gabaix (1999) in which the rank and population size have an inverse relationship. In both models, the outcome for b coefficient is the same. Singer (1936) noted a similarity of city size distribution and Pareto's Law. In the end, the rank size rule serves as the minimal benchmark of admissibility for any model of city growth. This outcome underlie further empirical and theoretical work.

Figures 4.2 and 4.3 show apposite population distribution curves and ranking for 40 regions in Central Java and Yogyakarta. The curves express non-linear relationship convex to the origin ($b = -1$). The coefficient constantly shows up in the calculation of 1990, 2000 and 2010 yet in different intercepts. The population rankings, however, have changed little in the past 20 years. Yoyakarta and Surakata are consistently in the top rank for 1990, 2000 and 2010. The population rank for other urban regions with status *kota* (city) are after those two major cities.



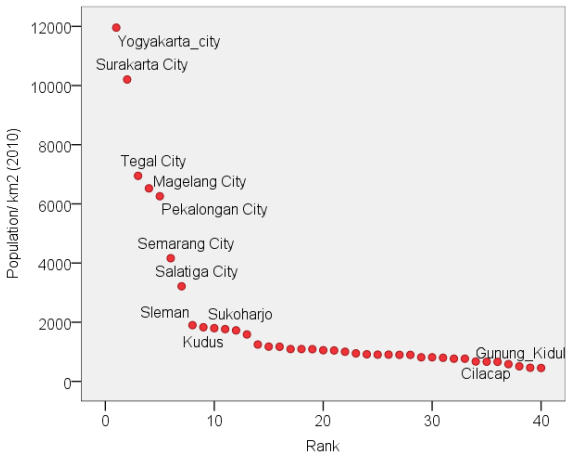
$\log(P_x) = a + b\log(x)$
$\log(P_x) = 4.336 + (-1.024)\log(x)$
$R^2 = 0.957$

$\log(P_x) = a + b\log(x)$
$\log(P_x) = 4.375 + (-1.024)\log(x)$
$R^2 = 0.962$

Figure 4. 2: Population Distribution and Rank Size Rule in 1990 and 2000

As Surakarta and Yogyakarta share the function of primate cities, it would be reasonable to assume further that in the surrounding regions of Surakarta, the population growth defines the changing employment structure. It is presumably as a result of commuting urban workers and the 'spillover effects' since various enterprises locate outside city boundaries. For Yogyakarta City, the high population growth is supposedly due to the various campuses located in greater Yogyakarta. In-migration students are responsible for the high rate. These two cities have a long history of urban development from even before Indonesia was established. They acted as the main hubs between the West and the indigenous societies in colonial Java, from the traditional pre-colonial times to modern capitalism. Yogyakarta and Surakarta[3] have always been noted as the center of traditional Javanese culture and society, preeminent in modern economics, politics and social affairs in Central Java.

[3] Surakarta principality differs from Yogyakarta albeit from the same ancestor, the Mataram Kingdom. The Surakarta mayor does not come directly from the Surakarta principality as in Yogyakarta but it is directly elected from Surakarta people.



$\log(P_x) = a + b\log(x)$
$\log(P_x) = 4.336 + (-1.024)\log(x)$
$R^2 = 0.957$

Figure 4. 3: Population Distribution and Rank 2000-2010

Despite the similarity of their social-cultural conditions, the urban pattern shows dissimilar spatial structure models. Yogyakarta has grown as a concentric city (ring radial) as shown by Greater Yogyakarta[4] whereas Surakarta has developed in a grid (rectilinear) pattern, which has affected the surrounding growth in *Sobosukowonsraten*[5] urban areas.

The urban expansion or urban sprawl in Yogyakarta (Divigalpitiya and Handayani, 2015) and Surakarta have led to the adjoining administrative areas in the surrounding areas. Divigalpitiya and Handayani (2015) argue that decentralization in Indonesian has accelerated the growth of periphery-urban areas. Another case is the larger agglomeration that fuses Yogyakarta, Magelang[6] and Surakarta. The congregate of these three cities come into urban cluster.

However, city size distribution is weakly related to either relative economic development or urbanization degree even though both are highly associated (Berry, 1961; Rosing, 1966). This is because the rank-size rule only shows a striking pattern of agglomeration highlighting the pull factor to the 'primate city'. As the primate city diffuses toward its periphery, a great change in the economic structure from agriculture to non-agriculture takes place.

4.2 Economic Dualism, Structural Change and Spatial Inequality

Contrary to the primate city, a rural area invariably performs traditional agriculture as its main economic activity. Some urbanized regions have transformed their economic performance from agriculture into non-agriculture through the process of modernization. The contribution of agriculture to regional income becomes subsequently less and less. The differences between agriculture and non-agriculture define the process of structural change.

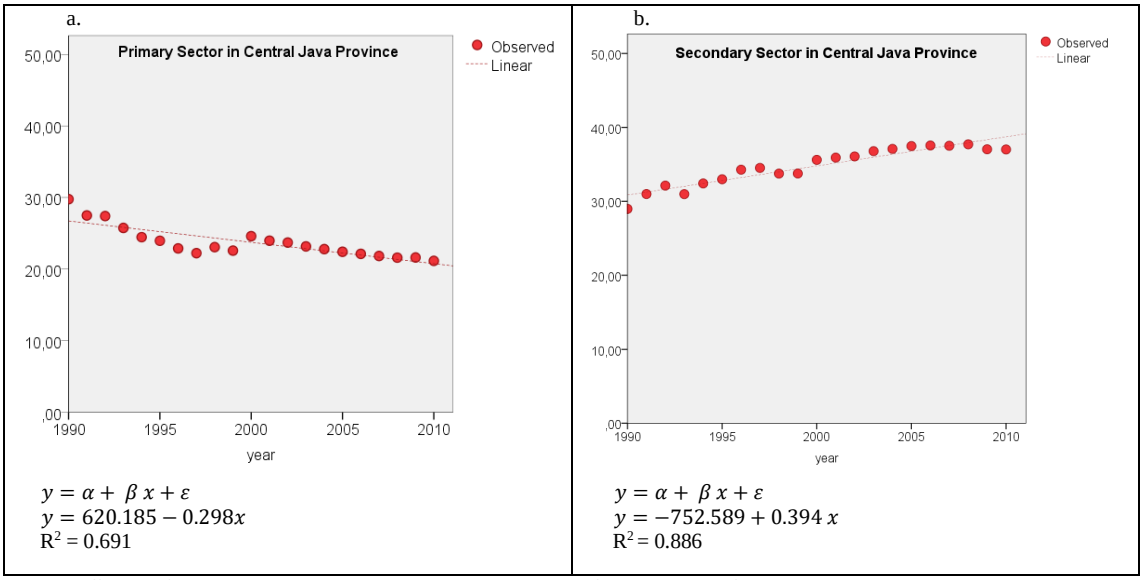
[4] See 3.2.3.2 and Figure 3.14
[5] See 3.2.3.2 and Figure 3.13
[6] Magelang City, located in Central Java province, in the border with Yogyakarta province, is the third densely populated region. It has a strategic position on the corridor Semarang-Solo-Yogyakarta.

In the setting of Indonesian economic growth, the three major activities and sectors are classified as primary, secondary and tertiary. The primary sector includes direct extraction and use of natural resources. Agriculture, mining, and quarrying are part of the first sector. The secondary sector includes transformative activities such as processing and manufacturing. These transformative activities include the manufacturing industry, electricity, gas and water supply, and **c**onstruction. The tertiary sector involves service activities, including trade, hotels and restaurants, transportation and communication, financial ownership and business services.

The decline of agriculture as a share of total output has occurred in most regions in Indonesia. In Central Java, since the early 1990s, the contribution of the primary sector to the GDRP has lessened (Figure 4.4). This has been followed by a rise in the contribution of the secondary sector, which has exceeded the primary sector contribution.

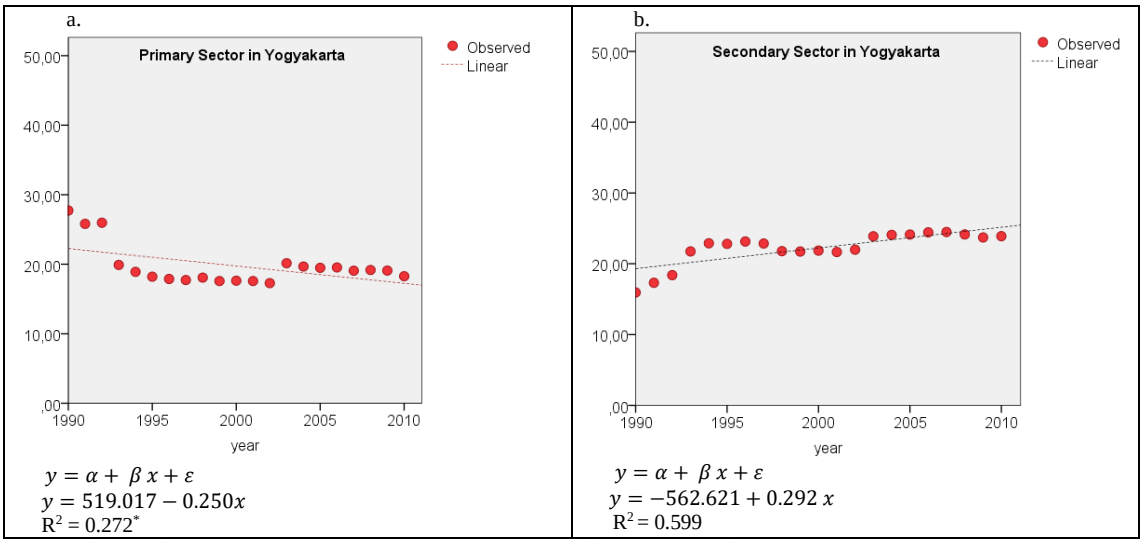
Figure 4. 4: Primary Sectors and Secondary Sectors in Central Java and Yogyakarta 1990-2010

The transition in Central Java was earlier than in Yogyakarta province. The primary sectors in both provinces slightly decreased by 0.298 in Central Java (Figure 4.5a) and 0.25 in Yogyakarta (4.6a), while in reverse, the secondary sectors was annual increases of 0.394 (Figure 4.5b) in Central Java and 0.292 (Figure 4.6b) in Yogyakarta. At this rate, the secondary sector contribution is higher in Central Java than in Yogyakarta.



***** *The coefficient of determination in this simple regression is insignificant because of the inconsistent data*

Figure 4. 5: Trend Percentages of Primary and Secondary Sector in Central Java 1990-2010



**The coofecient of determination in this simple regression is insignificant because of the inconsistent data*

Figure 4. 6: Percentage Contribution to GDP by sector in Yogyakarta, 1990-2010

The great changes in the labor structure from agriculture to non-agriculture have taken place in both provinces. By the simple regression shown in Figure 4.7, from 1990-2010, the agricultural share to GDP in Central Java decreased 0.311 percent per year whereas the labor structure share decreased 0.589 percent every year. On the other side, in Yogyakarta, the agriculture share decreased 0.25 and 0.73 in GDP and labor structure, respectively (Figure 4.8).

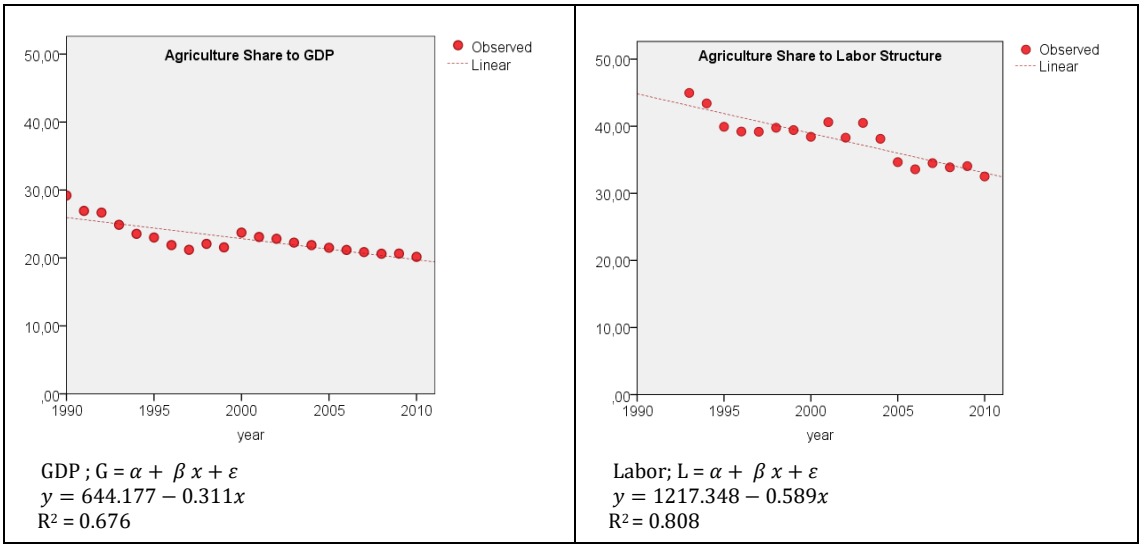
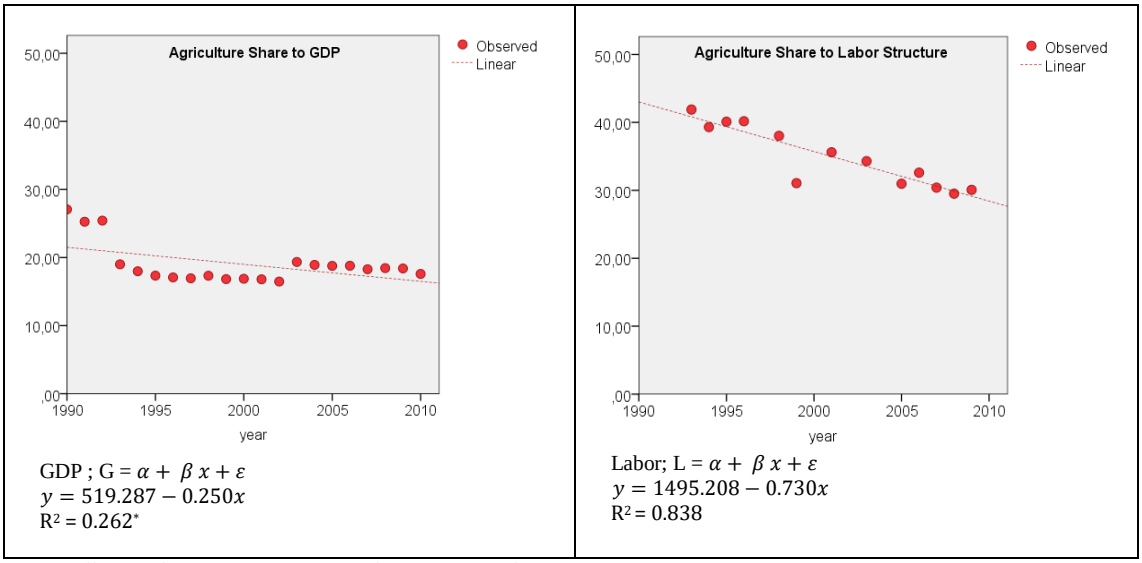


Figure 4. 7 Trend of Agriculture Share to GDP and Labor structure in Central Java, 1990-2010



**The coefficient of determination is insignificant because of the inconsistent data*

Figure 4. 8: Trend Percentage of Agriculture Sector Contribution to GDP and Employment in Yogyakarta Province, 1990-2010

As the transformation process varied greatly over time, development was uneven among regions. Some sectors have lead while other have lagged. The northern, middle and southern regions have experienced different amounts of growth between agriculture and manufacturing. Table 4 shows that the north and middle have had considerable manufacturing growth in GDRP yet shrinkage in agriculture growth. On the other side, although the major oil-gas manufacture in Java located in south regions, Cilacap[7], manufacturing growth in the south was not as quick as other corridors while agriculture has remained the greatest

[7] The Refinery Unit (RU) IV Cilacap is the major Refinery Unit in Java. It supplies 34 percent of the national fuel or 60 percent of the fuel needs in Java. Currently Cilacap refinery capacity has reached 348 thousand barrels per day (BPSD). In 2015 the capacity processing will increases 17,8 % barrels per day. It is the largest among the five other oil refinery run by PERTAMINA as RU II Dumai, RU III Plaju, RU V Balikpapan, RU VI and RU VII Balongan, Sorong.

contributor to the GDRP. The rice fields in south corridor has been preserved for the national food security corresponding to *sawah lestari* regulation.

Table 4: Percentage of GRDP by Industry and Agriculture

Regions	Agriculture*				Manufacturing**			
	1990	2000	2010	Decrease 1990-2010	1990	2000	2010	Increase 1990-2010
North Corridor	34.88	27.56	23.38	-32.97	16.01	25.13	25.04	56.40
Mid Corridor	30.16	26.57	23.91	-20.72	11.69	19.38	18.80	60.82
South Corridor	38.80	34.73	35.07	-9.61	15.11	15.21	17.19	13.77

Source: Calculated from various Central Java and Yogyakarta Economic
**agriculture, forestry, fishery*
***oil and non-oil manufacture*

Overall, the agricultural share of the GDRP in all corridors has experienced serious decline, and in reverse, manufacturing has gone up. Nevertheless, it has moved toward equality in terms of agriculture and manufacturing output composition and distribution in all corridors.

4.2.1 Change in Regional Specialization

The transformation of the economic structure is understood to be the modernization process from rural to urban. It emphasizes industrially diversity in manufacturing and the service sector to promote greater economic growth. Structural change indicates productivity growth, which is closely related to the diversification of production, increasing return and eventually knowledge spillovers. It is a necessary condition of the modernization process to attain high mass consumption. Structural change is identified as the regional specialization, which can refer to the comparative advantages in each region.

The changes of structural labor are measured using the simple Location Quotient (LQ) indicator. The Location Quotient is used to rate the specialization in certain economic sectors and in a particular time[8]. The specialization index is defined as follows:

$$LQ = \frac{e_i^J / \Sigma e_1}{E^j / \Sigma E}$$

or

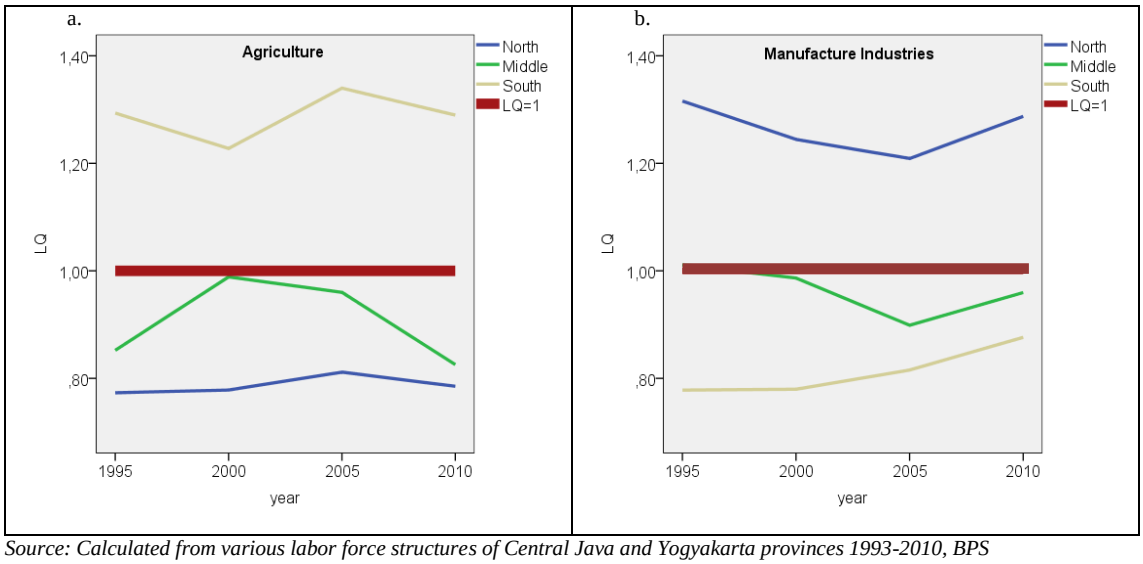
$$LQ = \frac{e_i^J / E^j}{\Sigma e_i / \Sigma E}$$

Where e_i^J is the employment in sector i in given city/ regency J; Σe_i is the total employment in sector i in the reference region; E^j is the total employment in city/ regency J and ΣE is the total employment of reference region. The result from this formula if $LQ > 1$, means that the ratio of employment in a particular industry in a given city/ regency at year t is bigger than the ratio of reference region in the same item comparison. The city/ regency is concentrated in certain sector compare to the reference region. If $LQ < 1$, it means that the ratio of the certain sector in a particular industry in given city/ regency at year t is smaller than the ratio of the reference region.

Despite the fluctuating trend, agriculture was concentrated in the south corridor (Figure 4.9a). The non-oil gas industries have strongly progressed in the north corridor which above the other two corridors ($LQ >$

[8] The LQ Concept (Bendavid-Val (1991); Isard (1998)) in general is a comparison of two different levels regions between low level region in a selected variable with the reference area in higher level region (national level) in the same selected variable during in a particular time.

1, see the red line in Figure 4.9b). The middle corridor has sustained a balance of dual growth in which agriculture and manufacturing share the same portion. In this case, the middle corridor was presumably functioned as a connecter between north-modern and south-traditional corridor development.

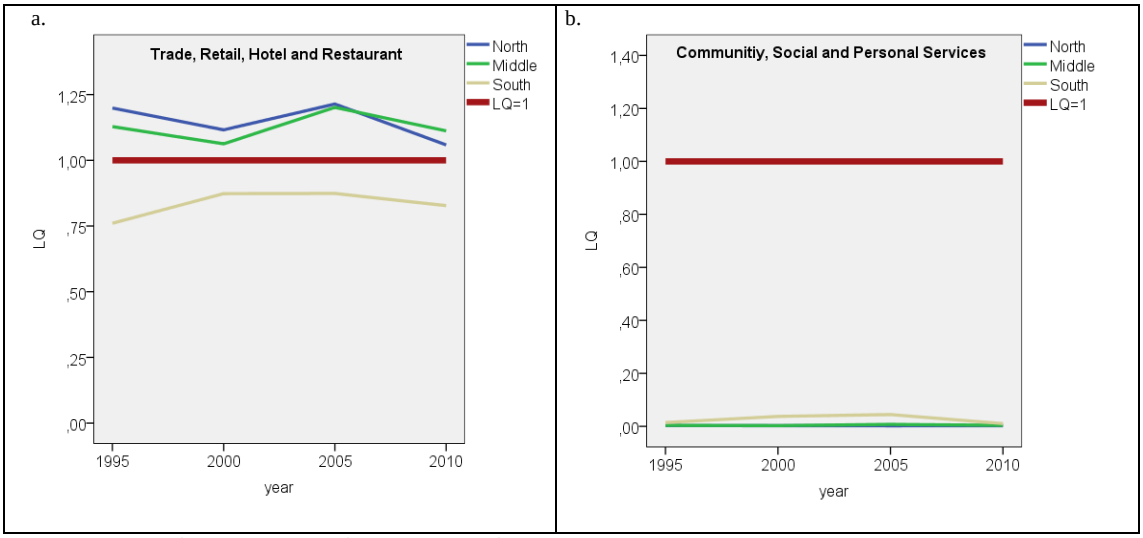


Source: Calculated from various labor force structures of Central Java and Yogyakarta provinces 1993-2010, BPS

Figure 4. 9: LQ Agriculture and Industry[9]

The manufacturing specialization in the north corridor was coherent to its specialization in trade, retail, hotel and restaurant. As a balancing and connecting corridor, it is reasonable to say that the middle corridor has a higher value in trade, retail, hotels and restaurants coinciding with the north corridor (Figure 4.10). However, the service sector is undeveloped in all corridors for which the LQ was nearly zero. The logical reason for this is that all corridors were engaged in the transition process from agriculture to manufacturing.

[9] The data for the labor force structure has been available since 1993 in all regencies/cities in Indonesia, including Central Java and Yogyakarta. However, in 2000, the labor force data in Yogyakarta was not available in every region and city in Yogyakarta province. The informal sector is not included in this data.



Source: Calculated from various labor force structures of Central Java and Yogyakarta provinces 1993-2010, BPS

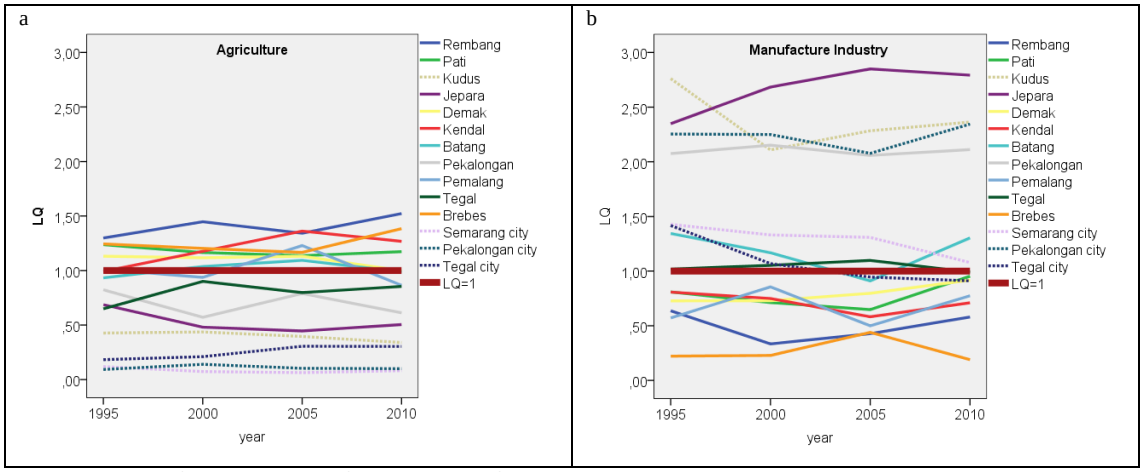
Figure 4. 10: *LQ* Trade and Service

Up to this point, as the north has intensified in non-agriculture sector and the south has concentrated on agriculture, it has been presumes that modern economic are present in the north and traditional economics exists in the south. However, each corridor consists of several city and regencies, which presumably have different specialization. In order to identify actual pattern specialization, LQ is calculated to evaluate each city/regency's specialization.

4.2.1.1 North Corridor

Although the north corridor was focused on the manufacturing industry, several regencies remained agrarian. The upper threshold of manufacturing specialization was considerably wide from LQ $1.5 - 2.0$ creating two differences groups, that above and that below the red line. The upper region consists of Kudus[10], Jepara[11], Pekalongan[12], Tegal, Pekalongan City, and Tegal City (Figure 4.11b) with Semarang City as the growth pole. The latter has experienced a decrease in manufacturing.

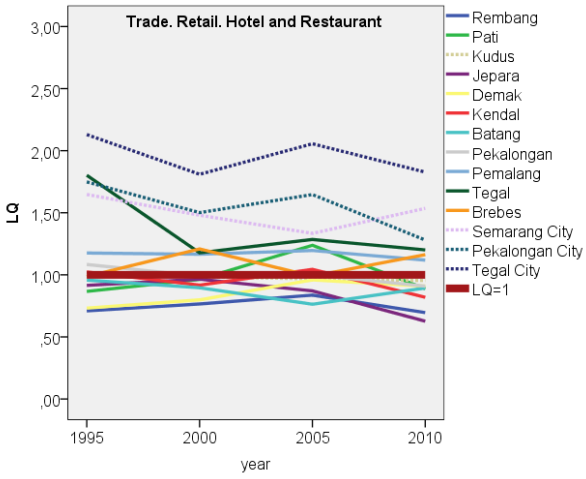
[10] Kudus is known as the center of small, middle, and large cigarette and electronic industries.
[11] Jepara is known as the center of small, middle, and large furniture industries.
[12] Pekalongan regency and Pekalongan City are known as the textile and batik industrial centers.



Source: Calculated from various labor force structures of Central Java provinces 1993-2010, BPS

Figure 4. 11: *LQ* Agriculture and Manufacturing Industry in North Corridor

As agriculture was continuously increasing in Rembang and Brebes[13], manufacturing showed the poorest value of *LQ* in both regencies. On the other hand, several regencies grew pro rata between agriculture and manufacturing, such as Pati[14], Demak, Batang, Kendal and Pemalang, indicating an increase of agriculture-based industry. Trade, retail, hotels and restaurants were concentrated primarily in urban areas such as Semarang City, Pekalongan City and Tegal City (figure 4.12) despite a continuous decrease.



Source: Calculated from various labor force structures of Central Java provinces 1993-2010, BPS

Figure 4. 12: *LQ* Trade Sector in North Corridor

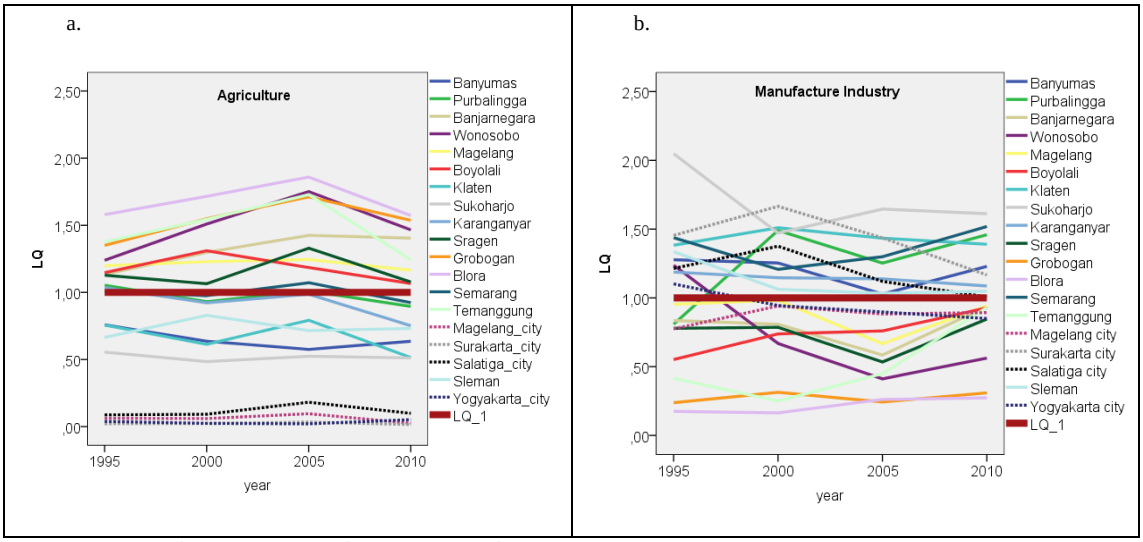
Specialization in the north corridor has been varied which has induced regional differences within the corridor. The port cities that established in colonial Java such as Tegal, Pekalongan, Semarang, Kudus and Jepara have matured in distinctive ways, continuing from past success while the rest continue to grow as agricultural regions.

[13] Brebes has developed the food estate industry. The noted local agricultural products are shallots, salted eggs processed from duck eggs, chili peppers, salt, and fish.
[14] Pati has developed the food industry based on local agricultural products, such as tapioca flour from cassava and peanut that is processed into various snack products. These two products are processed by small and large industries located in Pati.

4.2.1.2 Middle Corridor

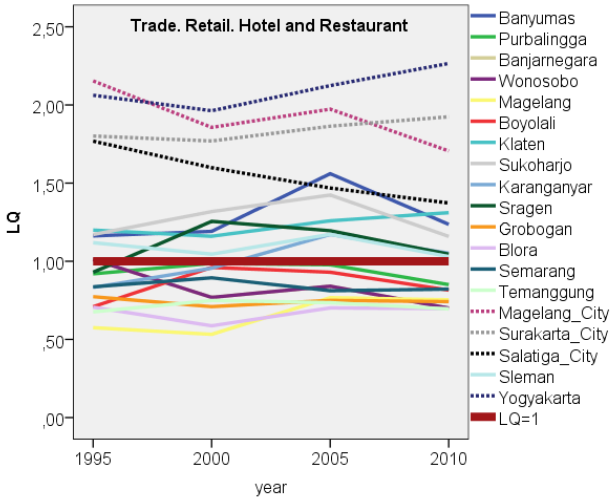
As agglomeration generated turnaround in urban-rural areas particularly in Surakarta's surroundings and Greater Yogyakarta, Surakarta and Yogyakarta shared a decrease in manufacturing while the hinterland experienced sustained growth.

As shown in Figure 4.13, the manufacturing activities were distributed nearly equally and agriculture existed equally in most regencies as well. However, as manufacturing declined in all cities in the middle region, they turn out to be specialized in trade, retail, hotels and restaurants (Figure 4.14).



Source: Calculated from various labor force structures of Central Java provinces 1993-2010, BPS

Figure 4. 13: *LQ* Agriculture and Manufacturing Industries in the Middle Corridor



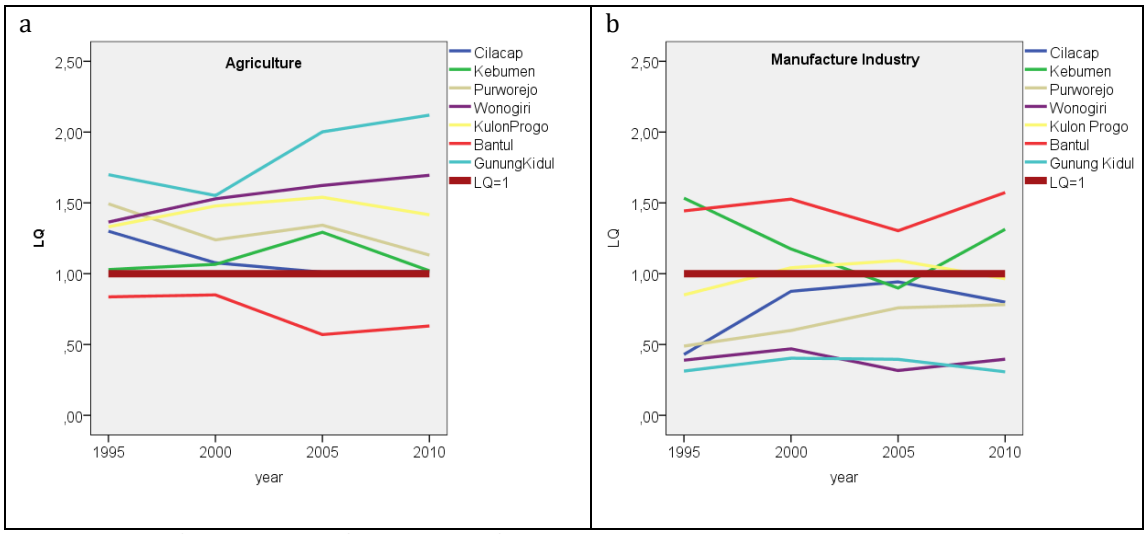
Source: Calculated from various labor force structures of Central Java provinces 1990-2010, BPS

Figure 4. 14: *LQ* Tertiary Sectors in the Middle Corridor

Development is more likely to spread evenly to the surrounding of Yogyakarta city and Surakarta city. The transition to non-agriculture occurs yet agriculture also subsists. Similarities in preferences created equal growth between cities and regencies in the middle corridor.

4.2.1.3 South Corridor

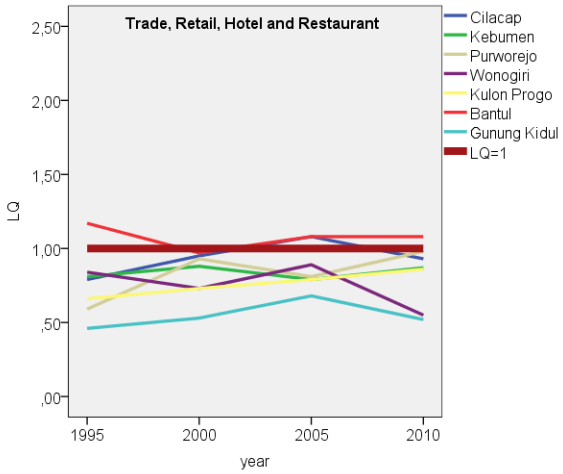
The main reason why the south corridor was not designated as one of Java's economic corridors (MP3EI) is that manufacturing and trade did not significantly expand (Figure 4.15). Economic activity was mostly dominated by agriculture.



Source: Calculated from various labor force structures of Central Java provinces 1993-2010, BPS

Figure 4. 15: *LQ* Agriculture and Manufacturing Industry in South Corridor

Changes in labor structure have greatly taken place in Bantul because it gains overflow growth from Yogyakarta City. On the contrary, Cilacap may have higher income from its natural resources, but non-oil gas manufacturing was not progressively developed as agriculture declined.



Source: Calculated from various labor force structures of Central Java provinces 1993-2010, BPS

Figure 4. 16: *LQ* Tertiary Sector in the South Corridor

Overall, for almost two decades, all corridors have experienced changes in the labor structure albeit with different intensities. The transition process within the north corridor varied greatly, causing a wide gap between the agrarian and industrial sectors. On the other hand, the middle corridor experienced equal changes in most cities and regencies while the south corridor concentrated on agriculture.

Table 5: Number of Investment Realization 1990-2010

Region	Foreign	Investment (US$. Thousand)	Domestic	Investment (Rp. Million)
North Corridor	241	969.128,20	156	7.647.459,10
Mid Corridor	181	1.036.595,50	284	7.596.195,50
South Corridor	50	82.409,70	18	156.065,80

Source: Indonesia Investment Coordinator Board, 2010

The early premise argues that the north corridor is more urbanized and more diversified with comparatively higher per capita income while the south corridor is primarily traditional agrarian. This hypothesis is both true and not true. It is true that in the number of investments in the north corridor has been higher than in the south corridor (Table 5). However, there is an indication that investment is moving toward the interior. It can be assumed that the north might have started off as the outlet of goods production in the interior. However, it could also be argued as untrue, as each corridor consists of several cities and regencies in which the favored regions of each corridor dominate the assessment as a whole. The pattern is presumed a matter of developmental diffusion from the growth pole to its surroundings. At last, as the regional differences widen, disparity definitely increases.

4.2.2 Regional Disparity and Assessment of Kuznets Curve

The most important aspect of structural transformation is the change of agriculture to non-agriculture and later from manufacturing to service industry corresponding to labor occupation changes (Kuznets, 1973). The seminal inverted U-curve from Kuznets shows that in the early stage of economic growth, all regions are equal and then become increasingly unequal, but they will improve in the final stage of economic growth (Lewis, 1954; Kuznets, 1955).

According to Williamson (1965), there are two ways to measure the Inequality Index: a weighted coefficient of variation by regional share of the population (V_w) and un-weighted coefficient of variation (V_{uw}) by regional share of the population but weighted by number of regions[15].

$$V_w = \left\{\sqrt{\left[\Sigma_i (y_i - y)^2 f_i / n\right]}\right\} / y$$

and

$$V_{uw} = \left\{\sqrt{\left[\Sigma_i (y_i - y)^2 / N\right]}\right\} / y$$

Where V_w is the weighted coefficient of variation and V_{uw} is the un-weighted coefficient of variation; y_i is income per capita of the region i, and y is national per capita income; f_i is the population in the region i, and n is the national population; N is number of regions. In this study, V_w will be used. Kuznets explains that population has a significant role in economic growth. The high rate of growth of the per capita product and of population is one of six characteristics of Modern Economic Growth. Therefore, the weighted coefficient by population share is more appropriate. Based on the R square, the polynomial (quadratic) is a better model to assess the trend of the Williamson Index. This equation will be used:

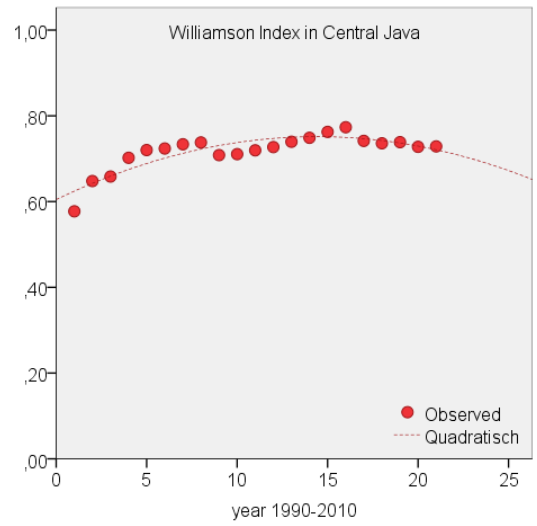
$$Y = \alpha + \beta_1 X + \beta_2 X^2$$

[15] The region refers to regency/ city. There are 35 regencies/ cities in Central Java and 5 regencies/ cities in Yogyakarta. These 40 regencies/ cities, based on location, can be aggregated to 3 corridors. The Williamson Index (V_w) describes regional inequality based on these corridors and provinces.

Where Y is the year and X is the Williamson Index

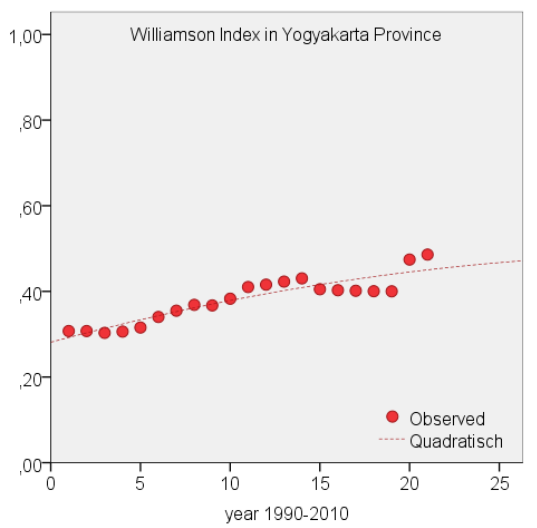
The equation for Central Java is $Y = 0.605 + 0.02X - 0.001X^2$, where $\propto$ is considerably high, at 0.605. This means that if the Williamson Index trend has a constant value, then the index will be 0.605. Compared to Yogyakarta province, the $\propto$ in Yogyakarta is relatively low at 0.281. The inequality in Central Java has been higher than Yogyakarta. The highest inequality was 0.77 in 2005 but later on it declined (Figure 4.17a). By contrast, thus far the highest index in Yogyakarta has been 0.49, reached in 2010 and continuing to increase (Figure 4.17b).

a



Central Java
$Y = \alpha + \beta_1 X + \beta_2 X^2$
$Y = 0.605 + 0.02X - 0.001X^2$
$R^2 = 0.779$
$F = 31.68$

b

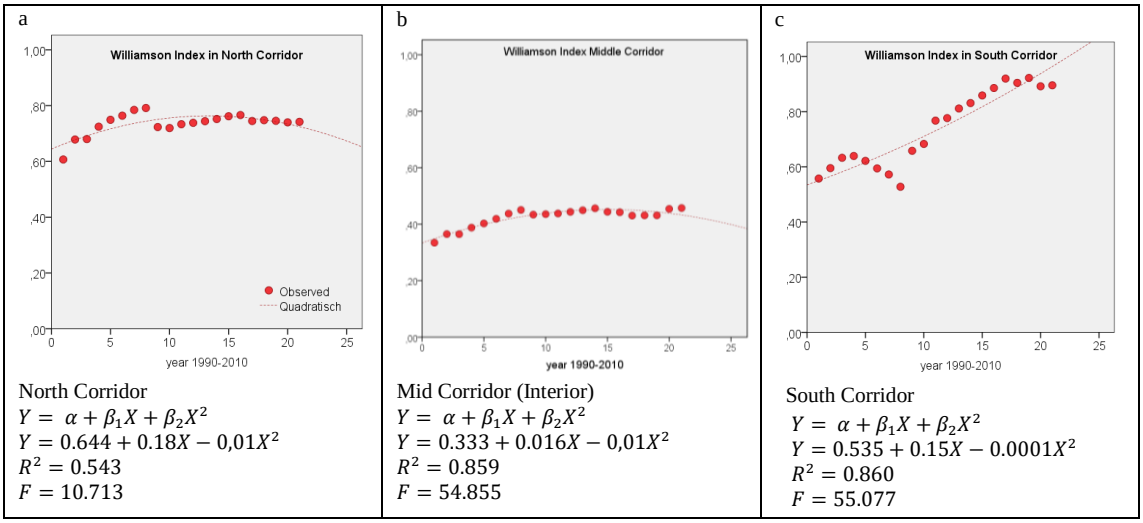


Yogyakarta province
$Y = \alpha + \beta_1 X + \beta_2 X^2$
$Y = 0.281 + 0{,}11X - 0.0002X^2$
$R^2 = 0.843$
$F = 48.183$

Source: Various Economic Growth in Central Java and Yogyakarta 1990-2010, calculated.

Figure 4. 17: Williamson Index Estimate and Observed Curve for Central Java and Yogyakarta Provinces

The inequalities in the north (Figure 4.18a) and middle corridors (Figure 4.1b) were more likely constant. The highest index (V_w) in the north corridor was 0.79 in 2006. On the contrary, the inequality in the south corridor continuously went up (Figure 4.18c) and in 2008 reached a high of 0.92.



North Corridor
$Y = \alpha + \beta_1 X + \beta_2 X^2$
$Y = 0.644 + 0.18X - 0{,}01X^2$
$R^2 = 0.543$
$F = 10.713$

Mid Corridor (Interior)
$Y = \alpha + \beta_1 X + \beta_2 X^2$
$Y = 0.333 + 0.016X - 0{,}01X^2$
$R^2 = 0.859$
$F = 54.855$

South Corridor
$Y = \alpha + \beta_1 X + \beta_2 X^2$
$Y = 0.535 + 0.15X - 0.0001X^2$
$R^2 = 0.860$
$F = 55.077$

Source: Various Economic Growth in Central Java and Yogyakarta 1990-2010, calculated.

Figure 4. 18: Williamson Index Estimates and Observed Curves

The inequality index was eventually related closely to the varied specialization shown with LQ. The pattern of structural transformation and regional disparity can be defined as having an inverse relationship. The LQ industry trend line in regional specialization has an opposite slope to the inequality trend line. In the north and middle corridors, the LQ_{2005} in industry significantly decreased, and this implied an increase of the inequality index trend. Since 2005, the LQ industry in both corridors has consistently increased while the inequality trends have gradually declined. In the south corridor, industry has been unspecialized (LQ <1) and the inequality index trend has slightly gone up.

4.3 Conclusion

Chapter four attempts to establish the spatial pattern of demographic distribution and of structural change in Central Java and Yogyakarta as the initial recognition of regional disparity.

The findings are consistent with the historical evidence, which states that population growth concentrated in primate cities where the ancient principalities were located, and prosperity grew initially in the coastal area as the outlet of trade and early centers for manufacturing. The result shows that structural transformation from the agriculture to the non-agriculture sectors greatly occurred in the north regions. Revisiting the Kuznets U–curve demonstrates a distinct disparity trend in each of the north, middle and south regions. In the north coast where several cities/regencies have served as manufacturing regions, there are still many agrarian regions.. Within the middle corridor, the similarities of geographical features simultaneously create an equal growth among cities/ regency and between agriculture and non-agriculture sectors. Thus, the middle corridor has enjoyed lower disparity compared to the other two. Highly development manufacturing in the middle corridor was presumably due to its close proximity to the north. In contrast, the south corridor was identified as a rural region with agriculture as its primary sector. However, as there are also regions in this corridor with an abundance of natural resources such as oil and gas, the disparity within the south region has been considerably high.

As disparity rises, the central government attempts to close the gap at the regional level. The impact of policy interventions may either reduce or widen disparity. In the context of a developmental unit, the

definition of ‘north-south’ regions has been interpreted with political, socio-economic and geographical realities in mind.

5 Decentralization and Imbalances in Regional Government of Central Java and Yogyakarta

Decentralization[1] was initially introduced in Indonesia during Dutch colonial rule (Green, 2005). The Dutch established sub-central[2] governments in 1903[3] and in 1920s[4] coinciding with the rise of sugar industry in colonial Java. In post-colonialism, the decentralized system was continued under the Old Order of the Indonesian Government. However after political agitation (Green, 2005) in several regions, expressing discontent toward the central government (Maryanov, 2009) and perceiving that government policy favored Java (Feith, 2007; Diprose and Ukiwo, 2008), decentralization was suspended in 1957. It was renewed in 1974[5] under the New Order but never truly implemented (Green, 2005). After the Asia Financial Crises and several secession threats from resource-rich regions, regional autonomy legislation was drafted in 1999 (Law 22[6] and Law 25) and then radically implemented in 2001 due to the high intensity of regional conflicts. At this rate, decentralization in Indonesia is more likely a political response to address an uneven distribution of political sensibilities and economic benefits across the country.

The major concerns in implementing decentralization in Indonesia are the fragility of national unity and widening uneven growth. The conflicts between rich regions and the central government and also among regions arise because of uneven tax share distribution of natural resources. This latent conflict leads to political instability. In sum, as Indonesia is spatially diverse with multicultural treasures, implementing or not implementing decentralization may create political agitation in some way. In this sense, decentralization is more likely a regional problem over considerable regional differences rather than the effectiveness of public administration issues. The regional problem is nevertheless only one of many political and social difficulties that have emerged since Indonesia was established (Maryanov, 2009).

[1] In Indonesia, the phrase "regional autonomy" is commonly used to denote decentralization and will be used interchangeably in this study.

[2] In this period, the administration system of *Kabupaten*, *Keresidenan* (Regency) was implemented which has been used to date (see also Figure 3.8 for the regional administration in Java colonial in early 1900s).

[3] *Wethoundende Decentralisatie van het bestuur in Nederlandsch Indie (Stb. 1903/ 329)* was known as *Decentralisatie 1903*. This Decentralization Law initially implemented in Java Island and Madura Island. The law granted the distribution of autonomy to regional government

[4] *Wet op de Bestuurshervoriming (Stb. 1922/216).* In this law, Dutch established local representative selected by local people. *Province-ordonnantie (Stb. 1924/ 78)* was about the province-system estasblishment. *Regentschap-ordonnantie (Stb. 1924/ 79)* was about the regency-system formation. *Statsgemeente-ordonnantie (Stb. 1926/ 365)* was about the forming of city. According to Maryanov (2009, p.20), three provinces were established in colonial Java, in 1926, 1929 and 1930. These were divided into 67 regencies and included 18 municipalities. Each of these units was completed with government organization and legal council. During Japanese occupation, the province system was abolished and regions were based on the residency (smaller unit than province but larger then regency) for military administration.

[5] Between 1957 until 1974, there were two regulation regarding decentralization. Presidential Instruction 6 of 1959 established three tier of Sub-National Government; province, *kabupaten* and *kecamatan*. Law 18 of 1965 outlined the improvement of regional authority. Law 5 of 1974 express the relationship between central government and sub-central government. The relationship was based on deconcentration, decentralization and co-administration assistant.

[6] According to Law 22 of 1999, the principal of regional autonomy are the importance of empowering people, actively fostering initiative and creativity, and increasing the role and the functions of the regional representative. Therefore, to get closer to the people, regional autonomy has been performed in the second tier of government, which refers to regency and city.

5.1 Decentralization: Accommodating Regional Differences

It is clear that decentralization was implemented in Indonesia to obviate the regional conflict as purely a manifestation of regional discontent. Besides geographical location and ethnic (cultural) diversity, there remain extensive inter-regional differences in living standards and economic development (Hill, 2014).

Decentralization in Indonesia reflects a deep concern regarding differences in regional needs and resources. It nevertheless differs from the literature[7] in several substantial features (Devas, 1997; Green, 2005). It is elusive as well. The implementation is more political and administration decentralization than fiscal decentralization. Fiscal decentralization is vaguely implemented because of central governance inclination to maintain control over local governance via transfer funds[8]. Transfer funds or balance funds aim to settle a huge mismatch between locally-owned source revenue[9] and total spending in performing local-public responsibilities (Ministry of Finance, 2009). Another purpose of transfer funds is to reduce the dissatisfaction of one or more resource-rich regions by redistributing fairly the revenue sharing to its origin. However, in practice, transfer funds are the dominant source of funding of most sub-national revenue in Indonesia. Green (2005) expresses that local governments receive more than 80 percent of their total revenues from central government. On the other hand, local spending has doubled because civil servants and thousands of facilities have been re-assigned to local level (Brodjonegoro and Martinez-Vazquez, 2004). Thus, without transfer grants, it stifles regional authority to made decision locally. Transfer funds paradoxically indicate a highly centralized system maintaining the central government's control and oversight in integrated planning (Crane, 1995).

5.1.1 Intergovernmental Transfer as an Attempt of Closing Gap

The implication of transfer authority and public responsibility from the central government to the local government is the necessity of substantial funds[10]. The intergovernmental transfer is assigned to assist the local government widening its authority to perform public responsibilities. It consists of revenue sharing[11], general allocation grants[12], special allocation grants[13], special autonomy and emergency grants[14]. However, the formula for calculating the amount of transfer funds is complicated. The amount varies according to population, urbanization, tax base, natural resource concentration, infrastructure- and education improvements (Ministry of Finance, 2009).

General allocation grants are a type of block grant which local governments are allowed to expend and manage autonomously according to their needs and priorities. This type of grant is a control tool from the

[7] The World Bank classified decentralization into three main types: political, administrative and fiscal decentralization. Available at World Bank Decentralization net http://www1.worldbank.org/publicsector/decentralization/what.htm. This is the most citation of decentralization studies

[8] A Transfer Fund is also known as an intergovernmental transfer. In this study, these terms are used interchangeably. In the centralistic period, subsidy allocation functioned similar to the transfer funds. Thus far, the implementation of transfer funds in Indonesia often shows changes in General Allocation Funds (DAU), the Special Allocation (DAK) formula, DBH spending and its origin, and the absence of a connection between transfer and expenditure assignments, or in this case, the target of achievement in minimum service standards (Ministry of Finance (2009)).

[9] It is known as PAD (*Pendapatan Asli Daerah*, Indonesia) PAD consists of local tax revenue, retribution and local resources revenue from separated management.

[10] The early-implemented decentralization referred to Laws 22 and 25, 1999 in which budgeting and expenditure arrangements were not yet regulated. The regulation was later improved in Laws 32 and 33 of 2004.

[11] It is known as DBH (*Dana Bagi Hasil*, Indonesian). In this paper, it will be consistently called revenue sharing funds.

[12] It is known as DAU (*Dana Alokasi Umum*, Indonesian). According to Law 22/2005 on equalization funds, the main purpose of general allocation is the fiscal capacity equalization between regions to counterweigh the disparity due the difference of revenue sharing funds and locally-owned revenue

[13] It is known as DAK (*Dana Alokasi Khusus*¸Indonesian)

[14] Law 32 and 33 of 2004

central government to equalize the fiscal capacity by giving more to the 'poor' regions to delivery local responsibilities. It functions to fill the gap between fiscal needs[15] and fiscal capacity[16]. The basic allocation of a general allocation grant is for wages of government employees, which make up the largest expenditure in each region. Brodjonegoro and Martinez-Vazquez (2004) express that general allocations generally do not equalize fiscal capacity. In fact, the general allocations per capita tend to increase along with income per capita, which means richer regions get higher allocations. This result tends to occur largely because of the impact of the 'balancing fund' or the transfer fund.[17] On the other side, special allocation grants are intended for particular regions especially for less developing, state-border and disaster-prone regions.

Revenue sharing is the original distributed portion of state revenues and local governments. It includes tax sharing[18] and natural resource sharing[19]. However, central governments regarded as the principle of origin determine the tax bases, rates and revenue sharing percentages.

As shown in table 6, general allocation grants for most regions are virtually the regions' budgets as their share is significant in the local governments' revenue. It was a considerably high ratio, about 80 percent in the beginning of decentralization, and then later it gradually decreased to 60 percent in each corridor. On the other hand, locally owned revenue contributes only about 5-12 percent of the total local revenue.

Table 6: The disparity of locally owned revenue, general allocation grants and shared funds

Revenue	**North** (%)*			**Mid** (%)*			**South** (%)*		
	2001	2005	2010	2001	2005	2010	2001	2005	2010
Local-own Revenue	7.44	11.04	10.69	8.12	11.42	10.51	5.35	8.20	7.42
General Allocation Grant	80.65	69.24	61.04	76.00	68.87	60.81	79.25	74.33	64.44
Shared Funds	5.80	8.61	8.24	5.67	6.91	6.69	4.32	5.74	5.67

**percentage share to local revenue*

The high share of transfer funds indicates an imbalance in local governments supporting their total expenditures. It turns out that the significant funds in fiscal decentralization come from the general allocation grants. Apparently, there is no direct correlation between higher general allocation grants and increasing locally owned revenue. According to table 6, the south corridor receives higher general allocation grants but its self-generated revenue is far deficient in comparison with other regions.

5.1.2 Inefficient (fiscal) Decentralization

Decentralization policy is expected to avoid the inefficiencies of the economy (Prud'homme, 1995). The over-dependency on the central government is responsible for that. Minimizing dependency means increasing fiscal autonomy. Fiscal autonomy mainly focuses on four main issues: expenditure assignment, revenue assignment (taxing powers), intergovernmental fiscal transfers and sub-national borrowing. There are two different perspectives of central government and local government approaches on the distribution of taxing powers. The central government continues to maintain control on important tax revenue for economic stabilization and income redistribution. On the other side, local governments focus

[15] The fiscal need formula involves the population, the total area, the human development, the construction cost and the GRDP per capita of a region

[16] The fiscal capacity is the aggregate of locally owned revenue and revenue sharing funds in a region

[17] This study uses regression with general allocation grant formula variables such as the contraction price index, the percent living in poverty, and other variables outside the general allocation grant formula such as population of retirement age, younger than working age and population density

[18] It consists of land and building tax/PBB, Duty on Land and Building Right Acquisition/BPHTP, Income Tax/ PPh

[19] Natural resources sharing comprises forestry, fisheries and mining sectors.

on increasing tax powers[20] for minimizing the expenditure-revenue gap. Thus, transfer funds will lessen and no longer be the dominant source of local revenue. Figure 5.1 shows that local revenue is extremely limited to underlying the public responsibilities. No city/regency experiences a fiscal balance even with the revenue sharing addition (Figure 5.1b).

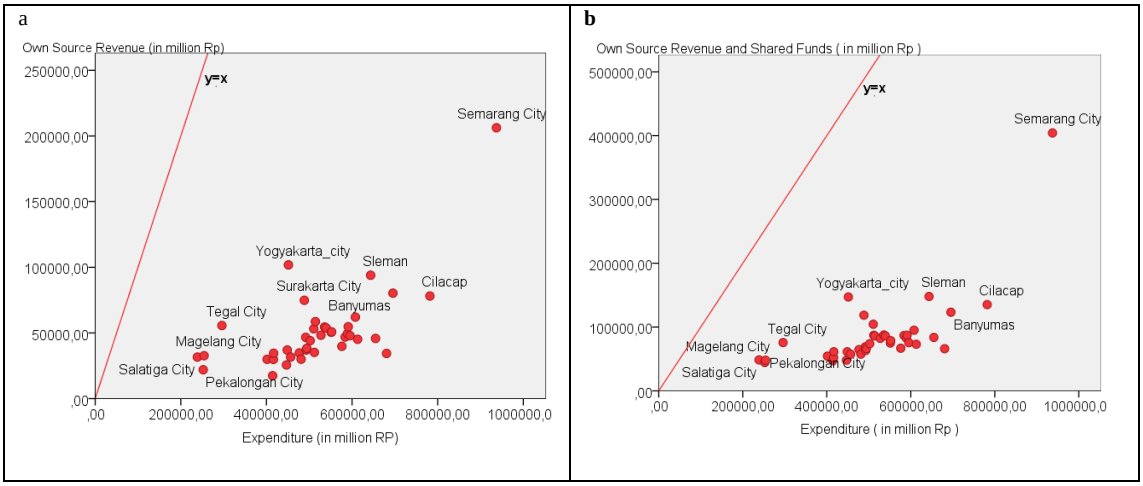


Figure 5. 1: Fiscal Autonomy (Locally Own Revenue and Shared Funds) and Expenditure

5.1.2.1 Vertical Fiscal Imbalances

Vertical fiscal imbalances or the transfer dependency ration (Ruggeri and Howard, 2001; Boadway and Tremblay, 2005; Oates, 2008) exists when low level governments rely greatly on transfers from above. An alternative to reducing vertical imbalance without reform of tax assignment is to re-delegate public goods and services provision spending responsibilities from the sub-national level back to the national government. The system falls back to being centralistic.

Vertical fiscal imbalance describes to what extent local government expenditures are financed through their own revenues rather than transfer funds from the central government or borrowing from other local governments (Aldasoro and Seiferling, 2014). There is no consensus regarding how to measure vertical fiscal imbalance. The most common measure of transfer dependency is the ratio of transfers received by local governments to their total revenues or spending. In this regard, VFI also includes borrowing from other sub-national governments. Following Eyraud and Lusinyan (2013), the vertical fiscal imbalance (VFI) is defined as:

$$VFI = 1 - \frac{r^{own}}{s^{own}}$$

[20] According to Law 18 of 1979 on Local Taxes, as amended by Law 34 of 2000, the sub-nation had discretion to levy 11 (eleven) types of taxes, which are 4 (four) provincial taxes and seven (7) regency/ city taxes. In addition, the regency/ city was given discretion to establish other types of taxes insofar as they met the criteria set by regulations. The law set the maximum tax rates for those eleven taxes. Furthermore, the central government stipulated provisions on the object, subject and the bases of the 11 (eleven) types of the taxes. Later, to respond to the balance of sub-central fiscal revenue and expenditure, the sub-central government was given extended discretion to levy new taxes in accordance with Law 32 of 2004 on Regional Government and Law 33 of 2004 on Financial Balance between the central and local government. As a result, many local regulations were canceled by the central government regarding lack of coordination with or contrast to the higher law. Furthermore, Law 28 of 2009 mentioned that other than those listed in the law, local governments were prohibited from issuing new taxes. The law lets the central government cancel any regional regulations contrary to the Constitution and the public interest. In this law, the component of locally owned resources has been added, namely property taxes and the acquisition of land and buildings tax is included.

Where r^{own} denotes sub-nationally owned revenue; s^{own} is sub-nationally owned spending; and s is sub-national total spending. Furthermore, sub-national spending and revenue can be defined as:

$$s = r^{own} + G + B$$

or

$$s = s^{own} + H + D$$

and

$$r = r^{own} + G + U$$

Where G is transfer grants from central government; B is net borrowing; H is the transfer paid by the sub-national government, and U is unspent funds at end of the fiscal year, carried forward to the ensuing year. In Indonesia's case, a local government budget consists of revenue, spending and financing (budget funds). Financing net is the surplus from finance spending, which is supposed to cover the budget deficit. A mismatching between revenue and spending creates a deficit which can be balanced with budget funds and generate surplus funds (unspent funds at end of the fiscal year and carried forward to the ensuing year[21].

Furthermore, Eyraud and Lusinyan (2013) formulated $\boldsymbol{VFI = TD + D}$ where TD is transfer dependency and D is sub-national deficit.

$$TD = \frac{G}{s^{own}}$$

and

$$D = \frac{B}{s^{own}}$$

Where G is identified as general allocation grants, special allocation grants and other transfer grants from the central government[22]. The r^{own} denotes the sum of locally owned tax source, shared funds and other lawful local revenue. The formula is modified as

$$VFI = 1 - \frac{r^{own} + U}{s^{own}}$$

or

$$VFI = \frac{G+B}{s^{own}}$$

The first formula of VFI will be used in this part. It is a simple ratio between the transfer grant from the central to local government to total expenditure. When the result from this formula $VFI \approx 1$, it means the region has a high vertical fiscal imbalance. But if $VFI \approx 0$, the locally owned revenue is sufficient to

[21] It is known as SILPA *(Sisa Lebih Penggunaan Anggaran*, Indonesian).
[22] Since 2007, other lawful local revenue includes special autonomy grants and adjustment grants that are transfer grants to assist local governments (particularly Aceh and Papua for special autonomy grants) in development programs/activities.

support the local responsibilities, including public service provisions. Figure 5.2 shows that VFI in Central Java and Yogyakarta as averagely high at 79.52%.

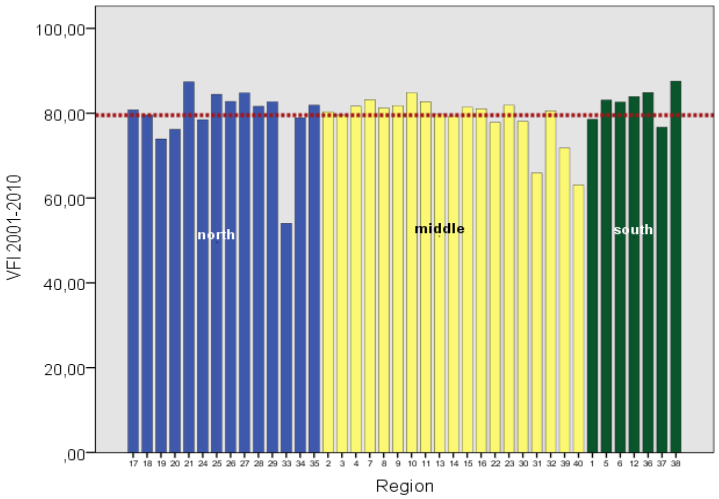


Figure 5. 2: *VFI* in North, Middle and South region (see the regions code in Appendix 4)

Even though it is still considerably high, Semarang City, Surakarta City and Yogyakarta have narrowed their VFI to 60%. Overall, this dependency induces reluctance in local governments to intensify PAD up to the optimal level. By contrast, if the local government collects an excessive local tax, it might harm the local investment climate.

Variation in economic activity generates differences in fiscal capacity. In the immediate term, it may reduce interregional inequality through the transfer balance, represented by government intervention. However, in the long term, it might increase inter-regional inequality and conflicts by hindering the region's economic growth.

5.1.2.2 Public Good Spending Vs. Government Routine Spending [23]

Economic theory does not explicitly draw strong conclusions about the impact of government spending on economic performance. The lower level government spending should increase economic growth, and higher levels of government spending should occur only when necessary. It does not mean that government costs nothing only that the benefits outweigh the costs. However, at some point, government spending turns out to be a burden either because of inefficient allocation or because of inefficient government performance. The latter is rather important since the ultimate purpose of decentralization is efficient government prioritizing of public services and infrastructure provisions.

Generally, government-spending increases per year (Figure 5.3) but high spending does not necessarily correlate positively to high-income growth (Figure 5.4). On the contrary, zero spending or the absence of government would not lead to higher incomes as well. Logically, if government spending were very low, it would generate a very slow income growth. This is because developing infrastructures, performing services, providing contracts and protecting properties would be very difficult.

[23] Local spending is divided into routine spending and modal spending. Routine spending is composed of government employee wages and local operational expenditures. Modal spending is local development in several sectors such as land, equipment and machinery, building, roads, irrigation, in process construction, and other assets. Government routine expenditure consists of public officer salaries, goods, interests, subsidies, grants, and social and financial assistance.

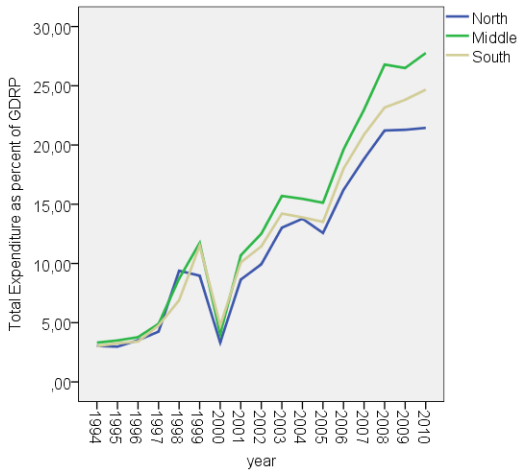


Figure 5. 3: Government Total Spending as Percent of GRDP in Each Corridor

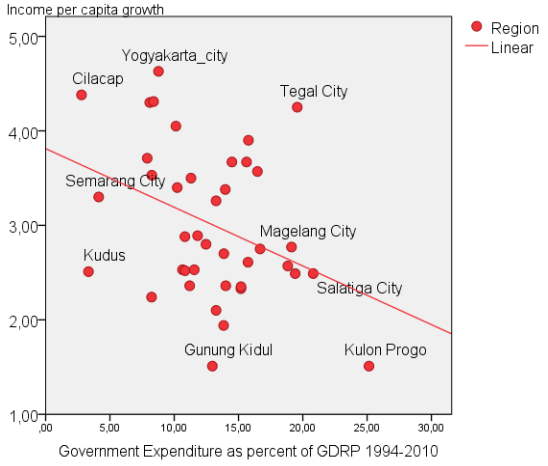


Figure 5. 4: Income Growth and Local Government Spending as Percentage to GRDP

The greatest cause is mainly inefficiency in local government performance, such as in wages spending. Routine spending increases after decentralization while public good spending lessens. More than 50 percent of local revenue is allocated to government employee wages.[24] (Figure 5.5)

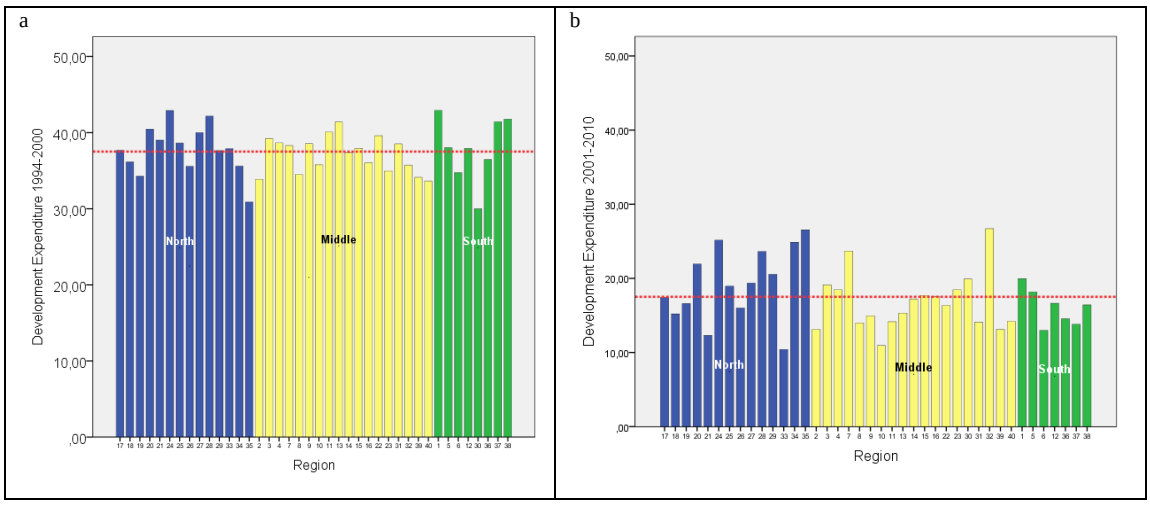


Figure 5. 5: Income Growth and Local Government Spending as Percentage to GRDP

In the early 90's, public good spending reached above 50% in most of regions (Figure 5.5a), but after 2001, spending dropped significantly in almost all regions to 37.51%. In fact, although the ratio to total expenditure decreased, the value in rupiah was actually higher.

[24] In order to improve the welfare of educators (teachers and lecturers), the Indonesia government has stipulated Law 15 of 2005 regarding higher allowances for teachers and lectures. Consequently, allocation of employee expenditures increased especially in education sectors.

5.1.3 Decentralization and Regional Disparity: Confusion

It is a problematic issue for a new decentralized country. Disparity increases and the government system accrues high-costs. An empirical finding conclude that fiscal decentralization has negatively correlated to economic growth in developing countries but no significance in developed countries (Davoodi and Zou, 1998). This gradual attempt over a decade in Indonesia is still far from the primary purpose of fiscal equalization. Dissimilarities in local revenues are implicated in the differences capability of each region to provide public responsibilities. The inequality of the local government budget and transfer grants is investigated with the Williamson Index.

$$V_w = \left\{\sqrt{[\Sigma_i (y_i - y)^2 f_i / n]}\right\} / y$$

And then it has been reassesed with

$$Y = \alpha + \beta_1 X + \beta_2 X^2$$

Where Y is the year and X is the Williamson Index (V_w)

Figure 5.6 shows that the Williamson Index for fiscal capacity tends to increase. However, the index of locally owned revenue plus revenue sharing has a stronger increase (figure 5.6a) than the index without revenue sharing (figure 5.6b). It assumes that a rich region gains more benefits and profits from revenue sharing and the poor regions grow slower. The equalization problem is resolved gradually by giving high revenue to rich (resources) regions and increasing the transfer grants or domestic revenue to poor regions.

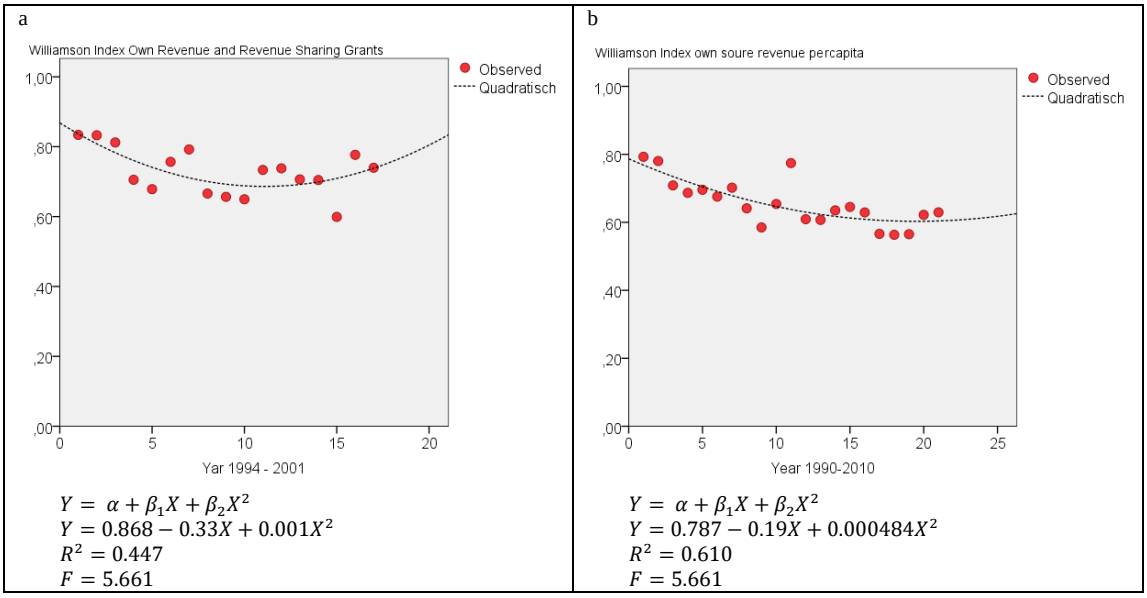


Figure 5. 6: Williamson Index for Fiscal Capacity and Locally Own Revenue in Central Java and Yogyakarta, 1994-2010

Many horizontal and vertical conflicts have emerged after a government is decentralized, particularly between low-level governments and toward high-level governments. Interregional conflicts intensify mostly because of 'us' versus 'them' thinking between regions. This shows a strong expression of region-alism and ethnic egoism, particularly at the level of local government. The common examples of 'us-them' conflict frequently involve regional collective interests such as water sources and landfills. As the authority is transferred from the central government to the low-level government (*kabupaten*/regency and

kota/ city), the latter believes that it is not obliged to follow the authority of the provincial government. The province loses its power over the low-level government.

There seems to be some confusion as to whether decentralization reduces or increases regional disparity in Indonesia. Decentralization and reducing disparity are indeed long processes that a single country must comprehend at the basic support level to reach its goal. It also depends on the competence of the administration system of the low-level government and the competences of each region in regards to actual education, social welfare, and technology in order to improve and compete with other regions. Moreover, the ineffectiveness and inefficiency of local government administration and the lack of coordination existing between the local public and private sectors will exacerbate the government's public service performance (World Bank, 2003).

5.2 Public Infrastructure Spending and Social Improvement

As a developing country, Indonesia faces a number of equality problems between regions. Connectivity infrastructure is required to shrink the gap between the following: the western, central and eastern regions of Indonesia; the urban and rural areas; and the vast sprawl of scattered islands (OECD, 2013a). Poor infrastructure clearly constrains growth. Infrastructure in water, sanitation, energy, housing and transport improve quality of living and eventually eradicate poverty. Technology infrastructure such as information and communication development promotes growth, reaches remote areas, and supports social and cultural advances in Indonesia.

Public infrastructure has an important role in indicating the level of and changes in disparity. Many studies[25] observing disparity in many developing countries invariably conclude that public infrastructure is the key explanatory factor. On the contrary, many empirical studies found a weak correlation between income growth and social indicators such as education and health (UNDP, 2010).

5.2.1 Infrastructure

The relationship between public infrastructure investment and economic growth has been a limelight issue for decades. One of the key requirements for sustained high growth is the sustainability of infrastructure investment. However, the ratio of public infrastructure spending to total government expenditure from 1994[26]until 2010 decreased in each region in Indonesia. In Central Java and Yogyakarta, the ratio changes averaged from 28.39% in 1994 and 9.92 % in 2010. Until 2010, most infrastructure provisions were entirely publicly funded[27].

[25] Sahn and Stifel (2004); Escobar & Torero (2005) describe infrastructure as the 'second nature geographic' that plays an important role in spatial inequality in Peru; Christiaensen, et al. (2005) show that some remote regions in Africa have been left behind as growth has picked up. Households with limited access to markets and public services did not benefit in growth during the 1990s. Remoteness is not just a matter of distance but also lack of transport connections to the capital city and the coast. The provision of public infrastructure services (from the Ethiopian case, roads, and from the Ugandan case, electricity) is vital to help poor households gain opportunities created by economic policy reforms and growth. Lall and Chakravorty (2005) show that in remote and lagging regions with poor infrastructure and poor connection to the coast, the major urban sector tends to be avoided by private firms.

[26] Government expenditure data is available online starting from 1994 for all regions in Indonesia. Furthermore, see http://www.djpk.kemenkeu.go.id/.

[27] The current government (2014-now) sets priorities for infrastructure development to encourage economic growth by attracting (foreign) investment and spending public funds to financing infrastructure. This difficult fiscal situation means that not all infrastructures can be financed by government investment and saving. One of the solutions is implementing a set of partnerships with

Apparently, most regions manage public infrastructure spending in similar manners. Their ratios of infrastructure spending are very much alike (Figure 5.7). The trend line between regions nestles closely to both total government expenditure (Figure 5.7a) and population (Figure 5.7b).

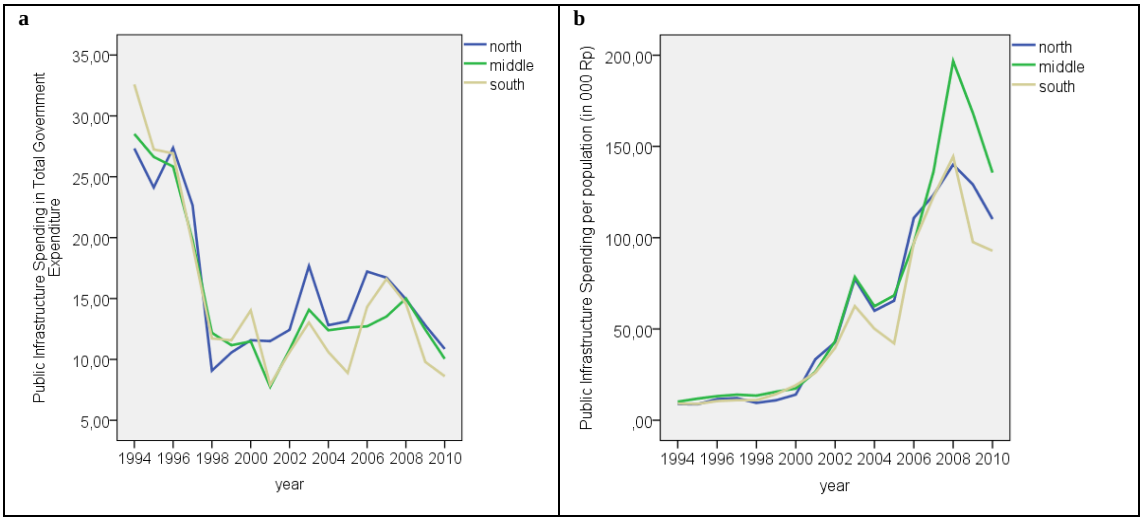


Figure 5. 7: Public Infrastructure Spending per Population for each Corridor

Entering 2000, each region had a different pattern of public infrastructure spending per km^2 (Figure 5.8). The middle region's infrastructure spending was clearly exceeding the other regions. This is because the middle region has bigger infrastructure challenges due to geographical features. The infrastructure spending per km^2 of cities and regencies differs greatly (Figure 5.8b). Surakarta and Yogyakarta manifest preeminence by investing the highest infrastructure rates of all regions. Their great urbanization is responsible for that.

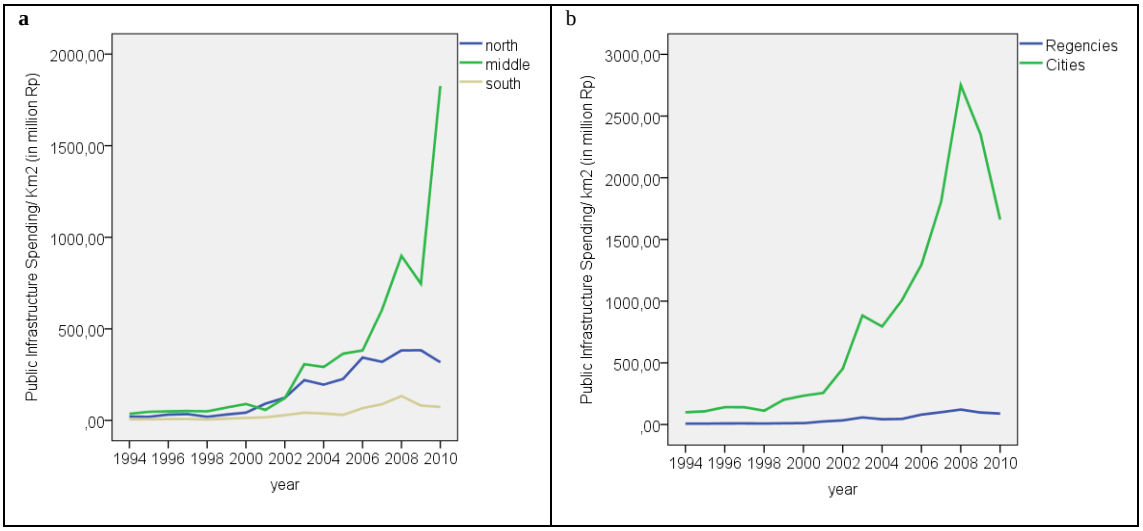


Figure 5. 8: Public Infrastructure Spending per Km between Corridors and between Cities/ Regencies

private investors (domestic and foreign). Many infrastructure projects have been established this way, and development is more emphasized in eastern Indonesia rather than Java.

5.2.2 Education Improvement and Education Spending

The nine years compulsory-education[28] enacted in 2003 is considered basic education. High school education is no longer a special attainment but a necessity. In this section, the ratio of high school enrollment in the population aged 16-18 years old represents educational outcomes (Figure 5.9a).[29] Figure 5.9b shows that educational improvement are not positively associated with per capita income over time. The lower-income regions have higher educational improvement than the highest income regions. It has risen 62% on average since 1996. This is an interesting consequence for a developing country such as Indonesia because if economic growth were indispensable for the improvement of living quality (such as education and health), the regions with falling GDRP would hardly have a chance to improve it. Moreover, the improvement and change in education mostly takes place in regencies instead of in cities. This is understandable because cities have already had high rates of education. As a consequence, the change tends to low and constant.

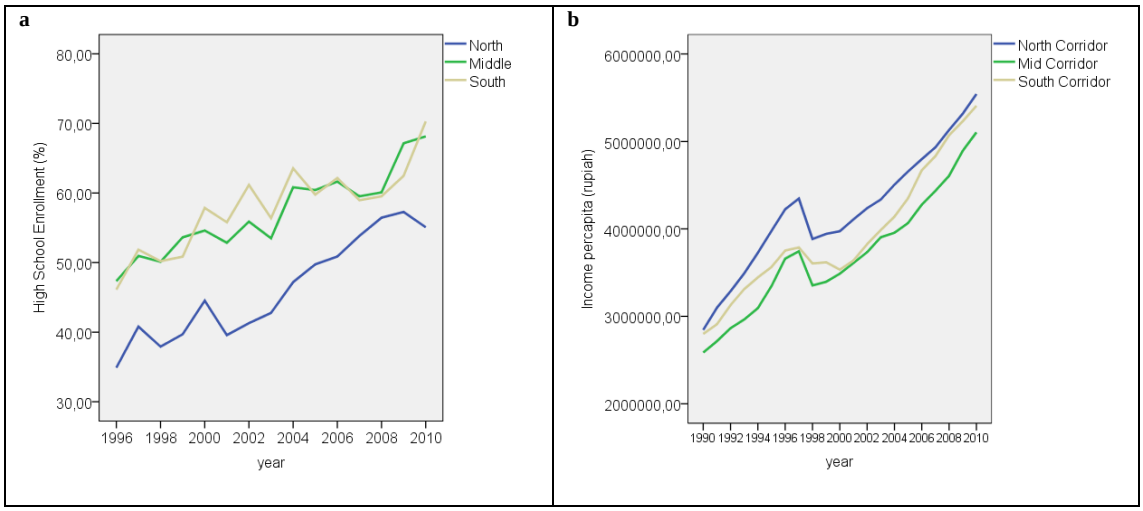


Figure 5. 9: High School Enrollment 1996-2010 in North, Middle and South

All regions have similar ratios toward education spending (Figure 5.9). The south corridor experienced a slightly higher ratio than other corridors, and the middle region was identified as the first place to realize public education spending per student in rupiah, with credit to Yogyakarta and Surakarta. Education spending has increased immensely since 2003 when regulation[30] of the Indonesian education system was enacted (Figure 5.10).

[28] Compulsory education program in Indonesia was initiated in 1950. Act 4 of 1950 in conjunction with Act 12 of 1954 determined that every child aged 8-14 years was required to enroll in school. Later, PELITA IV (Indonesia Five-year Development IV), enacted a six-year compulsory education for children aged 7-12 years old. Furthermore, in Act 20 of 2003 about the National Education System (*UU Sistem Pendidikan Nasional*), Article 6 expressed that every citizen aged 7-15 years old should enroll in a 9-years basic education, from elementary school until junior high school. In 2015, a 12-years compulsory education was enacted, but implementation still requires a new National Education System Act or revision of the latest one for legal protection.

[29] Due to insufficient data, the regions of Yogyakarta province are not included.

[30] Act 20 of 2003 about the National Education System (*UU Sistem Pendidikan Nasional*), article 49 regulates the proportion of education spending in the local budget. It eventually necessitated at least 20% of the State Budget (APBN) and Local Budget Revenue and Expenditure in addition to salaries of educators.

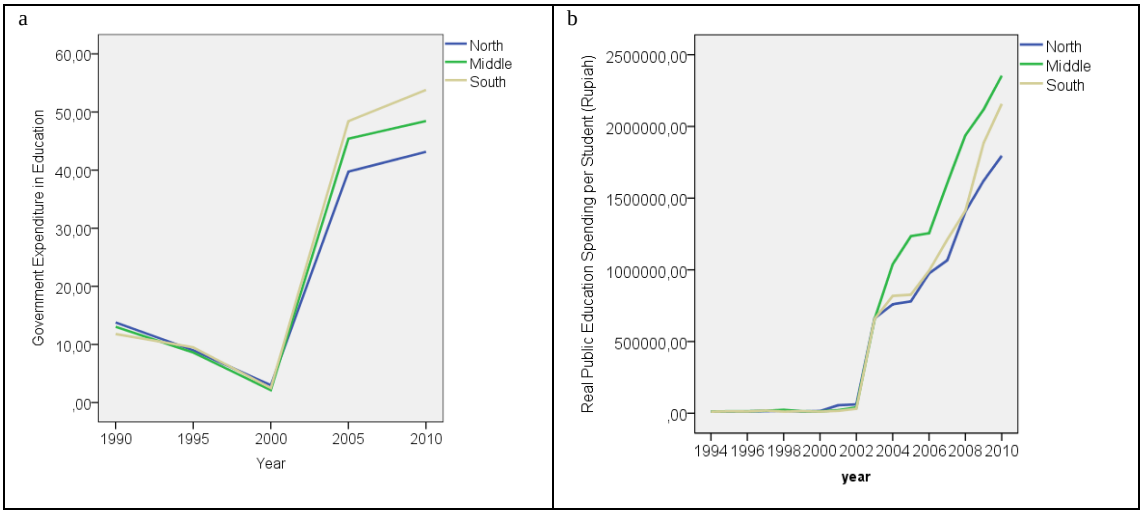


Figure 5. 10: Government Expenditure in Education

Education spending appears to have an insignificant effect on school enrollment in Indonesia. According to Suryadarma (2012), this is mostly because of ineffectiveness performance in and between government and agents. Furthermore, it is assumed that pouring public funds into the education system does not necessarily improve the outcome unless it is accompanied by efforts to improve governance in the education sector. Increasing education spending may be essential for improving school enrolment in Indonesia, but it is not sufficient yet.

Many studies argue that income growth can indicate opportunities for a better life through a better education—but it turns out that this is not always the case.

5.3 Conclusion

In Chapter five, the discussion has been divided into two parts. The first part attempts to address how the government overcame inequality through decentralization. The last part observes the differences of local government spending in infrastructure and education.

Decentralization is a political choice. It is when a central government distributes authority to a sub-central government in order to be more responsive and accountable to the local people. The main problem of fiscal decentralization involves the differences of fiscal capacity to meet local needs. Increasing the fiscal capacity of a sub-central government can stimulate growth and reduce regional gap in regional development. However, knowing to what extent decentralization diminishes the disparity in new decentralized Indonesia is still difficult due to relatively new implemented.

The implementation of decentralization in Indonesia is mainly addressed to obviate the regional segregation as a result of regional discontent on revenue sharing. It has different methods presented from the literature for several substantial features. It is more political and administrative decentralization rather than fiscal decentralization. Strategic issues on fiscal decentralization in Indonesia focus on the transfer system from the central government to the local government as an attempt to fill the fiscal gap between local spending and local revenue. The transfer fund in turn leads to great fiscal dependency.

As a region's capability to underpin its expenditure is very poor, the transfer grant turns out to be the dominant source of revenue. The rich (resource) regions gain more profits and benefits because of high

revenue sharing, while on the other side; the central government increases the transfer grant to support a poor (resource) region.

In Indonesia's case, the central government has a strong role in all systems, decentralizing or not. Sub-national governments have limited discretion on changing the tax bases and rates. The taxes proportion and shares are regulated and determined from central government. As a result, sub-national governments have restricted authority to adjust their revenue on meeting local needs.

Apart from the center-local relationship, it is important to define and contextualize how decentralization could be beneficial and further constructive for Indonesia. Otherwise, it would lead to a high-cost government and move toward great disparity. Nevertheless, it is a fundamental problem that there will constantly be disputes and conflicts over political and economic issues.

6 Regional Convergence

6.1 Regional Classification

In this part, the discussion will focus on a growth pattern by classifying regions into four different quadrants. The quadrants do not imply absolute regional levels. They illustrate a simple inter-regional performance during a certain period regarding economic growth and referring to the growth pattern reflected in the cluster zoning. The pattern is identified to construct a simplified form of regional interaction. Subsequently, the transformation of quadrant levels in each region does not necessarily indicate an increase in growth between periods. In addition, it can be a critical overview regarding the corridor pattern of the north, middle and south.

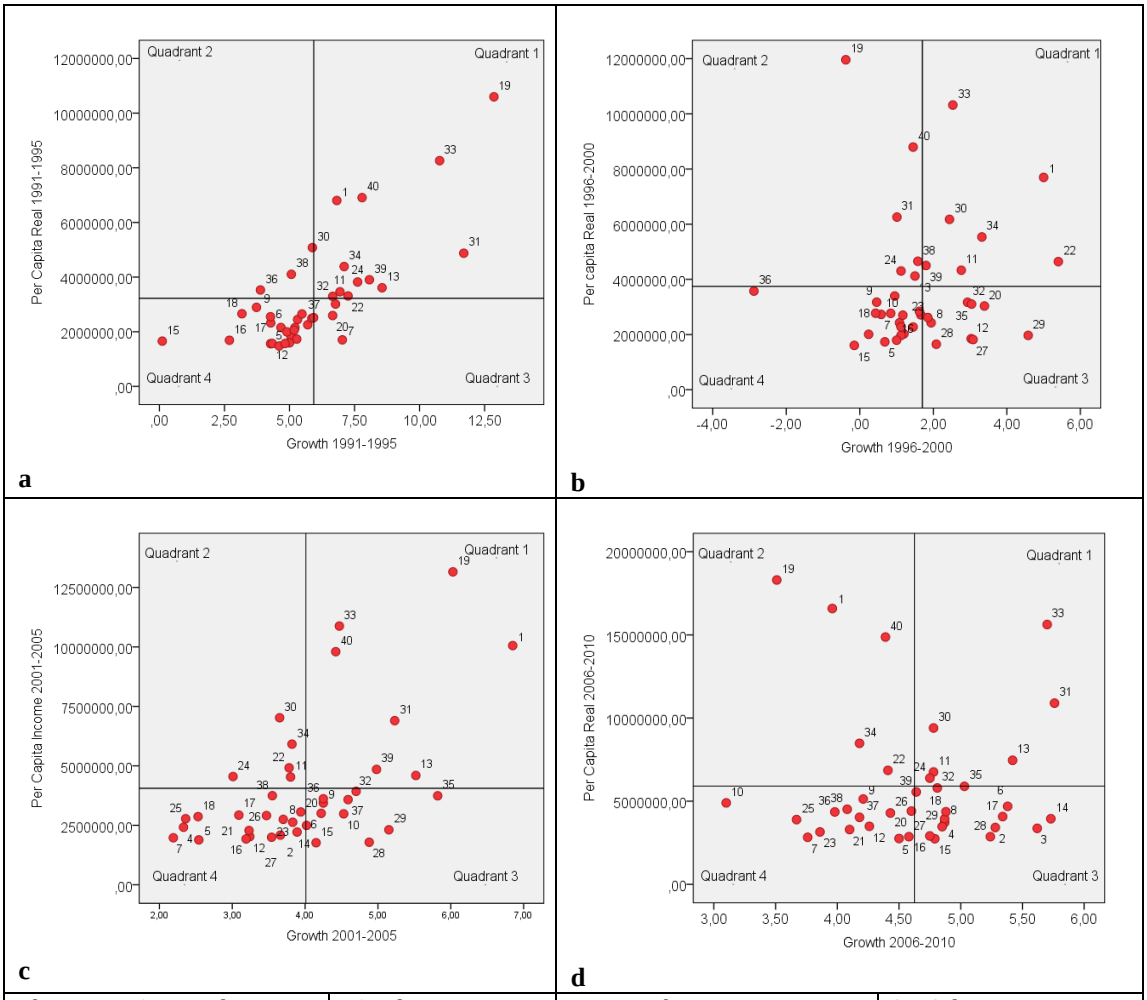
The shortage in using this classification is the difficulty in determining the time range of classification and the selected quadrant particularly when the point is very close to the axis; 'x' represents economic growth and 'y' is the income per capita. Moreover, as the axis margin changes in relation to the average of overall GRDP, the up-down quadrant could generate a biased interpretation in a different time-period. Thus, the up-down quadrant does not imply literally that the region experiences better or weaker economic growth.

The rationale behind the five-year leg is due to the crisis impact. As the critical point was in 2000, the analysis pulls ten years back and pushes ten years forward. Subsequently, each ten years has two five-year episodes. The first ten years (1990-2000) describes the episode of the golden years during the New Order Government and the languished growth during the Asian Crises. The next ten years (2001-2010) portray the episodes of the revival and recovery period after the crisis.

The classification is comprised of four quadrants (Figure 6.1). Quadrant 1 represents the regions in high growth and high per capita income. The regions in inverse development, high per capita income yet low growth, are represented in Quadrant 2. Quadrant 3 illustrates region in high-growth with low income. The last quadrant indicates regions below the overall average.

The study detects that most of the first hierarchical regions[1] constantly show up in Quadrant 1. This only occurs continuously when the characteristics of the growth pole-hinterland linkage serve as the determinants of growth. However, in 1997, growth dropped in all region affected by the crisis.

[1] Cities are largely scattered in the north and the middle regions. They are Semarang, Pekalongan, and Tegal in the north region and Salatiga, Magelang and Surakarta in middle region. The only city in the south region is the major city of Yogyakarta. Sustained high growth is not solely dominated by cities. Cilacap and Kudus are rich regencies where the latter has had the highest income per capita of the city/ regency for the past 20 years (1990-2010). According to Central Java Province (2011), all of these regions are namely the first hierarchical regions.



The regency/ city code:	10. Klaten	21. Demak	32. Salatiga city
Central Java Province	11. Sukoharjo	22. Semarang	33. Semarang city
1. Cilacap	12. Wonogiri	23. Temanggung	34. Pekalongan city
2. Banyumas	13. Karanganyar	24. Kendal	35. Tegal City
3. Purbalingga	14. Sragen	25. Batang	
4. Banjarnegara	15. Grobogan	26. Pekalongan	***Yogyakarta Province***
5. Kebumen	16. Blora	27. Pemalang	36. Kulon Progo
6. Purworejo	17. Rembang	28. Tegal	37. Bantul
7. Wonosobo	18. Pati	29. Brebes	38. Gunung Kidul
8. Magelang	19. Kudus	30. Magelang city	39. Sleman
9. Boyolali	20. Jepara	31. Surakarta city	40. Yogyakarta city

Source: Statistics Indonesia, GRDP per regency and cities from 1990-2010, calculated

Figure 6. 1:Regional classification based on growth of GDRP and the income per capita each region in Central Java and Yogyakarta

The First Five-Year Episode, 1991-1995. In this episode, the range of the growth rate was considerably high. The highest (Kudus-19) was 12.86 and the lowest growth (Grobogan-15) rate was 0.11, whereas the ratio of income per capita was 7.17 with the highest income in Kudus and the lowest in Tegal regency. The diffusion in Figure 6.1a shows a broad range in the growth rate. The implicit assumption appears to be that this can be attributed to regional disparity by means of economic growth.

The imaginary line reflecting developing regions around the major cities (Semarang-Surakarta-Yogyakarta/ 33-31-40) more likely represents the growth pole-hinterland effect. Proximity to the cities

was admittedly essential. Thus, the less-developing regions emerged mostly in middle corridor and the provinces border located away from the cities.

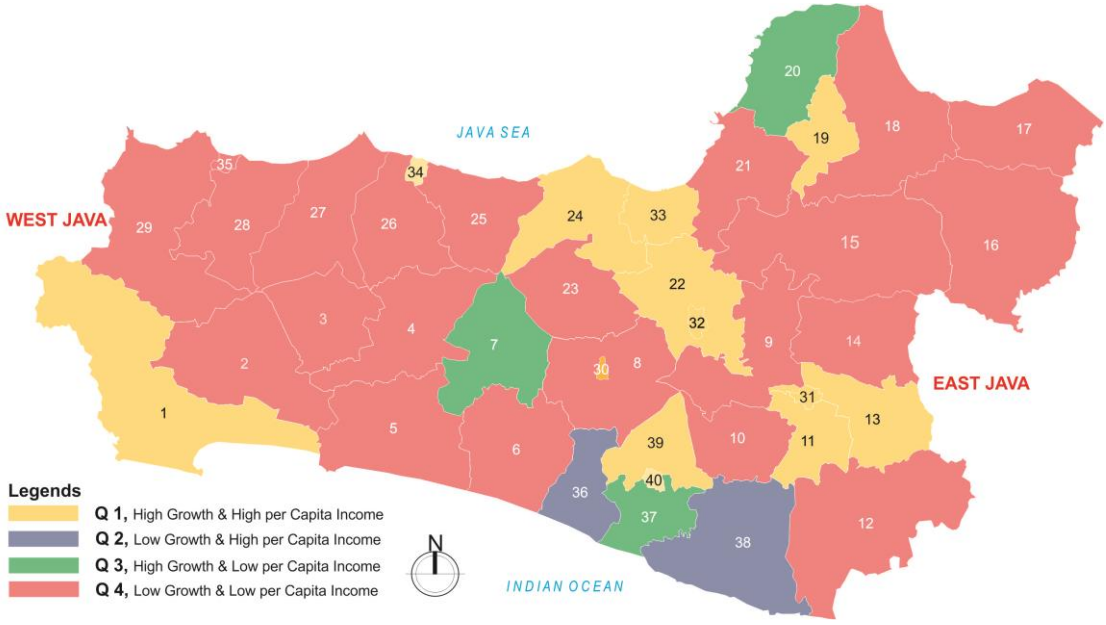


Figure 6. 2: Regional classification based on real income per capita and GDRP growth 1991-1995

One way to understand why red pattern overruns most regions (Figure 6.2) is that the urban center can only spread its effect to its surrounding area in certain proximity. Spatial proximity to the pole accords its hinterlands easy access to the growth diffusion from the growth pole.

The Second Five-Year Episode, 1996-2000. During the crises in 1997, many regional development strategies were adjusted. Many projects and investments were postponed or even canceled due to inflation. The crisis hit sorely in manufacturing regions and scaled down the growth in most regions. Entering into the second leg, Kudus (19) still manifested the highest per capita income, even though Kudus was the most affected region during the crisis. Its growth dropped to the lowest after Kulon Progo (36). The growth rate competed tightly between 2.88 and 5.4, but the ratio of income differences from the highest to the lowest aggregated to 7.45 (Figure 6.1b). As inflation increased, per capita income rose 15.98% instead of falling. Again, the changing color pattern does not imply an increase or decrease in growth.

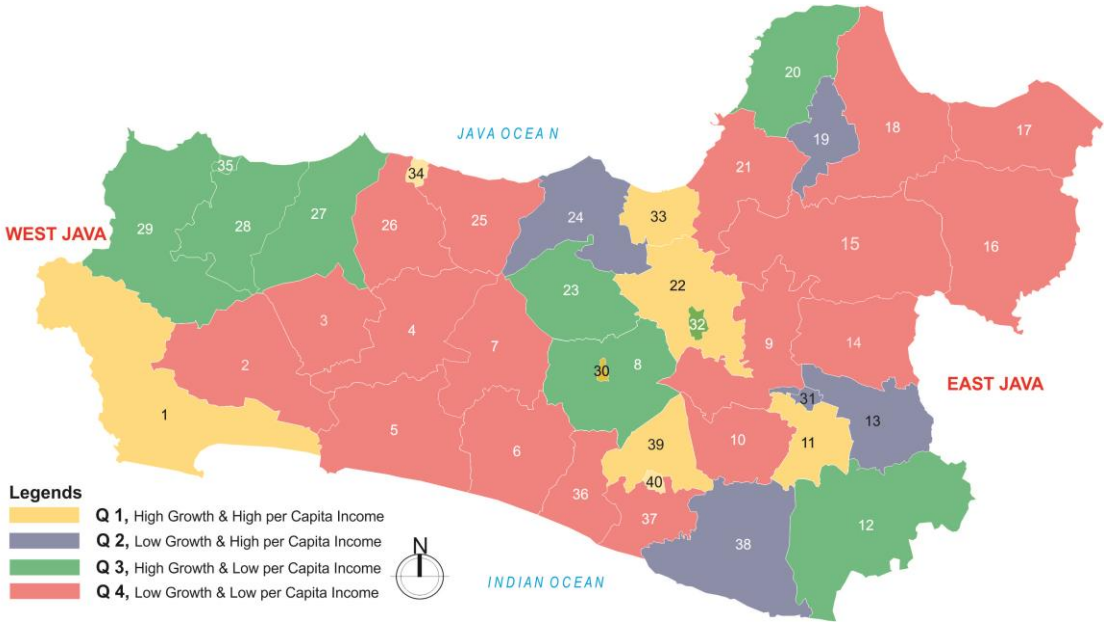


Figure 6. 3: Regional classifiation based on real income per capita and GDRP growth 1996-2000

In this unstable period, the overall growth in these regions fell sharply. In the cluster around Tegal City (35), the growth rate was relatively stable compared to other regions. This cluster is comprised of Pemalang-27 (from 3.08 to 3.54), Tegal-28 (from 4.6 to 2.08), and Brebes-29 (from 4.83 to 4.58). The regions that could sustain their growth had greater opportunities after the crisis. It is remarkable how a crisis can remove roadblocks, reverse the situation and become more creative in lifting obstructions.

The Third Five-Year Episode, 2001-2005. The last ten years was a period of revival, in which regions were primarily built around economic policy choices, used to overcome the impact of the crisis and to promote growth. Despite intergovernmental policy changes, all the regions in this episode constantly and positively grew and per capita income rose as well. Figure 6.1c illustrates that the diffusion of growth dispersed widely from spot 2.19 (Wonosobo-7) to 6.85 (Cilacap-1). The differences income ratio was slightly improved at 6.76 from the highest income in Kudus -19 to the lowest income in Grobogan-15.

Entering this episode, the three major cities (Semarang-33, Surakarta-31, Yogyakarta-40) re-established an imaginary line (Figure 6.4) similar in the first episode (Figure 6.2). This cluster region had reinforced positive growth dynamics. The middle mountainous regions were making progress but rather slowly such as Banyumas-2, Purbalingga-3, Banjarnegara-4, Kebumen-5, Wonosobo-7, Magelang-8, Temanggung-23, Pekalongan-26 and Pemalang-27.

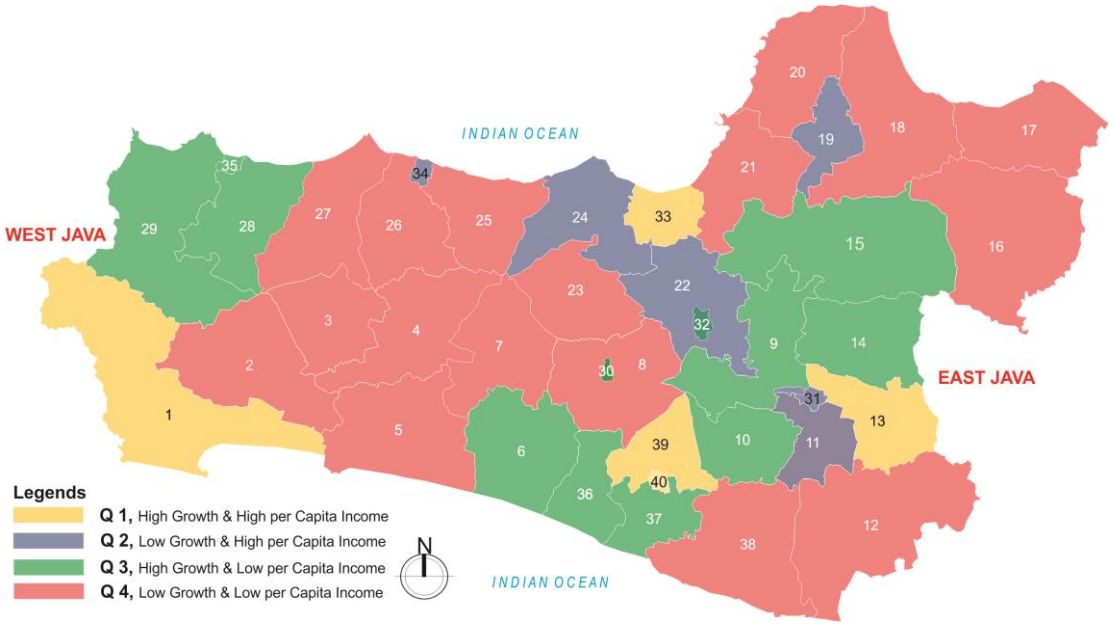


Figure 6. 4: Regional classification based on real income per capita and GDRP growth 2001-2005

The fourth five-year episodes, 2006-2010. In the wake of unanticipated financial crisis and politic, most of the rich regions have fared less well, while things have dramatically improved in the middle regions since the crisis.

In this episode, the differences of growth rate ratio became less wide, from 3.10 (Klaten-10) to 5.76 (Surakarta-31). However, the differences of income per capita ratio were constantly high at 6.78. Kudus-19 was persistently at the highest and Grobogan-15 at the lowest income (Figure 6.5)

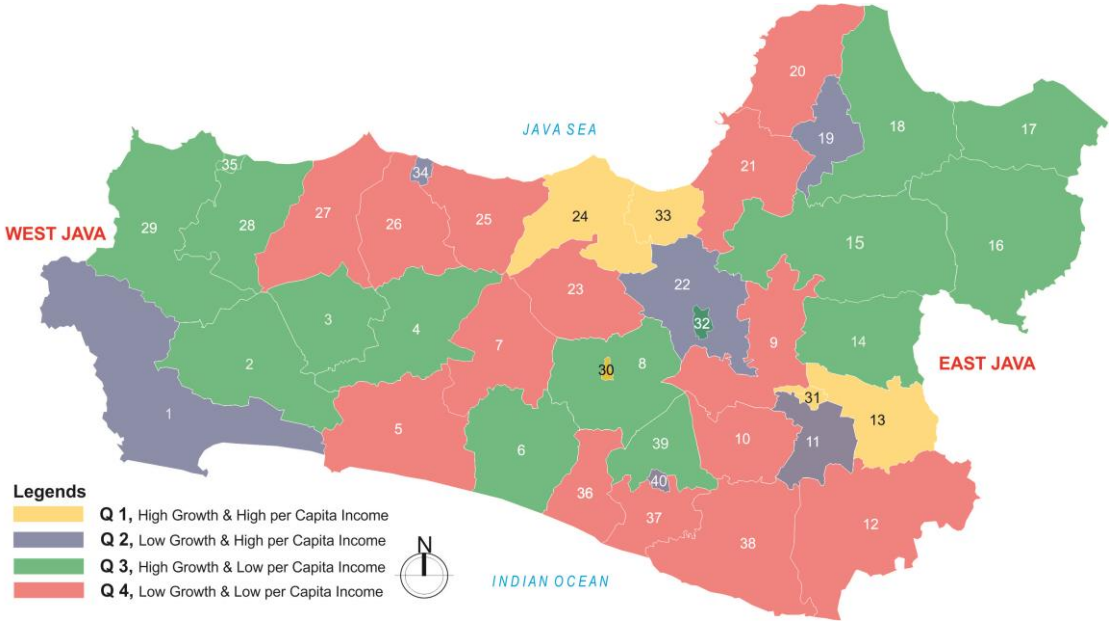


Figure 6. 5: Regional classification based on real income per capita and GDRP growth 2006-2010

These five-year classifications illustrate the linkage of pole to its surroundings. Three major cities, Semarang, Solo, and Yogyakarta, are the dominant regions toward their surroundings creating a growth corridor. The surroundings, which have direct links to their perspective poles, gain overflow growth from those cities. Given that reason, higher growth regions evolved mostly around cities/poles and less-developing regions clustered mostly in regions away from the cities. However, after decentralization of the government, the high growth regions were more likely to spread widely, especially in the middle regions. At this rate, the differences in economic growth between regions became prevalent.

From the perspective of hindsight, it is hard not to overstate the importance of the post-crisis process, particularly of the shifting from a centralized to a decentralized government. The transfer authority had created cooperation with local governments to leapfrog the crisis back then. Subsequently, it led to diverse interests and competencies among the local governments. In principle, this is a good thing, but it makes the convergence process more complicated. This appears to have slowed down. Some regions with higher competence outpaced the slower regions in many ways.

6.2 Regional Convergence and Regional Disparity

Convergence illustrates how poor regions tend to grow at high rates and exceed rich regions. Accelerated and sustained high growth causes an income transition from poor to middle regions and lastly to advanced regions. Thus, convergence can be associated with the so-called catch-up process. On the contrary, divergence refers to disparity.

The Solow growth model shows that an economy between regions, over the long term, will come near a steady state of equilibrium. This state depends on the rates of depreciation, population growth and saving. A steady state refers to the condition in which the growth rates of all variables are constant (Arbia, 2006). In contrast to developed regions, which have sustained low-growth, developing regions with advanced technology experience progressive growth that exceeds of developed regions. Technology development increases the output per worker and the savings rate in the growth of output per worker. This catch-up effect may lead to income convergence between regions.

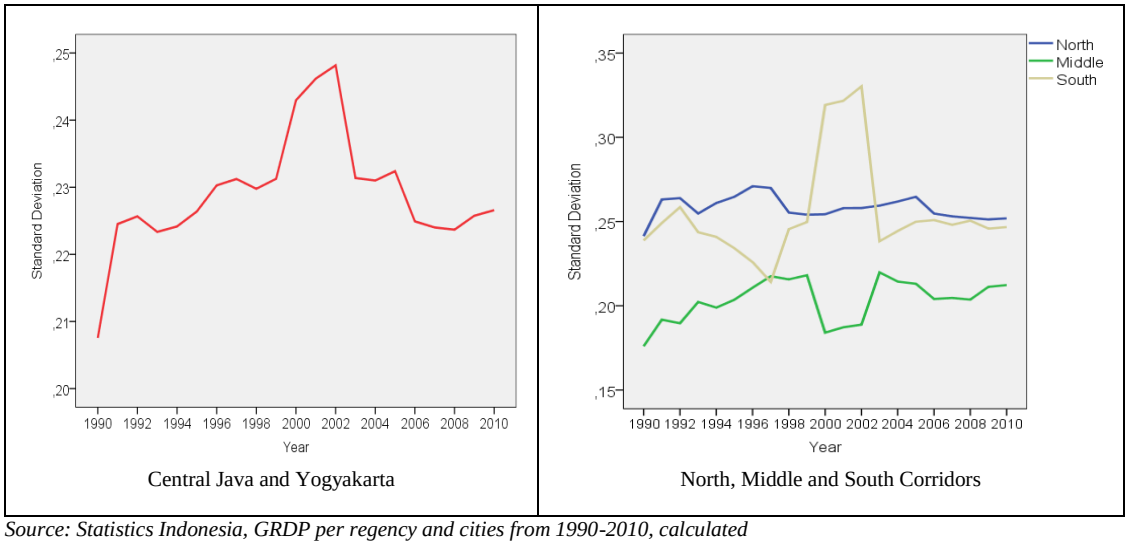
Knowledge transfer and learning processes are the main causes of accelerating growth in potential output. A region pushes to import technology and knowledge, but concurrently it initiates progressive production of technology. Eventually, high-sustained growth results from technological changes (Spence, 2011). Technology change is a necessary condition, otherwise, growth and productivity will stagnate.

6.2.1 σ Convergence

This section is devoted to examining whether or not inequality across regions in Central Java and Yogyakarta decline or increase over time using σ Convergence. Furthermore, it directs policy implications for income equity. σ Convergence is defined if the dispersion of the real capita GDP within a group of regions tends to decrease over time (Sala-i-Martin, 1996b). That is if

$$\sigma_{t+T} < \sigma_t$$

where σ_t is the standard deviation of the logarithm of economic region *i's* GDRP by time *t* and T is the observation time period. Figure 6.6 illustrates that the propensity of dispersion widened. In spite of this, economic growth was at its highest rate, 7.1%, since initial observation, and dispersion was also apparent. This catapulted an increase, especially in 2001, during the economic crisis and decentralization implementation.



Central Java and Yogyakarta | North, Middle and South Corridors

Source: Statistics Indonesia, GRDP per regency and cities from 1990-2010, calculated

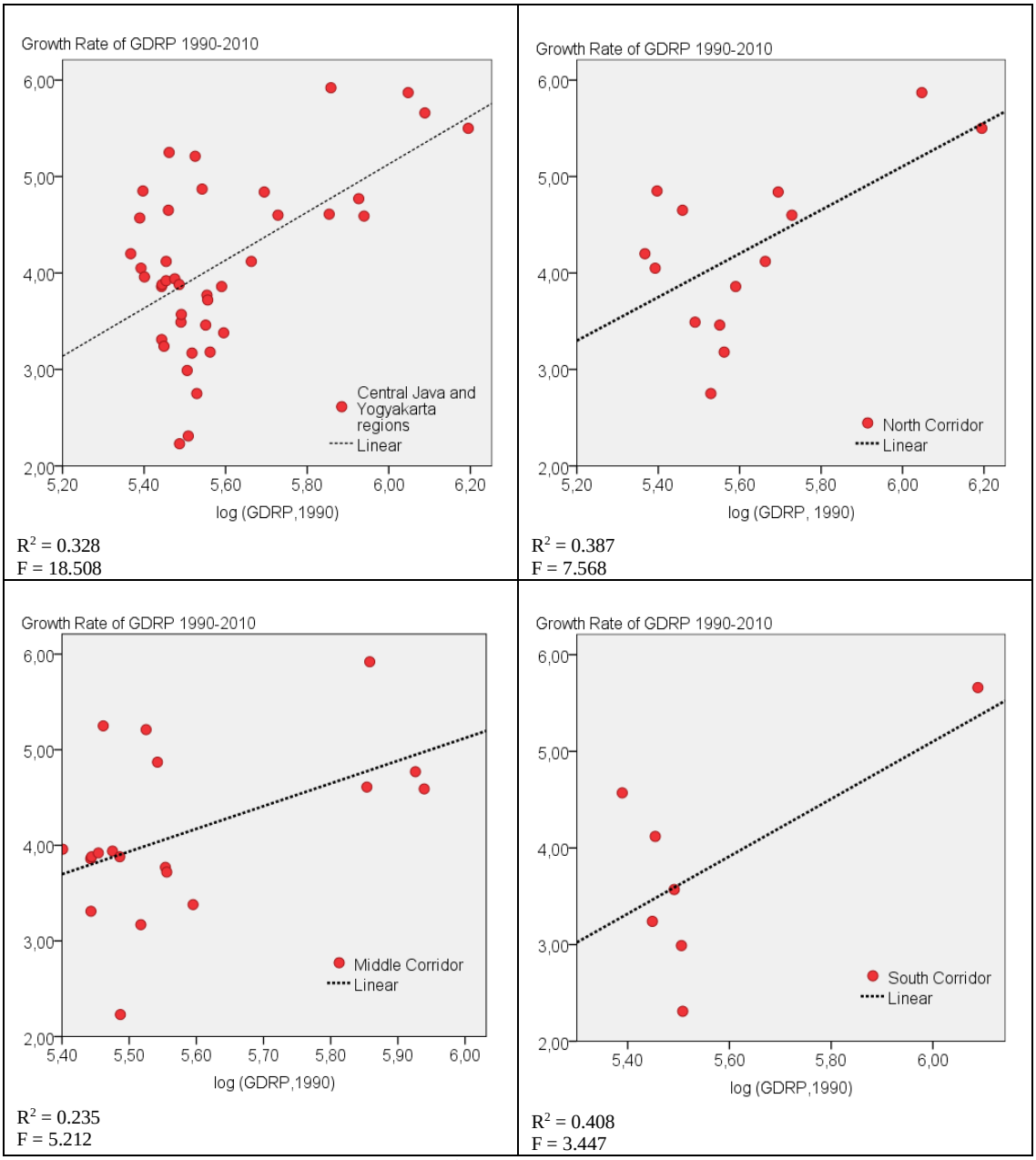
Figure 6. 6: σ Convergence from 1990-2010

In regard to dispersion, the trend lines in all corridors have different symptoms. The increase trend line implies an increase of dispersion. Over 20 years, the trend line in the north corridor tended to decrease while those of the middle and south continued to increase. In the first three years of decentralized government, deviation in the south and middle remained elusive. In the southern regions, the line pointed to an increase then fell to the point it was at three years prior. In contrast to the south, the middle's line intensively dropped before it began to increase again to the point of three years before. This erratic line may correspond to the 'big bang' implementation of regional autonomy. However, some regions in the middle, especially the Surakarta cluster, drew benefits from the opportunities created by economic policy reforms and growth in the early years of decentralization. In most cases, crisis was the opportunity change because it weakened vested interests and resistance. It's worth noting that the opportunity is not always seized.

6.2.2 β Convergence

Barro regression is the popular methodology for estimating convergence by performing growth-initial level regression. β-Convergence describes how less-developed regions grow to catch up to the developed regions' growth. β Convergence is a necessary condition for narrowing the σ-convergence.

This hypothesis expects to find a negative correlation in the coefficient of the initial income level. Figure 6.7 analyses the existence of β Convergence across the regions over 20 years. On the horizontal axis, it displays the log of GRDP per capita in 1990. On the vertical, it depicts the growth rate between 1990 and 2010. Regardless of the poor R^2 (coefficient of determination), the figure shows a positive relationship between growth and the initial level of GRDP. It illustrates the presence of divergence instead of convergence. Along with the absence of spatial spillovers, the inequality widens across the regions.



Source: Statistics Indonesia, GRDP per regency and city from 1990-2010, calculated

Figure 6. 7: Convergence across region

The nonlinear "Barro Regression" approach is applied to measure the β Convergence level in the cross-sectional data. The nonlinear approach is expressed as follows

$$\left(\frac{1}{T}\right) ln\left(\frac{y_{i,t+T}}{y_{i,t}}\right) = a - \left(\frac{1 - e^{-\beta T}}{T}\right) ln(y_{i,t}) + \mu_{i,t+T}$$

Where i is the regional unit, t is the initial year and $t + T$ is the observation time. Thus, T is the interval period time. $\mu_{i,t+T}$ represents the error term $\mu_{i,t}$ between t and T, α is the intercept, and y is the output or income per capita. $\left(\frac{1-e^{-\beta T}}{T}\right)$ is the coefficient log $(y_{i,t})$, and β shows the speed of convergence.

It is said that the region unit i with the GDP from t to $t+T$ is the log GDP per capita of region i in year t, and therefore according to Sala-i Martin (1996), if there is a GDP per capita for the cross section of i then it can be stated as follows

$$\gamma_{i,t,t+T} \equiv \frac{log\left(\frac{y_{i,t+T}}{y_{i,t}}\right)}{T}$$

when

$$b = -\left(\frac{1-e^{-\beta T}}{T}\right)$$

then

$$\beta = \frac{\ln(b-1)}{T}$$

According to Sala-i_Martin (1996), When $b < 0$ or $0 < \beta < 1$, it indicates that the less-developed regions have dynamic growth in contrast to the more-developed regions. β indicates the rate of convergence. Then the equation will be

$$\gamma_{i,t,t+T} = a - b\ log(y_{i,t}) + \mu_{i,t+T}$$

Table 7: Estimates of the absolute β Convergence for Provinces and Corridors in Central Java and Yogyakarta

Regions	b-convergence*		β
Central Java and Yogyakarta Province	0.007 (0.003)	0.115 [0.008]	-0.25
North Corridor	0.007 (0.003)	0.235 [0.006]	-0.25
Middle Corridor	0.007 (0.005)	0.052 [0.009]	-0.25
South Corridor	0.013 (0.007)	0.309 [0.009]	-0.22

**the regression uses the nonlinear logarithmic least square*

In Table 7, each column contains four numbers. The first one is the estimate of b. Below, in parentheses is its standard error. To its right, the adjusted R^2 of the regression and below that is the standard error of regression. From the estimations above, the positive b-convergences with negative β and a long term rising curve of σ-convergence confirm that economic growth led to divergence instead of convergence. Apparently, the developing city/ regency gained more progressive growth and bulky GRDP per capita by promoting an investment arranged autonomously with the local government. Eventually the developing city/ regency grew more advanced and the less-developing city/ regency managed to grow steadily as well. The continuously rising curve of divergence over 20 years reflects a consistent increasing regional disparity in the regions.

This study about regional inequality in Indonesia is very interconnected with the studies examining the hypothesis of convergence across Indonesian regions. These studies – both based on regressions of growth rates on the initial income levels and on other economic variables - have produced mixed results.

There are two important points to make. First, there has been no absolute convergence (apart from a short period). This means that there does not appear to be any tendency for less developing regions to grow faster than the more developing ones. Secondly, there is, nevertheless, a certain degree of conditional convergence; that is to say, each region tends to reach its own steady state.

Export-oriented manufacturing aimed for the global economy in developing regions and resource-oriented products in less-developing regions admittedly have differentiated sustained-growth across regions. However, structural change and industrialization are not the sole causes of divergence. For that matter, the diffusion of technological change plays a role. There are many sources of this technological transfer process in developing regions such as FDI and engagement with the global economy through multinational supply chains (Hassan, 2004; Spence, 2011). Under this concept, technological transfer and creation are clearly the substantial variables in the process of dynamic growth. As it is a necessary condition in modern growth, the technology progress in fact determines high-sustained growth. For that reason, the next part observes the extent of technological capabilities in regions, and then it will look at different growth patterns in the regions.

6.3 Regional Technological Capabilities and Spatial Inequality

In the neo-classic theory (Solow, 1956), the regional economic growth depends on the factors of steady state, such as capital and labor. The Cobb-Douglas model explain as follows

$$Y_t = Af\ (K_t^{\alpha}, L_t^{\beta})$$

Where *Y* is the output, *K* is the capital, *L* is the labor and *t* is the time period. σ and β are the elasticity of capital and labor.

Schumpeter (1936) said that innovation breaks the circular flow of equilibrium or steady state. It is the creation of new knowledge. Technological progress underpins the functional part of the economy. It is later called the endogenous growth theory and explains technological progress underpinning economy in its model. It is described as follows:

$$Y_t = F(K_t, L_t, T_t\ )$$

Where *T* is the technology[2] in time period *t*

The insights of this theory illustrate co-determining of the dynamic of innovation and productivity developed by Schumpeter (1936). Income is determined by the productivity of labor. As time goes by, productivity can increase when capital is added and later deepened further with advanced tools. However, there are limits to increasing productivity by just adding capital to substitute labor. The return eventually declines. Output leads to a diminishing return and the steady state is achieved. In this limits, technology changes put back the incomes and productivity back to rise. Innovation or technological progress has an extensive effect on increasing the productive potential of an economic process. Given all of that, technology is an essential catalyst of finding a way into the global economy. Therefore, technology and knowledge are disseminated around the world. Transfer of technology, knowledge and skills from advanced regions to developing regions and subsequently using these in a new environment are the principal reasons that developing regions can grow a high rate relative to advanced regions. Simultaneously,

[2] In many developing country, it is known as technicization or mechanization.

developing regions manage to elaborate upon the new technology at the next level. The effect from transfer technology and knowledge on potential output and on productivity eventually becomes similar to that in the advanced country (Spence, 2011). Spence explained that new technologies are transferred mostly through foreign direct investment. Further, foreign firms play a significant role in various industries where technology is decisive. This clearly shows that in the global economy, technological change plays an important role in increasing growth. Indonesia is currently only a net importer of technology (Hill, 1995; Kumar et al., 1999), not yet an innovator. Imported technology is expected as part of technology transfer in host regions. The technology transfer process is expected to affect the development of indigenous technological capabilities.

6.3.1 The Development of Empirical Methods in Urban Context

The variables related to technological and innovation capability such as level of education level and adequate infrastructure technology are furthermore insufficient to represent technological capabilities. Based on Indonesia standards, the scientific personnel in Indonesia involved in R&D is great and growing fast. Unfortunately, this is not directly proportional to the research establishment and applied technology. The amount of strategic research in Indonesia is much smaller than in other Asian countries, particularly Korea and India (Hill, 1995). R&D is often neglected as the essential factor for maintaining high-sustained growth (Westphal and Evenson, 1993).

Technological capabilities would improve from transfer technology. The most regular channels are FDI and R&D activities with patents or licensing as the result. Studies argue that the amount spent on R&D and various measures of inventive output have a reasonably close relationship (Dunning, 2014). Knowledge and technology spillover offer great opportunities for economic growth, particularly in developing countries. Furthermore, expansions in science and technology have marked the multifaceted development. Many industrialized countries and several developing countries adopt these technology opportunities to create and innovate by regulating the strategies of technological policies. Indonesia is a dynamics adopter[3], and the next steps for it are creating and innovating technology. Eventually, innovation becomes about finding new sources of growth and improving competitiveness through strategic (technology) sectors.

Patents are mostly used as indicators of technological development (Westphal and Evenson, 1993). Thus, the need for available data on patents[4] and R&D is very urgent. Patents reflect genuinely novel innovation (OECD, 2013b). Furthermore, the patent system allows patent owners an appropriate reward for their innovations while at the same time fostering and spreading technological progress for the society. However, unavailable or unreliable data about patents on innovations in the developing world is mostly due to a large informal economy. Much empirical evidence for industrial technology in developing countries is less complete (Westphal and Evenson, 1993). The patent data at the regional level in Indonesia is far from complete.

As there is no "standard development path" for technology in Indonesia, to attain the technological and innovation data, a plausible empirical methodology has been developed. This method aims to identify stakeholders' perceptions of technological capabilities. It is also known as the expert-interviews methodology. This method was formulated on how technology capabilities differ from one another. Apparently, the high and less growth in specific city/regency is the indirect reference of most respondents for filling the hierarchy. Doing this does not provide an exact figure of the technological level, but it does give

[3] In 2001, the World Bank in Human Development Report recorded that Indonesia was a dynamic adopter of the technology achievement Index (http://www.fao.org/docrep/005/ac483e/ac483e09.htm).
[4] Unlike some other higher income Asian countries, until 1991 Indonesia did not have a domestic patent law.

useful clues and leads, particularly in convergence analysis. Around 40 relevant stakeholders who reside in different regions in Central Java and Yogyakarta were willing to participate in a personal interview to rank 40 regions in Central Java and Yogyakarta.

The stakeholders are the academics, industrial leaders, planners and government leaders who represent regions in the north, middle and south of Central Java and Yogyakarta. The stakeholders is the selected person who understand the critical elements in the process of technology transfer and creation for enhancing and leveraging the technology capability. They have unconstrained choices. The experts have similar ideas about the general view of regional disparity but in the end, the results deliver thoroughly diverse values. At this rate, the interviewees' opinions draw different pictures and substantially support the discussion on regional disparities.

The investigation of technological development in this section emphasizes the manufacturing sector. Indonesia has an eminent tradition of agricultural research and, of course, there has been some assessment of technology issues in the service sector, such as with commercial banks (McKendrick, 1992). Many empirical studies build technological models to contribute policy relevance. However, this study is quite valuable, especially in regards to industrial growth since the industrial base in Indonesia is still weak, despite its acceleration as a whole (Kumar et al., 1999). Further, policymakers are looking for a way to strengthen and upgrade technological capability. The field of technology is thus primarily an empirical field (Westphal and Evenson, 1993). In the next section, the results of the questionnaire will compare regional classification and cluster analysis in the next chapter in order to determine consistency.

6.3.2 Data Collection Methods and Process

In order to gather information, the empirical evidence method in this section relied on two methods: (a) a questionnaire with a supplement and (b) analyzing documents and materials[5]. The questionnaire consists of eight questions, and each question is supplemented with a Central Java and Yogyakarta A4-map (Appendix 2). The stakeholders answered the questions by ranking regions from one (1) to forty (40), with one (1) being the highest point and forty (40) being the lowest point. In analyzing documents and materials, ranks were set by transforming responses into a valid ordinal rank using a fitted-procedure of the expert-interview and comparing the results with other patterns.

Technology has two primary components: (1) the physical component such as products, tooling, equipment, blueprints, techniques and processes; and (2) an informational component such as know-how management, marketing production, quality control, reliability, skilled labor and functional areas (Kumar et al., 1999). Technological capability is a process of acquiring technical knowledge or a process of organizational learning (Rosenberg and Frischtak, 1985). Furthermore, Archibugi and Coco (2004) argue that the creation of technology, technological infrastructure and the development of human skill are considered the main dimensions of technological capabilities. In this model, Kumar et al. (1999) describe how technology transfer generates technology capability, which in the end, will boost economic performance (Archibugi and Coco, 2004).

The questionnaire[6] was formulated to describe how technology is created and developed. The goal was to establish comprehensive perceptions of technological capabilities in different regions. This consisted of four different categories: (a) the creation of technology as the output of joint research and mutual collabo-

[5] The documents refer to the seven question formulated as technology level indicator. The materials preparation emphasize the procedure of expert-interview. Before this methodology has been performed to the real respondent, the pre-tested as a trial and error has been conducted. Nonetheless, the procedure was developed continually to overcome difficulty, failure and frustration from ranking the regions. Ultimately, those fitted-procedure models intend to reduce the bias.
[6] See Appendix 2

ration between industry and higher education, (b) R&D spending in local government expenditures, (c) infrastructure adequacy, and (d) the education level of the workforce. The first question aimed to capture the respondents' overall information about technology development in their regions as the preliminary findings of the regions' technology levels. It was meant to describe respondents' general understandings of the underlying themes and regional scopes. The following questions up to number seven involved the dimensions of technology development.

During the data collection process, person-to-person interactions were necessary. It was important from the start to ensure and to assist the experts[7] on completing the assessment properly without affecting their answers. The experts were expected to complete the questionnaire without pause in order to prevent external disturbances and maintain consistency, as accurate data collection and accuracy of the data itself were essential. The most problematic during the process was to keep the experts focused while ranking the regions all the way to 40. The experts assessed in doing this by four ways. First, the expert had successfully completed all of the rankings from 1 (one) to 40 (forty) in series. This is what would produce the ideal answer sheets to analyze further. Second, if an expert missed one or more numbers on the assessment, the ranking would turn out to be one (1) to 38 or 42 (or any number close to 40). Third, an expert may have refused to rank up to 40 in each question, arguing that it is illogical to do with over 40 regions in an absolute hierarchy. Furthermore, they may have insisted that it is beyond their capabilities to evaluate all of the regions. Mostly, these respondents only ranked up to 10 or 20. Similar to third condition and also considered an illogical ranking, the forth condition was when an expert was only capable of ranking three dominant regions with one, two and three because they consider the others equal, which all are in rank 4 (four). The last condition is when the experts ranked only one (1) to three (3) for whole regions. It implies that there are several regions in number one (1), two (2) and three (3) at once. These varied expert assessments induced and adjustable procedure to analyze the responses further.

6.3.3 Transforming the Rank

The main problem of analyzing the documents was the differences in the range of levels. As the respondents ordered the rankings in five different ways, simple calculating was developed to rate and to manipulate these incomplete rankings.

The basic method was to establish a scale from one (1) to forty (40). The non-scale regions were sorted with the ranks after the last scale that the respondent filled in. If the scale was only from one (1) to ten (10), then the rest of the none-scaled regions were applied the same scale. The scale came from the sum of the rank order from 11 to 40 and was then divided to the count of how many non-scale regions there were. This same method was also implemented in other ranges of scale e.g. one (1) to fifteen (15) or even one (1) to three (3) and the skipped rank scales:

$\Sigma\, L = 2,3, \ldots 40$

$\Sigma\, R_{n-s} = 1,2,3 \ldots$

and

$$S = \frac{\Sigma\, L}{\Sigma\, R_{n-s}}$$

when $\Sigma\, L$ is the level of the rank and $\Sigma\, R_{n-s}$ is the non-scaled regions. S is the transform scale. As mentioned above, if the respondent ordered the scale only from one (1) to ten (10), then $\Sigma\, L$ is the sum from

[7] See Appendix 3 for the list of the experts

the rank eleven (11) to forty (40) which is 765, and ΣR_{n-s} is how many of the non-scale regions were observed. If in this 1-10 scale were 30 regions, then S would be 25.5. The final scale for all regions was determined from the median[8] of all the respondents' answers. The ordinal rank transformation resulted in a question range from 1 to 29[9].

6.3.4 Knowledge Transfer, Dissemination and Further Innovation

The mosaic pattern of technological capabilities in this study is fairly easy to see. The pattern is mostly oriented to the rich-smart[10]-regions and the manufacturing-based regions. This may mean that rich-smart-regions are the growth centers of the regions. The urban growth overspread to the surroundings but was not able to reach the regions geographically away from the cities. Consequently, disparity can be explained by how regions evolved through convergence or divergence. In addition, two non-urban but rich regions represented with numbers 2 (Banyumas) and 19 (Kudus) emerged as the prosperous regions that adopted advance knowledge.

Except in agriculture technology, investment in technological change in developing countries has not come to prominence in the general design of development policy (Wheaton and Shishido, 1981). Most of the respondents agree that technological capabilities and innovation are not yet being emphasized in the dynamic growth of Indonesian development. Moreover, there is an absence of coherence between research and the real needs within society, particularly for the manufacturing industry. The government does not yet seriously encourage the development of that connection. Compared with other countries in South East Asian such as Malaysia, Singapore and Thailand, research collaboration with firms or major manufacturing industries lags behind (Hill, 1995; Firmansyah, 2011). Furthermore, Firmansyah argues that the difference of interests and viewpoints between research institutes and industries in Indonesia constrain the establishment of sustainable research collaboration. The industries demand an increase of output value imminence, whereas research products are born over time and through many mistakes and proofs.

In order to build technological capabilities, most of the large industries in Indonesia import technology from advanced countries. This is actually a common practice in developing countries. However, in the Indonesian case, the acquisition of advanced technology to increase production capacity or to improve product quality gives only contributes a small amount to the development of technological capabilities (Kumar et al., 1999).

As explained in Chapter 2, inequality in the modern world is largely caused by the uneven dissemination of technologies and manufacturing production. Technology diffusion is dependent on the number of educated workers who can thrive with the new technology and perform new innovation. If this premise is true, then education is one of the important aspects underlying knowledge inquisitiveness. However, in most developing countries, innovation and/or technology are not yet an outcome of their education systems. These systems merely deliver the know-how adopted from an advanced country and produce skilled labor. The main goal is that the population becomes educated and the living standard improves across the regions. Urban regions offer better living in any scope

[8] Since the result was determined by a range level of the ordinal scale form, the mean value was not the right option to interpret the final value. This ordinal scale is not a Likert Scale, so it was not necessary to transform it into the interval scale to find the mean value. In this case, the best interpretation for the final result was to find the median value or mid-point of the rank, which is one way to measure the concentration of the data set.

[9] This analysis used an ordinal scale, which was adopted as an approach of the quasi-metric scale.

[10] Smart regions have a propensity in the regions where many universities are located such as Semarang, Solo, Banyumas and Yogyakarta. Most of the renowned universities are located in cities such in Semarang (private and state), Surakarta (many private and one state universities), Salatiga (private university), Banyumas (one state university) and Yogyakarta (two state and many private universities)

In most developing countries, technological capability and knowledge derivation exist largely in the urban areas or cities. In Figure 6.8, universities engage mostly in a variety of joint research. The concern that technological advancement is created over time and not self-perpetuated has been negligible. It does not just spring into existence. Regardless of whether old knowledge is already in place, dissemination of new knowledge is an expensive investment. It indeed consumes many human resources, especially from the educated population and labor. In Figure 6.9, most of the dense population, namely in the cities, seizes the highest rate of labor education. This is because pull factors encourage people to move to urban regions due to a better standard of living. Skilled labor agglomerates in multiple sites, such as chains of trajectory, around cities.

The share[11] of Indonesian GDP devoted to innovation is very poor. It was less than 0.1% in 2015 (State Ministry of Research and Technology). However, this is hardly considered a significant measure of the impact of technology and knowledge transfer on Indonesian development. The quantitative measure is very elusive. Nevertheless, in considering regional growth, technology, knowledge and know-how transfer demand full attention.

The catch-up pace is associated with the size of the differential and the rapid transfer of knowledge across regions. To create innovation, joint research is established in many university research centers in Central Java and Yogyakarta. Cities are the starting point for widespread imported technology and innovation. A further expectation is that as the city begins to produce and progress knowledge and technology, growth will be promoted. In turn, cities disseminate the adopted technology to their surroundings.

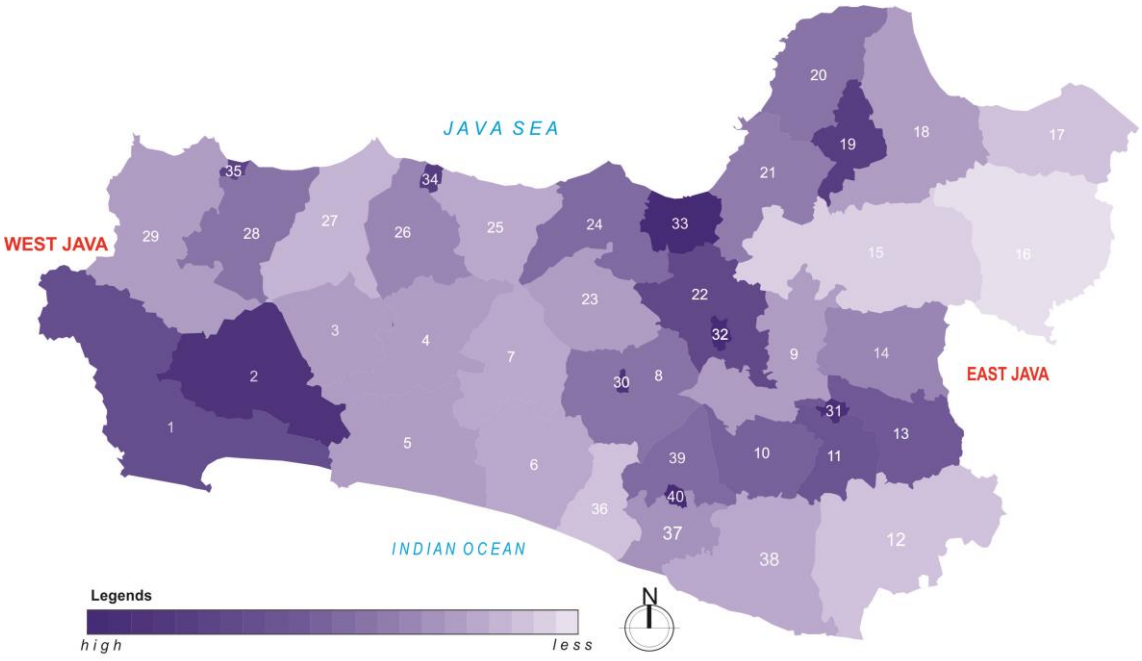


Figure 6. 8: Join research

The government mostly directs the coordination between government research institutes, universities and industries. The linkage between these entities eventually improves the diffusion of technology and creates innovation.

[11] Gross Expenditure on Research and Development (GERD)

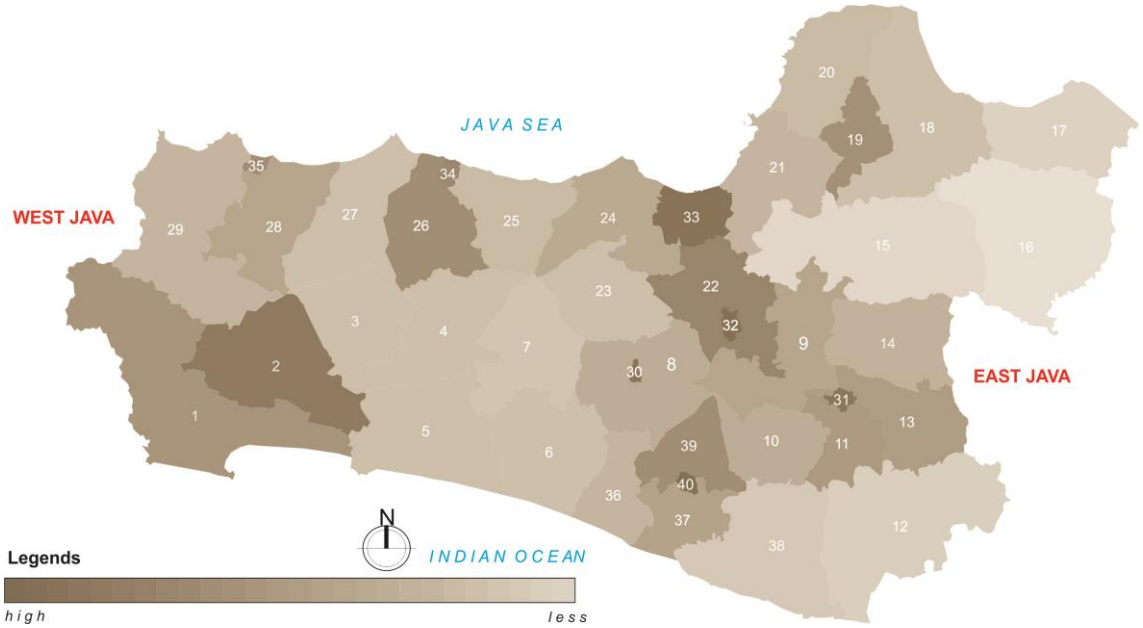


Figure 6. 9: Education level of labor

6.3.5 Innovation Policy Governance

Knowledge and innovation indeed increase competitiveness. In the absence of technological development and knowledge dissemination, an abundance of natural resources and low-wage labor (most likely be the pedestal of Indonesia's economy) cannot facilitate survival by depending only on the conventional manufacturing industry (Firmansyah, 2011). Furthermore, the predominant proportion of S&T activities is mainly funded through the Indonesian government. It is reckoned that almost 76% of total S&T expenses in Indonesia come from the government (State Ministry of Research and Technology, 2015)

As institutional development and market dynamics are codetermined, respondents argued that the government budget for research and labor education is the crucial factor for creating and using technology. According to the respondents, the allocated budget for research is spread almost equally across the regions in terms of low levels (Figure 6.10). The outcome of joint research is inevitably intangible in a short period. It may be even less than what is expected. The main reason for the low outcome of intellectual property and patents in Central Java is that incentive is lacking, despite the many universities there. It is necessary to recognize the full implication of technological research as a long-term opportunity to speed up the catch-up growth.

It is interesting that the respondents placed the infrastructure in the next order after government spending for technological progress instead of the first rank. This may be an indication that a government presence is missing in real regional technological development.

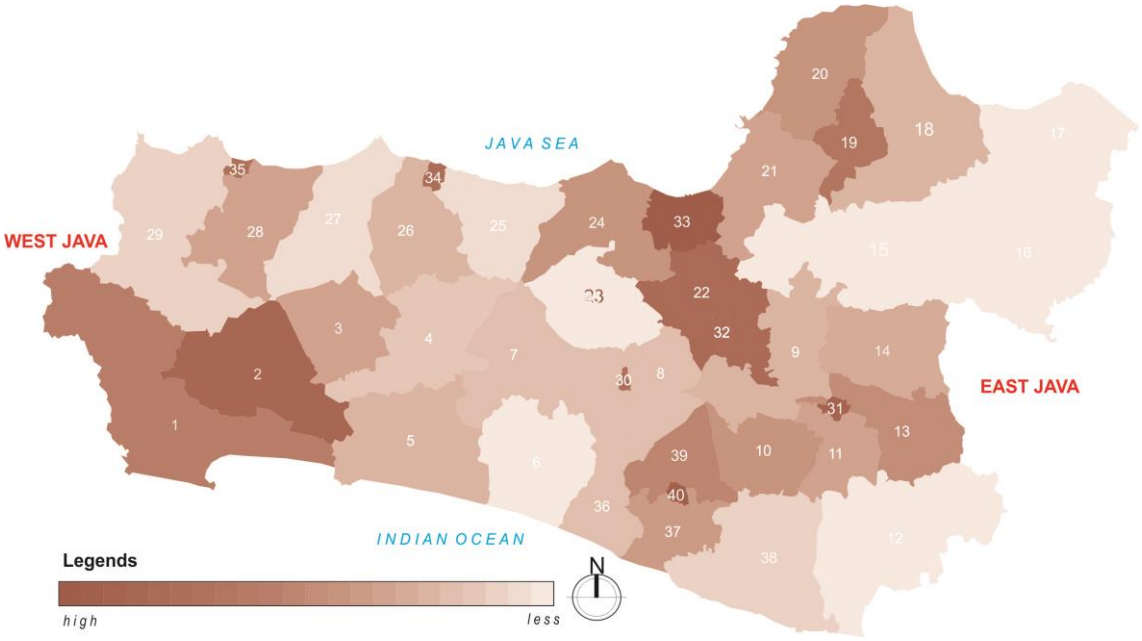


Figure 6. 10: Local government special budget for research

6.3.6 Framework Condition for Innovation

In Indonesia, the government plays the sole role in providing regional infrastructure for the public. The framework for innovation, Internet and electricity are important in assisting the dissemination and absorption of knowledge. Its availability and diffusion in regions stimulate technological capabilities, up-to-date information and knowledge. The study about the efficiency and effectiveness of technology in ASEAN countries by Chien et al. (2011) revealed that a variety of Information and Communication Technologies (ICTs) is principally advantageous to technology efficiency.

The application of information and communication technologies (ICTs) can promote innovation productivity and output. ICTs create efficiency gains that deliver certain resources for operations elsewhere. Empirical studies argue that there is a positive link between increased adoption and use of ICTs and regional economic performance (OECD, 2012).

An insurmountable barrier is a geographical feature such as mountains. According to the stakeholders, Internet connections are facilitated mostly in urban regions (Figure 6.11), and the continuous electricity supply (figure 6.12) is assured and equal among regions particularly in the north.

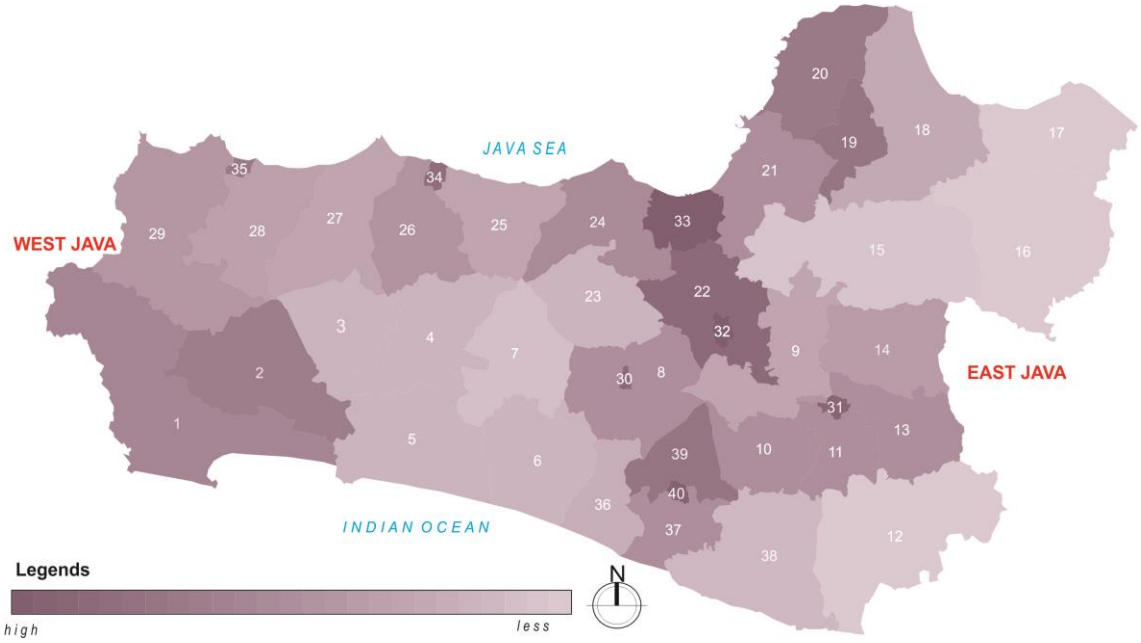


Figure 6. 11: Internet connection

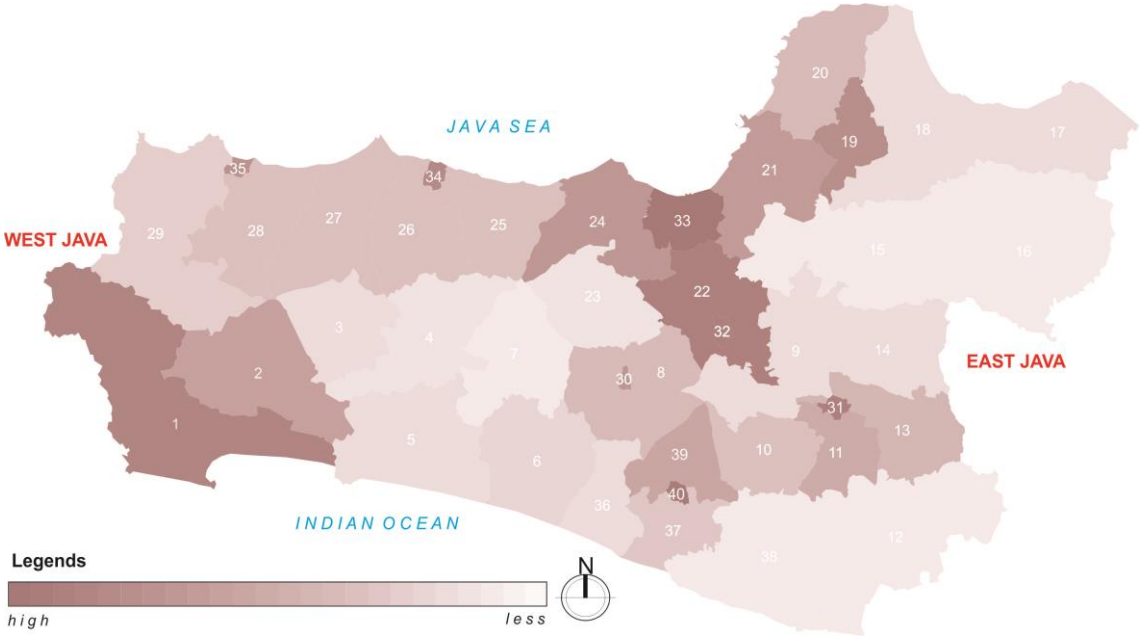


Figure 6. 12: Electricity supply

6.3.7 Speed, Sequencing and Catch-Up Growth

It is noteworthy that most of the north respondents argued that the growth in the north is at higher rates than in other regions and has potential to diffuse to the surrounding areas. Meanwhile most of the south respondents opposed that argument. The orientation development in the south region is largely towards

Yogyakarta instead of the north. The pattern shows the high growth and the tendency to catch up is in the cluster Semarang-Solo and Yogyakarta.

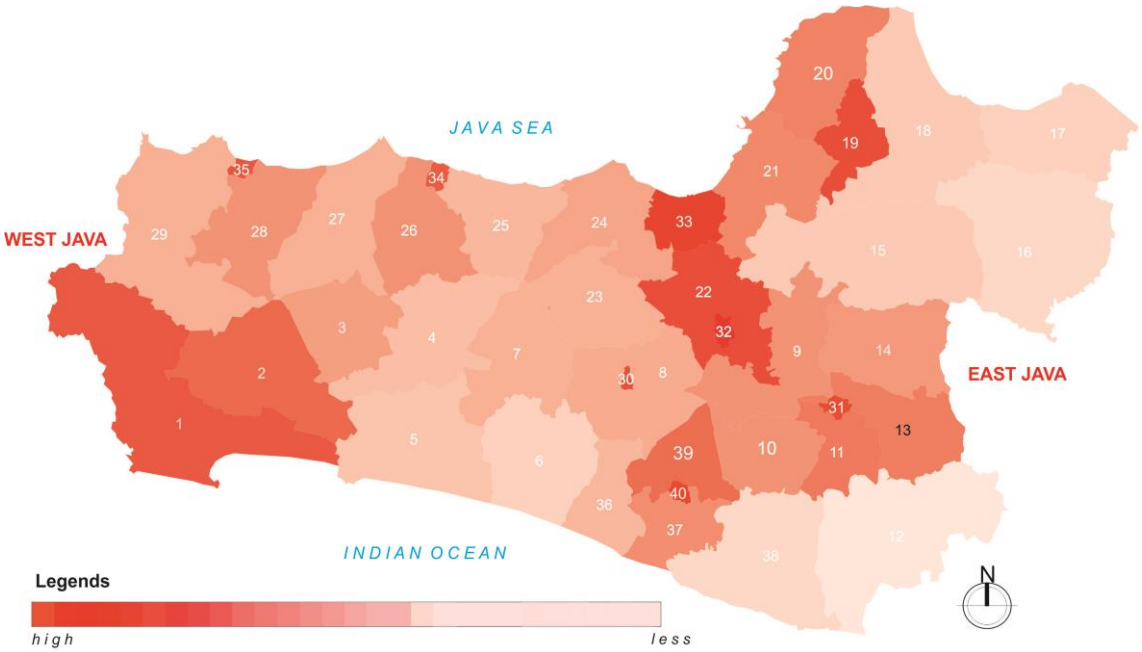


Figure 6. 13: The highest technology level

6.3.8 Technological Capabilities, Investment and Regional Growth

A complete understanding of technology-transfer practices and creating innovation between policymakers and firms is what encourages foreign companies to develop more effective technology transfer agreements with Central Java manufacturing companies. Figure 6.14 shows that the best places to invest are mostly the regions where channel knowledge and technology are developed. Figure 6.13 and Figure 6.14 are very much alike in pattern. The dark color is mostly clustered in urban regions such in the cluster of Semarang City-33, the cluster Surakarta-31, the cluster of Yogyakarta (40) and other industry-based regions such as Kudus-19 and Cilacap-1. These regions are the manifestation of openness to trade, direct foreign investment, technology licensing and migration.

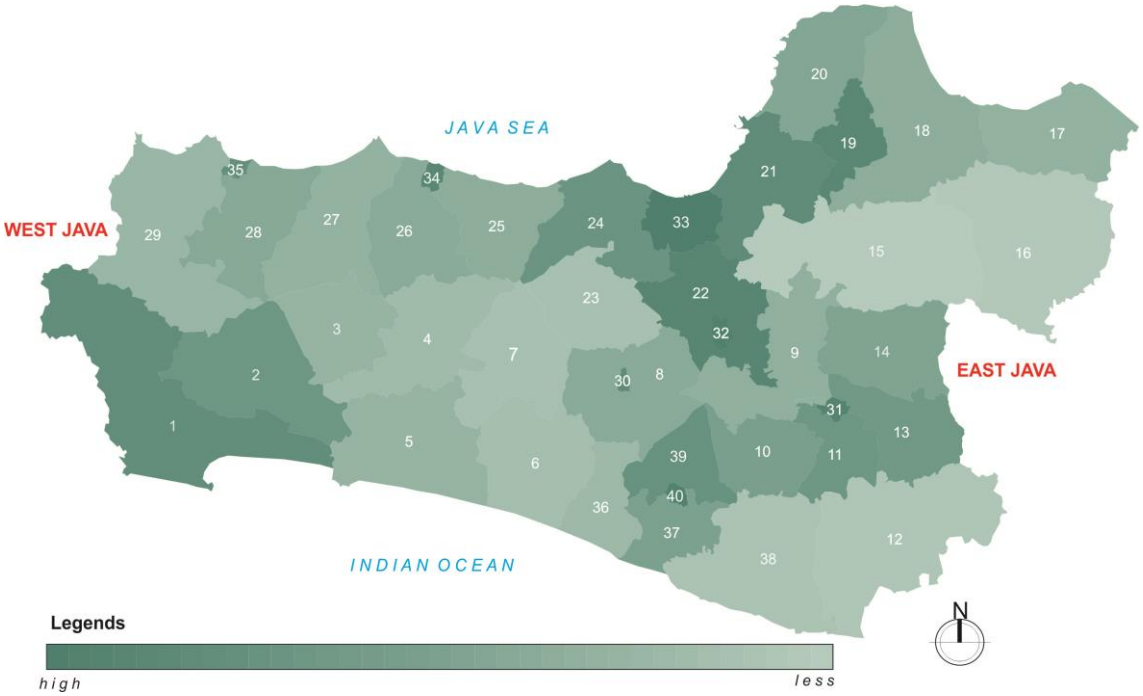


Figure 6. 14: The best place to invest

6.4 Conclusion

In chapter six, the discussion is divided into two parts. The first part establishes the regional classification as measured by GDP, and the second part demonstrates the limited evidence of the convergence process in σ Convergence and ß Convergence. This study indicates a slow catching up process and failed to disclose the division of the north, middle and south corridors.

The 5-year classifications show that the regional pattern strategy is to adhere to the growth pole-hinterland concept of economic growth. Somehow, the growth poles of Semarang, Solo and Yogykarta diffused toward each other and into one giant cluster along one line from north to middle to south. This pattern is in accordance with the technological capabilities pattern that resulted from the experts-interviews. It was said that once it generated in a certain region, it was expected to have self–sustained growth. However, the pole could not spread the growth to lower order cities behind the hinterlands. Proximity and lack of direct access to the pole have been responsible for that.

Technological change is necessary to push forward convergence by substituting capital and labor. It speeds up growth and promotes output. Lack of data on technology at regional levels causes a limited analysis of facts. The technology level in this study was obtained through the expert-interviews in 40 regions. This new methodology has been developed to collect the primary data for technological capabilities. Eventually, the result shows a consistency pattern as growth pole-hinterland linkage. It negates the spatial pattern of north-south corridor.

7 Spatial Development Pattern

Based on this statistical and empirical study, the spatial pattern is no longer about North-Middle-South differentiation but more about growth centers and their hinterlands. At first glance, the empirical implementation shows what seems like surprising result. However, these results are not surprising if we recall the theoretical model of growth center theory. The typology is more or less similar to the first sugar-growing areas in the Dutch colonial period. Those areas were mostly what evolved into the urban centers of today.

7.1 Regional Typology in Regional Cluster Analysis

Cluster analysis is a multivariate statistical approach for grouping similar data. This analysis was applied in creating regional typology, which is underlying with related economic, political and social variables. The variables are eventually classified into groups based on their similarities. This clustering was used to perform the most likely cluster in Central Java and Yogyakarta based on multi-variables at once. The variables were compared with all possible algorithms and all possible distance measurements.

After comparing the methods within cluster analysis, the best method for the purpose of this study was the Ward's hierarchical method, with its squared Euclidian distance to determine how close or how far cases in the cluster from each other. The z-score was used as the standardization method on the differences unit of variables. Z-scores measure each value of variable Xi against the mean of variable X, and then the result is divided by the standard deviation of each variable σ. The equation was as follows:

$$Z = (X_i - X)/\sigma$$

In the next step, to assess the variables, the Z-score examined the multicolinearity of the variables. However, after performing several cluster analyses, there was instability in the solution because of different cluster methods and different variable sorting[1]. Therefore, the assessment and selection of variables before performing analysis was necessary in order to build robust and conclusive indicators.

7.2 Assesment of the Variables

A reliable cluster is a cluster that has homogeneity within-cluster and heterogeneity between-cluster. Thus, the first relevant step in assessment of the variables involved a matrix correlation to minimize multicolinearity. It was inevitable that many variables initially analyzed were related to each other. For example, the GDP of industry or agriculture may be highly related to the number of employees in those sectors.

Initially there were seventeen variables to examine. However, in Yogyakarta province, the data of school enrollment and Gini Indices were unavailable. Among the chosen variables, multicollinearity was not found either. The variables were density, income growth, income per capita, GRDP, GRDP growth, primary sector, secondary sector, tertiary sector, fiscal capacity, government budget for infrastructure and education, and employment in agriculture, industry and trade (Table 7.1). These variables determine the

[1] Only in Single linkage method, the variable sorting does not affect the final cluster solution.

region type based on the regional growth process and represented by socio-economic-political typology in Central Java and Yogyakarta provinces.

Table 7. 1 Socio-Economic-Political Variables to explain the performance of the regional typology.

	Social	Economic	Politic
Static	- Density - School Enrollment (Failed)* - Gini Index (Failed)*	- Income per capita (rupiah) - GRDP (rupiah) - Contribution of Agriculture to the GRDP (%) - Contribution of Industry Manufacture to the GRDP (%) - Contribution of Service Sector to the GRDP (%) - Proportion of employment engaged in Agriculture sector (%) - Proportion of employment engaged in Industry Manufacture sector (%) - Proportion of employment engaged in Service Sector	- Fiscal Capacity of sub-national government in performing public goods and service (%) - Proportion of Government expenditure for Infrastructure in Total Spending (%) - Proportion of Government expenditure for Education in Total Spending (%)
Dynamic		- Growth of income per capita (%) - Growth of GRDP (%)	

7.3 Cluster and Dendrogam Interpretation: Growth Pole – Hinterland Relations

From examination of the Dendogram, four main groups were identified (Figure 7.1 and Figure 7.2). First, three regencies were classified as advanced regions in region type 1. They were mainly characterized by relatively high proportional growth of GRDP (> 5 %) with high income per capita (> Rp.9 million). Manufacturing is the dominant activity in these three regions; Semarang (no.33), Kudus (no.19), and Cilacap (no.1). Although Kudus and Cilacap do not have *kota* (city) status and are instead rural-urban areas with relatively low density, their growth has exceeded other major cities such as Yogyakarta (no.40) and Surakarta (no.40) as urban areas. As the central government set the budget ratio for education at 20% of the total expenditures, the ratio of education in this cluster was between 19%-21.5%. On the other hand, the ratio of infrastructure budget from the total expenditure was 14%-17.31%. However, with high per-capita income and economic growth, the fiscal capacity to provide public goods and services in this cluster were considerably varied between 28%-49%, with Semarang City being the highest.

In cluster region type 2, six cities were identified as progressive regions. All regions in this cluster are cities, which are mainly recognized as urban areas. They are mainly characterized by relatively high density (>2500 people/km^2). Yogyakarta (no.40) and Surakarta (no. 30) are classified as urban with 12,658 people per km^2 and 11,624 people per km^2, respectively. In fact, as the provincial capital, the density in Semarang was far below both regions at 3,675 people per km^2. The dominant economic activities in this cluster are mainly non-agricultural. For fiscal capacity and total expenditure in education and infrastructure, the ratios were similar, between 28%-40% for fiscal capacity, for which Yogyakarta was the highest ratio, 16%-20% for education, and 15%-18% for infrastructure.

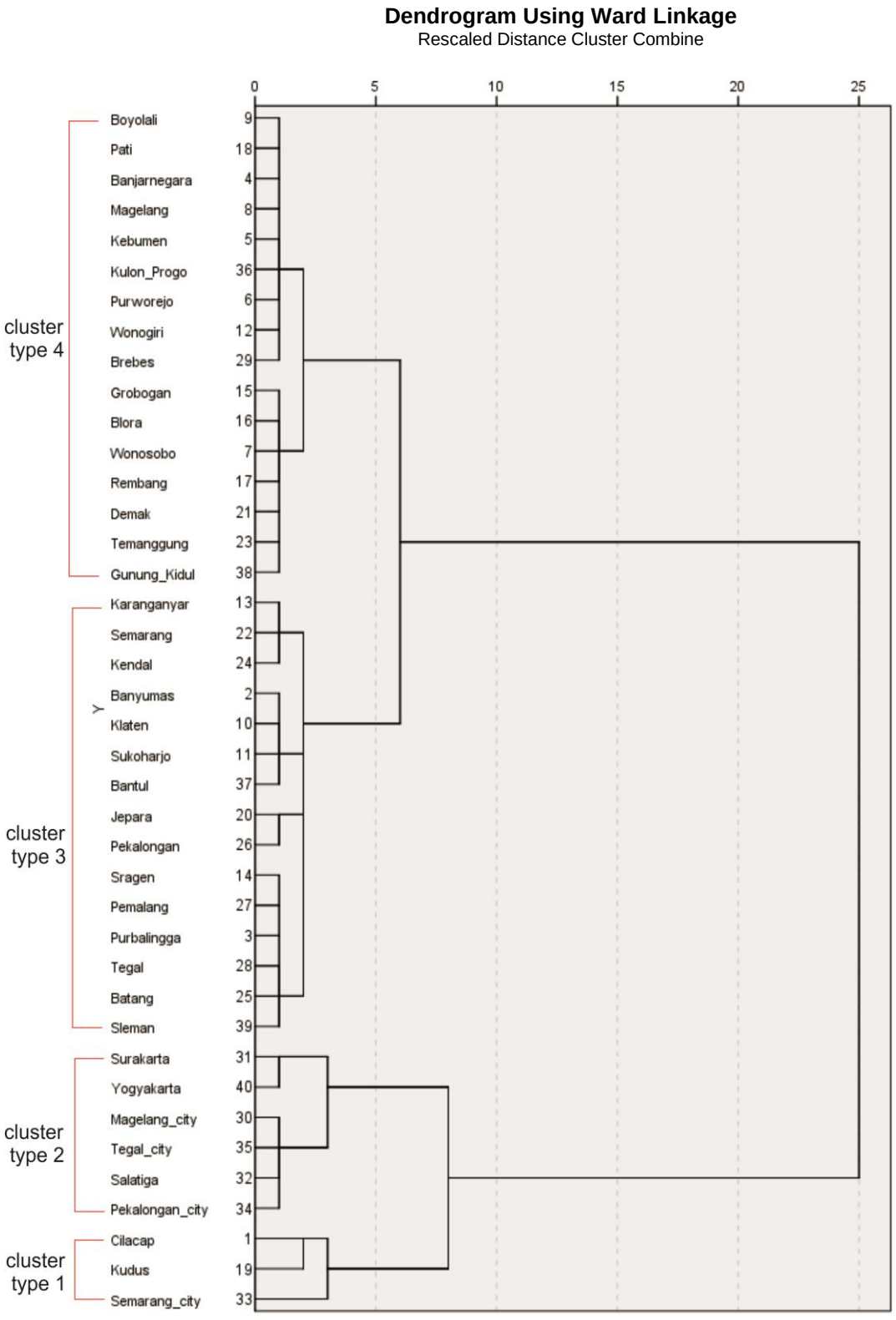


Figure 7. 1: Cluster of Regions

There were fifteen regions identified as the cluster type 3. These regions were recognized as developing areas. They are mainly located in the surroundings of the urban areas and are considered suburban areas. Dominance was found to be relatively equal between the primary and secondary sectors. However, in some regions such as Sukoharjo (no.11), Kendal (no.24), Semarang (no.22) and Karanganyar (no.13) that are adjoined to urban areas, the dominant sector was frequently the non-agricultural sector. Although the regional financial capacity to provide public responsibilities was less than other clusters at 17%-29%, the government investment for education was 21%-27%, which is higher than the previous cluster. However, the expenditure for infrastructure was slightly less than the previous cluster at 12%-16%.

In the last cluster, thirteen regencies were identified as slow growth regions with relatively low economic growth (>1,8%) and income per capita (>Rp1,8 million). In turn, their fiscal capacity is poor for providing public goods and services (12%-15%). In education expenditure, the proportion was relatively high at 22%-27%. That is a considerably high ratio compared to other clusters. For infrastructure investment, the ratio is relatively poor at 12%-15% of the total expenditure. However, the regions in this cluster are mostly located a significant distance away from the closest growth-centers (see cluster type 1) and in mountainous regions.

The concept of cities performing as growth centers creates a backwash effect on rural areas, something expected to occur only in the early stages of development. As regions mature, it is expected that development will naturally spread to the hinterlands, reversing the dominant polarization process. However, the cluster follows the traditional path of trade path from inland/principality to the coastal areas. This can be identified in the cluster group from Yogyakarta (40) to Solo (31) inland continuing to Semarang (33), Pekalongan City (34) and Tegal City (35) on the coast. This path can be described as tracing the impact of modernization on the formation of the growth center. This was highly correlated to the nature of structural transformation in each region leading to the particular feature of urban-rural interface in Central Java and Yogyakarta. Another path was the line from Cilacap (1), which acts as the growth center, to the north coast. Eventually the economic activity of both paths became dominated by manufacturing industries.

There are perceptible cluster group interlinks in the south-north-south formed growth center to its hinterland (Figure 7.2). The imaginary lines pass through regency no. 1 (Cilacap), urban no. 35 (Tegal City), no. 34 (Pekalongan City), no. 33 (Semarang City as the provincial capital) and no. 32 (Salatiga City). It then continues to urban no. 31 (Surakarta) and ends in urban no. 40 (Yogyakarta City). These regions were grouped in clusters type 1 and 2 as advanced and progressive regions. Over time, the regions surrounding the urban areas were characterized as rural-urban areas because of the coexistence of agriculture and non-agriculture industries.

Clusters type 3 and 4 had low capacities for providing public responsibilities to their regions. This depended solely on intergovernmental transfers to cover their expenditures. Although the economic growth was not as high as the clusters type 1 and 2, which also had a higher capacity for providing public goods and services, the education spending in clusters 3 and 4 was higher than the other clusters. This was probably because clusters 1 and 2 prioritized infrastructure expenditure spending. Clusters type 3 and 4 were trying to boost their regional development through educational improvements.

In sum, what made a clear difference between the four cluster types was distinguishing regions of agriculture from manufacturing regions. The urban areas eventually functioned as center, creating extended urban areas with non-agricultural sectors as their economic base and spreading out growth toward its surroundings. Hinterlands also gain overflow growth when the center’s growth diffuses. In this case, the proximity to the pole is crucial. The farther from the pole, the slower the diffusion process became. Nonetheless, this cluster analysis shows that disparity between the north and south was not a definite result. As Figure 7.2 shows, the regional typology based on cluster analysis and technological perception patterns seem to establish a more consistent system of classification.

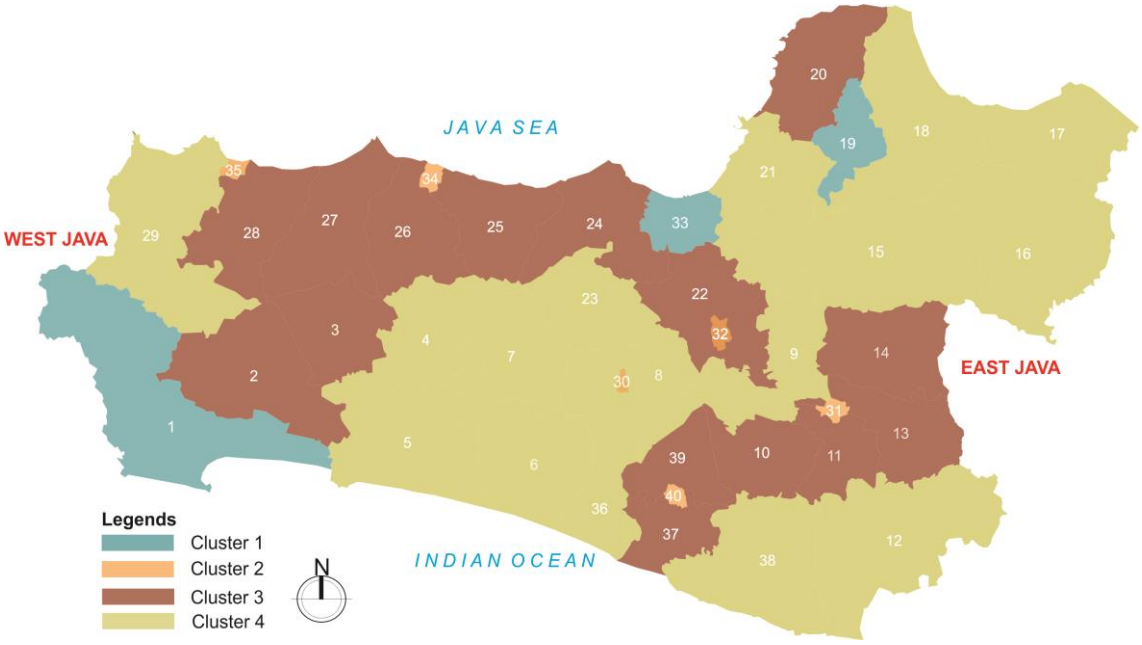


Figure 7. 2: Regional typology pattern based on Dandrogram of Cluster Solution

The cluster solution shows that typology was formed on at least two different paths. The first path is described as industrialization from the higher regional hierarchy, in which the transformation takes place as part of a radial effect from the growth center to its surroundings (Semarang-Surakarta-Yogyakarta). The second path could be explained as industrialization from the lower regional hierarchy, in which industrialization might occur far from the urban areas (e.g Kudus no. 19 and Cilacap no. 1). However, combinations of typical urban and rural activities have resulted in an increase of certain features of structural transformation.

As several patterns and typologies were simulated by this research, it did not clearly result in the classification of north-middle-south regional distinctions. The north-south disparity had either actually occurred in a sustained manner for decades since colonialism or it was a deep-rooted assumption surviving as a long-term belief on behalf of the people in Central Java and Yogyakarta.

8 Some Lessons from Central Java and Yogyakarta for Future Study

8.1 Recognizing the Spatial Pattern and Disparity: An Overview

This study shows how urban patterns formed over time and why sometimes they were altered, as they were in north coast and south central part of Java during pre-colonialism, colonialism and post colonialism.

Most of the ancient principalities in Central Java and Yogyakarta were located away from the sea and oriented in the river valley for rice-based production. However, under Dutch colonial rule, the urban pattern changed in favor of coastal areas with economic interests. The port cities in Central Java gained importance for international trade. They witnessed and experienced urban growth along with tension and competition between port cities and the principalities in inland (Surakarta) and in south-central court (Yogyakarta). Urban growth brought new functions for cities such as markets for the outlet and inlet of agricultural products from inland. The northeast coastal region in Central Java served as a major economic center and social change leader back then. The shifting function of inland regions from centers to merely hinterlands led to changes in socio-economic differences. Urban growth is no longer oriented toward the south-central court but toward the outside world via the north coast. On the other hand, Dutch colonial rule formed a clearly distinctive north – south pattern with the establishment of the northeast coastal province (*pasisir*) and inland regions (*kejawen*). The proximity had far-reaching effects in regional development. Subsequently, the mobility infrastructure was built to reduce the distance. The Great Mail Road connecting Jakarta-Surabaya changed the orientation completely regarding orthagonality and the cosmos of Java's urban development. The railway system connecting the north port cities to the agricultural south was the complementary infrastructure of regional development for transporting goods and people.

Since then, Java has been modernizing yet at the same time, traditional agricultural regions persisted so regional differences were initiated. However, the spatial contest between north-middle-south regions recurred over time. Therefore, the assumption of disparity between the north and south rooted itself in people's minds. As a result of this study, in the sense of regional economic growth, the actual fragmentation process shows a different spatial development pattern. The empirical evidence simply reveals a common awareness of the need for proximity to the urban center or growth pole. For this reason, the assumption of north-middle-south disparity in Central Java and Yogyakarta is not sustained with the objective assessment of the statistical data and empirical data. The impact of that deep-rooted assumption eventual misleads the aim of regional development.

In regards to socio-economic differences, inherent specialization, particularly in agriculture and non-agriculture industries actualizes only when there are mutual needs and interests. The structural changes in the north, middle and south corridors more or less indicate regional specializations rather than disparity patterns. Thus, it is not directly proportional to per-capita income and economic growth. Using LQ, specialization indicates that the north region has been specialized in non-agriculture forms similar to modern the manufacturing industry, the middle has a mix of economic bases and the south is the most profitable with its fertile soil and mainly agrarian economy. Structural change is recognized as the initial

indication of urbanization and regional growth differences leading to disparity. It is indicated with labor movement from traditional agriculture to modern manufacturing. Changes in employment structure increase in urban centers and their peripheries. It is presumably a result of commuting urban workers and 'spillover effects' because various enterprises concentrate in urban centers and then later relocate to outside city boundaries. In-migrants may directly influence productivity growth in several way as part of the mobile capital effect. However, this study did not comprise the labor mobilization from traditional rural to modern urban and in-out migration due to lack of data available at the regional level.

Industrial manufacturing in developing countries has developed in different ways than developed countries. The initial manufacturing industry in Indonesia was related to agricultural goods. It was sugar manufacturing during Java's colonial period. The food processing industries mostly employ local labor using local raw materials. In this study, the transformation process does not include the informal sector and small medium enterprises (SMEs) due to inadequate data on the regional level even though they play significant roles in Indonesia's economic growth. The informal sector contributes to the development of urban economic growth and supports the formal sector in Indonesia by circulating its output to the lowest level community and absorbing a great amount of labor.

As dualism economic occur, the differentiation of modern industrial city as the urban growth pole and its surrounding as the agriculture hinterland creates the imbalance development. Growth pole concept offers the spreading effect from the pole to its hinterland and the hinterland gains an increase growth from overflow growth of the pole. The spread effects or polarization from the pole, in some cases nevertheless, is effective for its surroundings, which have direct access to the pole. However, the regions that are located away from the pole was not affected with the overflow growth from the pole. Consequently, the convergence growth may occur in some affected region but in general, the divergence takes place. As urban-hinterland intertwine, the finding show that growth pole-hinterland pattern arises. There are several dominant clusters comprising growth pole and its hinterland in Central Java and Yogyakarta. Each cluster connects to each other formed corridor in such a giant cluster in Yogyakarta-Surakarta-Semarang linkage with interplay connection. However, this study do not include the degree of urban diffusion in form of inner-ring and outer-ring establishment. Inner ring refer to the core area within the urban area indicated with high urbanization and industrialization, whereas, the outer ring express the newly developed regions.

Lastly, the regional growth is accelerated dynamically corresponding to the speed of global economic changes and political transformation. However, the growth speed in each region is frequently different. The findings shows that manufacture region generally has immediate responding to the changes compare to the agriculture region, which experienced a delayed growth for relatively long term due to existence of great subsistence structures. It is a fundamental fact that in dualism economic, the regional growth moves toward greater disparity. This difference creates imbalance development among regions. The basic fact that each region is difference points out that observing and analyzing regional development in traditional way such natural, political or particular spatial categories based on the underlying homogeneity unit hypothesis is not relevant anymore. It turn out that finding show different cluster based on the socio-economic and politic variables. Thus, the regional differentiation must be based on the actual clusters, which comprises of the spatial units on similar structures yet different spatial processes. Consequently, the corresponding of government planning supposedly responses on the actual regional differentiation based on statistical data and the expert advice in order to diminish the negative effects of crises, globalized world and urban bias resulting of pro-urban development. This is the starting points, which can be derived for exemplifying concretely that the generalization of spatial homogeneity is not compatible approach anymore.

8.2 Grappling with an Old Issue: Appropriate Methodology for Better Approach

Statistical Data and Empirical Approach. This study uses two kind of manner to identify the north-middle-south differences as the urban growth pattern based on regional differences of socio-economic-politic significance. Firstly, by using statistical significance using secondary data for quantitative methods and secondly by collecting the data for empirical evidence. This method has beneficial in comparing the findings in both statistical and empirical evidence. The most challenge overall in this study was to gather the proper data. The complete statistical data is important for performing the ideal research but incomplete data has been continually confronted in many studies. Despite all the shortcomings of statistical data deficiency, there are possible ways to obtain the data from other methods in different angles.

While these are well-researched issues, two factors motivate empirical evidence due to certain limitations in studying regional disparity by depending solely on traditional context. First, the statistical data has problems, particularly in its application to convergence and divergence models developed and applied in Europe and North America. The representing data of technological capabilities for convergence assessment in Central Java on the regional level is rather arguable. For that, this study re-examined the proper method with more comprehensive aspects on related issues. Secondly and more importantly, these combinations of statistical significance and empirical evidence allow us to look at the issues in new ways. We are able to utilize data on the convergence process as a proxy for the urban growth pattern. This study emphasized identification, categorization and representation of information in a way that better illustrates disparity and urban growth patterns. It is about measuring disparity and its patterns in several dimensions by way of two methodologies.

Deficiency Data in Regional Level. In the assessment of disparity, technological progress is the significant variable for determining whether growth moves toward convergence or divergence. However, several variables that are frequently used to represent technology were viewed as debatable. Many studies have utilized education level of the population to serve as the technological change in a giving region. Based on empirical evidence, higher education is not directly proportional to the high-level technology. Technology progress or change should be distinguished from the concepts related to an individual's educational achievements which may include education levels or an individual's actual knowledge, skills and competencies (e.g. levels of literacy and numeracy) standardized by testing during school years. On the other side, technological change is the overall process of technological improvement through invention, innovation, developing and the diffusion process involving commercialization, producing and continual technology via foreign or domestic R&D such as university or government/private research institutions. On this point, some scholars suggest that the most appropriate data should be about how many technologies have been innovated which is eventually reflected in the number of patents in certain regions. However, in Indonesia, it is hard to find patent data even on the national level. Moreover, it is not available at all on the regional level.

Another consideration is that the patent data to some degree could not identify clearly the technological progress in a given region because technological change is mainly related to how the technology diffuses through society and industry. The spread of technology can only be qualified not quantified with statistical data. From this standpoint, a new approach was developed. It thoroughly emphasizes the societal and industrial perspectives. The new approach provides a rich, detailed description that considers society's reflections about technological change and technology diffusion. However, it is important to be aware of the advantages and disadvantages of this new approach as this may influence the final results of the data collection.

The advantage and limitation. This approach is well-suited method for the comparative inter-regions studies supported with well-selected expert in each related regions. As this approach is relatively new method, it requires careful analysis of the type of information given by the experts. Thus, some advantages and limitation should be recognized and confronted.

The advantages are mostly about gaining breadth and depth of understanding and corroboration from the other data sources by approaching it from different points of view using different methods and techniques due to inadequate data. In this approach, there is a real value in making ideas explicit and understandable because by collecting data, the observer has to make person-to-person contact with the selected experts. As this research included multiple regions, it was extremely useful to be able to compose information from diverse sources in order to understand thoroughly the existing issues in each region. The reflections of experts ensured this study's findings were grounded in participants' experiences. This approach provided methodological flexibility in the main study design, such as observational studies, randomized controlled trials and structured rank to elucidate more information and comprehensive data. The perception was quantified with a standardized survey instrument. In this context, standardization was challenging so it was necessary for the instruments to be more adaptive. The scale and structured rank was initially problematic because of information complexity. As the main task was to order the rank, experts had diverse perspectives about order and hierarchy of cities/ regencies.

However, as this approach is a distinguish method, it required careful planning to describe all aspects of research, including choosing which experts were compatible with the methods and the aims of the study. It was most important to avoid bias. Thus, the selection of experts was an extremely important stage because there was a strong possibility of different results if the wrong experts were chosen. Finding the correct experts who are both comfortable and willing to undertake the assessment can be challenging in many environments. Given that, this approach must adhere to its standard for rigor, ensuring appropriate quality of each expert's assessment, which can be difficult. Thus, this approach is labor-intensive and time-consuming with high resources needs because of the complexity of the process.

At last, this methodology was a suitable approach for obtaining data and knowing the actual information from direct sources. It reflects public perceptions about a given subject. It is true that the empirical approach has problems, but at least it involves the assessment of actual actors from the region. It therefore appears to be the most methodologically secure way to work in a multi-method way in order to bring the results together. This is for me the methodical yield of this study.

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Appendixes

1. Number of People and Regional Growth in Central Java and Yogyakarta

	Area		Annual Growth**		Economic Growth ***	
	(Km^2)	(%)*	1990-2000	2000-2010	1990-2000	2000-2010
Central Java Province						
North						
Rembang	1.014,10	3,11	1,19	0,65	3,46	4,28
Pati	1.491,20	4,58	0,72	0,40	2,75	3,28
Kudus	425,19	1,30	1,45	1,05	5,50	4,51
Jepara	1.004,16	3,08	2,19	1,32	4,65	4,30
Demak	897,43	2,75	2,13	0,94	3,49	3,60
Kendal	1.002,27	3,08	0,84	0,64	4,12	3,72
Batang	788,95	2,42	1,28	0,71	3,18	2,93
Pekalongan	836,13	2,57	1,43	0,54	3,86	3,81
Pemalang	1.011,90	3,11	1,53	-0,07	4,05	4,03
Tegal	879,70	2,70	1,52	0,13	4,20	5,04
Brebes	1.657,73	5,09	1,73	0,26	4,85	4,96
Semarang c.	373,67	1,15	1,69	1,49	5,87	5,07
Pekalongan c	44,96	0,14	2,65	0,80	4,60	4,00
Tegal c.	34,49	0,11	0,91	0,26	4,84	5,42
Middle						
Purbalingga	777,65	2,39	0,43	0,21	3,92	4,44
Banjarnegara	1.069,74	3,28	0,83	1,28	3,24	3,38
Wonosobo	984,68	3,02	0,91	0,33	3,31	2,51
Magelang	1.085,73	3,33	0,80	0,79	3,96	4,27
Boyolali	1.015,07	3,12	0,27	0,44	3,17	4,04
Klaten	655,56	2,01	-0,60	0,20	3,38	3,83
Sukoharjo	466,66	1,43	1,03	0,70	4,57	4,22
Karanganyar	772,20	2,37	0,70	0,75	5,25	5,28
Sragen	946,49	2,90	-0,19	0,16	3,94	4,69
Grobogan	1.975,85	6,06	0,72	0,40	2,23	5,05
Blora	1.794,40	5,51	0,77	0,26	2,91	3,84
Semarang	981,95	3,01	0,74	1,19	5,21	4,16
Temanggung	870,23	2,67	0,89	0,71	3,77	3,75
Magelang c.	18,12	0,06	-0,11	0,18	4,59	4,18
Surakarta c.	44,03	0,14	-0,55	0,23	5,92	5,37
Salatiga c.	52,96	0,16	5,52	1,32	4,77	4,64
South						
Cilacap	2.142,59	6,58	1,03	0,25	5,66	5,54
Banyumas	1.327,59	4,07	0,71	0,72	3,86	4,54
Kebumen	1.282,74	3,94	0,11	-0,02	2,99	3,54
Purworejo	1.034,82	3,18	-0,26	-0,13	3,88	4,58
Wonogiri	1.822,35	5,59	-0,57	-0,40	3,72	3,75
Yogyakarta Province						
Middle						
Sleman	574,82	18,04	1,44	3,37	4,87	4,70
Yogyakarta c.	32,50	1,02	-0,38	-0,21	4,61	4,51
South						
Bantul	506,85	15,91	1,14	1,55	4,12	4,26
Kulon Progo	586,27	18,40	-0,04	0,47	2,31	3,92
GunungKidul	1485,36	46,62	0,29	0,07	3,57	3,72

*ratio per province

**calculated as: $\left[\left(\frac{1}{n}\right)\ln\left(\frac{P_{t+n}}{P_t}\right)\right] x\ 100$; where n = number of year between years t and year $t+n$. Population data come from National census 1900, 2000, 2010

***10 years growth rate is the average growth rate which is calculated per year as: $[(GDRP_t - GDRP_{t-1})/GDRP_{t-1}]\ x\ 100\%$,

2. The Questionnaire consists of eight question and seven map supplements in A2 format. In this appendix, the map format is adjusted to the size of this paper (A4)

Karlsruhe Institute of Technology

Questionnaire

Identifikasi Perkembangan Teknologi

The Identification of Technology Development

Di Jawa Tengah dan Yogyakarta

In Central Java and Yogyakarta

Kode Kuesioner *Questionnaire Code*	: TECH- ☐☐☐	Kode Surveyor *Surveyor Code*	: ☐
Tanggal Interview *Interview Date*	:	Kode Peneliti *Researcher Code*	: ☐
Kode ID Responden *ID Respondent Code*	: ☐	Kode Entri Data *Entry Date Code*	: ☐

Pendahuluan

Tujuan utama dari survey ini adalah untuk mengukur tingkat teknologi di daerah Jawa Tengah dan Yogyakarta. Survey ini merupakan bagian dari penelitian disertasi yang berjudul Kesenjangan spasial antara koridor utara dan selatan pada bagian tengah pulau Jawa (Jawa Tengah dan Yogyakarta). Informasi yang dikumpulkan dari survey ini adalah untuk mengidentifikasi dan menguji apakah perkembangan ekonomi di Jawa Tengah dan Yogyakarta mengalami konvergensi. Kegunaan perhitungan konvergensi ini adalah mengitung tingkat dispersi nilai pertumbuhan output dan mengetahui faktor-faktor yang mempengaruhi tingkat konvergenitas. Analisis ini juga akan mengungkapkan bagaimana distribusi pendapatan di seluruh wilayah dari waktu ke waktu terjadi.

Jumlah wilayah yang akan dievaluasi adalah 40 kabupaten dan kota. Jawa Tengah terdiri dari 30 kabupaten dan 5 kota dan Yogyakarta terdiri dari 4 kabupaten dan 1 kota.
Sebelum menjawab pertanyaan, dimohon membaca instruksi pengerjaannya dengan seksama. Pastikan anda sudah memahami dengan baik sebelum mengisi lembar pertanyaan. Bila masih belum paham, mohon untuk bertanya kepada surveyor agar dapat dijelaskan.

Jawablah berdasarkan pengetahuan dan informasi yang anda miliki. Ini bukan merupakan tes sehingga tidak ada jawaban benar ataupun salah. Anda diwajibkan untuk menjawab semua pertanyaan yang diberikan sehingga hasilnya dapat di analisa lebih lanjut.

Kerahasiaan

Hasil survey tidak akan dipresentasikan dalam bentuk yang dapat mengidentifikasi responden. Identitas responden sepenuhnya akan **dijamin kerahasiaannya** oleh peraturan tentang Statistik yang berlaku di Indonesia

Introduction

The main purpose of this survey is to estimate the level of technology in Central Java and Yogyakarta. This survey is part of a research dissertation 'Spatial Inequality between North and South Corridor in the central part of Java Island'. The result from this questionnaire will be served to support the economic convergence analysis in Central Java and Yogyakarta. The convergence is the theory that will identify the dispersion of real per capita income that tends to narrower overtime, reveal the influenced factors also explain how the distribution of income over time across region occurred.

The total numbers of the research areas are 40 regions in Central Java and Yogyakarta. Central Java has 30 regencies and 5 cities and Yogyakarta has 4 (four) regencies and 1 (one) city.

Before answering the question, please read the instruction carefully. Make sure that you understand well before starting to fill in the questionnaire.

Answer it according to your own knowledge and information. This is not a test therefore there is no right or wrong answer. You oblige to answer the entire questionnaire so the result can be processed and analyzed.

Confidentiality

The survey results will not be presented in a form that can identify the respondents. The individual respondent data confidentiality is **fully guaranteed** due to the Statistics Regulation in Indonesia

Instruksi Pengerjaan

Kuesioner ini terdiri dari 8 (delapan) pertanyaan.
Jawablah pertanyaan-pertanyaan yang diajukan dengan menandai nomer pada peta yang telah disediakan. Berikan angka 1 (satu) untuk yang tertinggi hingga nilai yang terendah. Mohon berhati-hati dengan daerah yang memiliki nama kabupaten dan kota ataupun propinsi yang sama. Daerah-daerah tersebut adalah:

- Kota Semarang dan Kota Kabupaten
- Kota Tegal dan Kabupaten Tegal
- Kota Pekalongan dan Kabupaten Pekalongan
- Kota Magelang dan Kabupaten Magelang
- Kota Yogyakarta dan propinsi Yogyakarta

Instruction

The questionnaire is consists of eight questions.
Please answer the following question by marking number in the yellow circle on the map provided. Allocate a rank from the highest value to the lowest value. Please be careful with the regions in the same name, as follows:

- *Semarang city and Semarang regency*
- *Tegal city and Tegal regency*
- *Pekalongan city and Pekalongan regency*
- *Magelang city and Magelang regency*
- *Yogyakarta city and Yogyakarta province*

1. Teknologi adalah kombinasi antara inovasi dan pengetahuan yang didukung oleh peralatan yang dapat berupa mesin-mesin, infrastruktur dan kemampuan sumber daya manusia. Berikanlah peringkat dari yang tertinggi hingga terendah, daerah mana yang memiliki **teknologi tinggi**? (Jawablah di lingkaran kuning pada peta yang telah disediakan)

   Technology is the combination of innovation and knowledge and supported by the equipment or machinery, infrastructure in region and human skills.

   *Please rank in order of the highest to the lowest value, which city/ regency has **the highest technology level**? (Please answer it in the yellow circle on the map provided)*

2. Faktor-faktor yang mempengaruhi perkembangan teknologi suatu wilayah adalah:
   - Penelitian bersama antara industri dengan lembaga pendidikan ataupun institusi penelitian
   - Anggaran yang diberikan pemerintah untuk pengembangan penelitian dalam bidang teknologi
   - Infrastruktur untuk mendukung perkembangan teknologi
   - Kualitas sumber daya manusia dalam hal ini tingkat pendidikan

   Berdasarkan uraian diatas, berikanlah peringkat dari yang terpenting pada faktor-faktor tersebut di tabel berikut ini:

Penelitian bersama dalam bidang Teknologi	
Anggaran Pemerintah di bidang Teknologi	
Infrastruktur untuk Teknologi	
Tingkat pendidikan Pekerja	

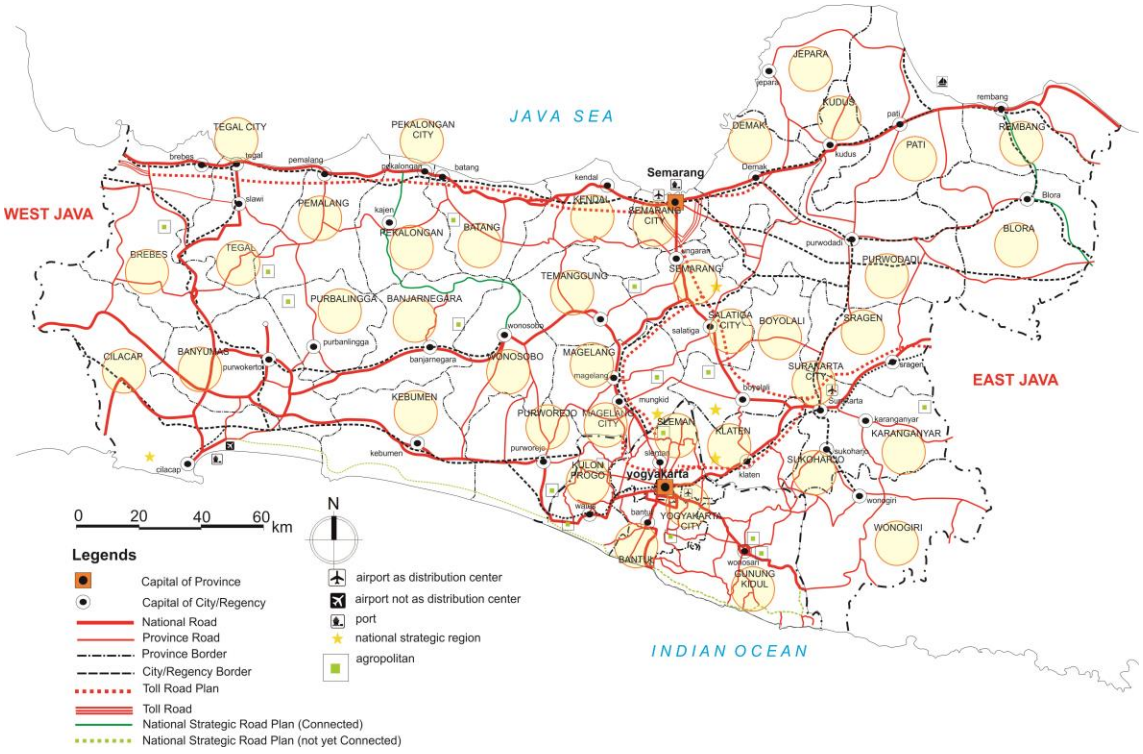
The development of Technology in a region is generated by several factors, as follows:
- *Joint research between Industry and academic institution.*
- *Government budget for research development in Technology.*
- *Infrastructure*
- *The quality of human resources in term of education*

Please rank in order of the most important factors that generate technology development in region:

Joint Research in Technology development	
Government Budget in Technology development	
Technological Infrastructure	
Level Education of Labor	

3. Teknologi adalah hasil dari perkembangan penelitian. Dalam rangka untuk memperluas teknologi sebagai pondasi dari perkembangan ekonomi regional, dibutuhkan kerjasama antara institusi akademik yaitu Perguruan Tinggi dan Lembaga penelitian dengan Industri. Berikanlah peringkat dari yang tertinggi hingga terendah, daerah mana yang memiliki **penelitian bersama yang signifikan dalam bidang teknologi** antara institusi akademik dan industri?

   Technology comes from the result of research development. In order to expand the technology as the foundation of regional economic development, the joint research between academic institutions and industry is substantially set up.
   Please rank in order of the highest to the lowest value, which areas have the most significance ***technological joint research*** *between academic institutions and industry?*

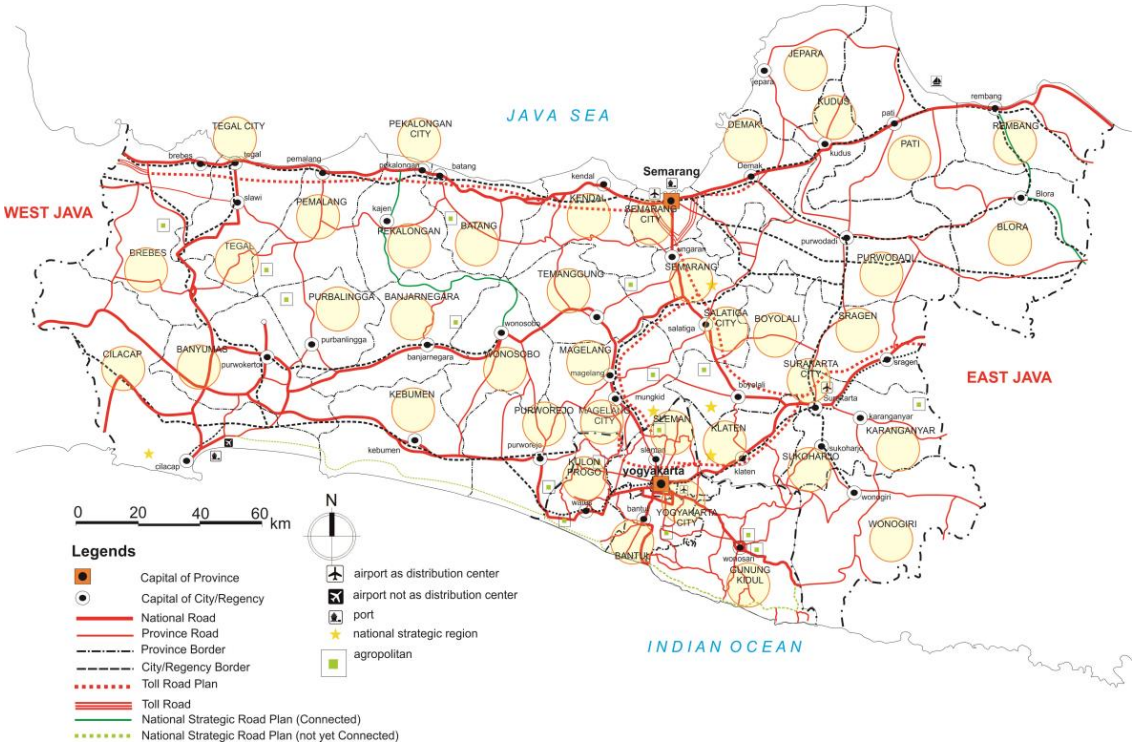


4. Pemerintah daerah perlu menganggarkan biaya untuk pengembangan penelitan di bidang teknologi sebagai salah satu bentuk investasi di masa depan.

   Berikanlah peringkat dari yang tertinggi hingga terendah, daerah mana yang menginvestasikan secara intensif **anggaran khusus** untuk penelitian di bidang teknologi?

   The local government needs to allocate budget for technology research as a future investment.

   *Please rank in order of the highest to the lowest value, which region has invested **budget** intensively for the research of technology?*

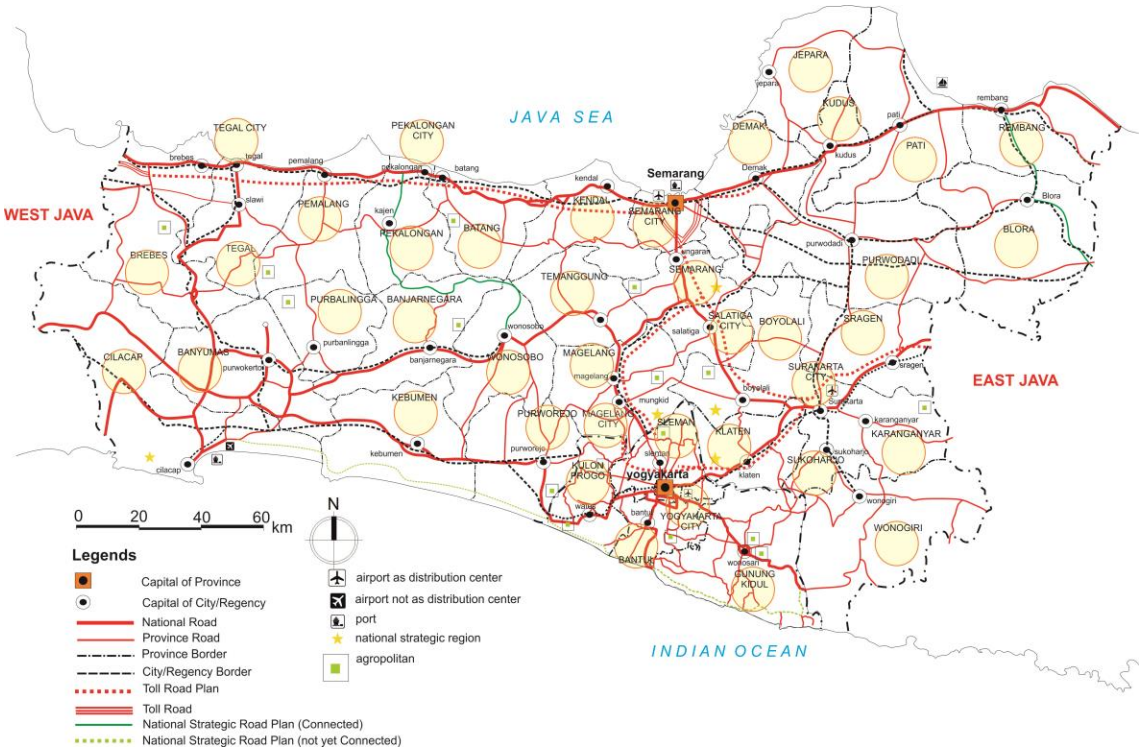


5. Infrastruktur adalah salah satu variabel pengembangan teknologi. Kami beranggapan terdapat dua indikator yang penting dalam infrastruktur teknologi yaitu internet dan listrik. Walaupun mereka tidak secara langsung berhubungan dengan kemampuan teknologi namun demikian informasi yang terkini dan pengetahuan terbaru memiliki hubungan yang sangat erat dalam hal keberadaan dan penyerapan teknologi dalam suatu wilayah.

   Berikanlah peringkat dari yang tertinggi hingga terendah, daerah mana saja yang memiliki jaminan terbaik dalam **koneksi internet**?

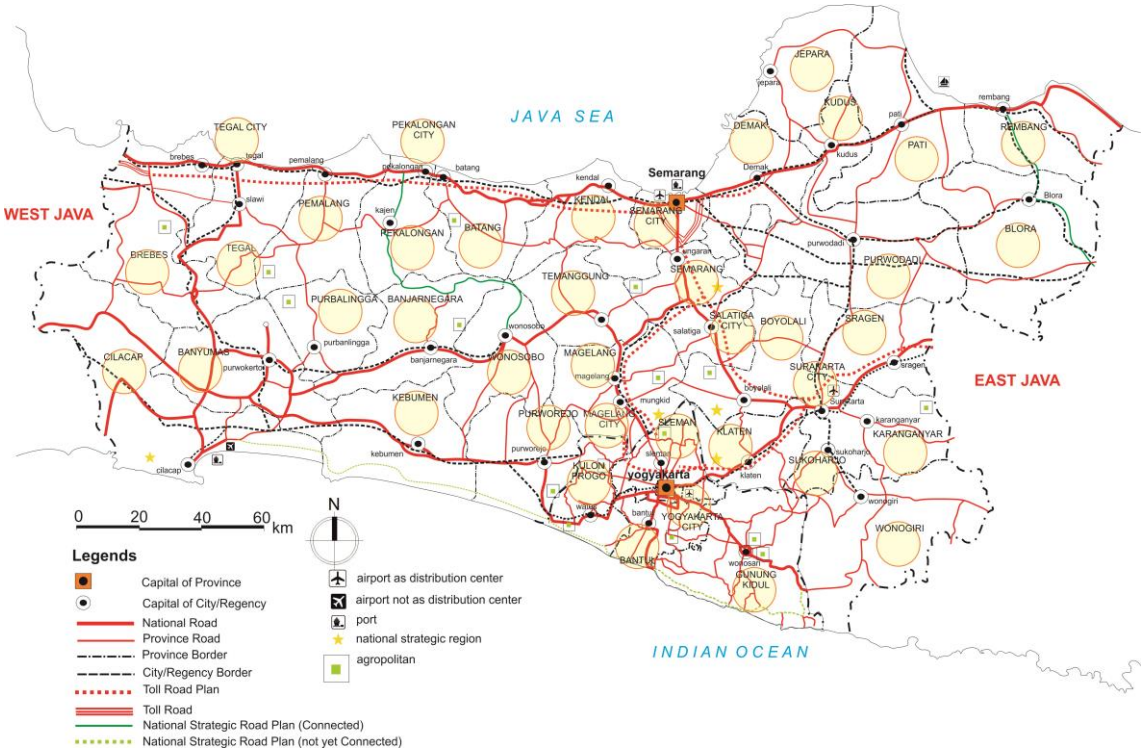
   Infrastructure is one of the main variables in technology development. We considered two important indicators of technological infrastructure: Internet and Electricity. Although they are not directly connected to technological capabilities, the up to date information and knowledge are strongly associated to their availability and diffusion.

   *Please rank in order of the highest to the lowest value, which region has the highest certainty of **the internet connection**?*



6. Berikanlah peringkat dari yang tertinggi hingga terendah, daerah mana yang memiliki tingkat jaminan terbaik dalam **penyediaan listrik**?

   *Please rank in order of the highest to the lowest value, which region has the best guaranty in **electricity supply**?*



7. Kemampuan teknologi juga sangat terkait erat pada ketrampilan manusia. Ketrampilan manusia berhubungan dengan tingkat dan jenis latar belakang pendidikan.

   Berikanlah peringkat dari yang tertinggi hingga terendah, daerah mana yang banyak memiliki **tenaga kerja lulusan perguruan tinggi atau sederajatnya**?

   Technological capabilities are also closely related to human skills. The Human skills is related to the level of education.

   *Please rank in order of the highest to the lowest value, which region has the highest number of **college graduates labor**?*

8. Perbedaan tingkat teknologi, tingkat pendidikan serta infrastruktur pada suatu wilayah menyebabkan daya saing yang tidak imbang antar wilayah terutama adalah menarik investasi.

   Berikanlah peringkat dari yang tertinggi hingga terendah, daerah mana yang merupakan **tempat terbaik untuk menanamkan modal** di daerah Jawa Tengah dan Yogyakarta?

   The differences in the level of technology, education and infrastructure among regions lead to the competitiveness inequality, especially in attracting the investment.

   *Please rank in order of the highest to the lowest value, which region is **the best place to invest**?*

Ini merupakan akhir dari questionnaire
Terima Kasih
This is the end of questionnaire
Thank you

3. The experts consist of three different field; large scale enterprises, government agencies and professional organizations

Large-Scale Enterprises

No	Enterprises	Products	Region/Area (code)
1	PT. Mubarok Food	Food Processing	Kudus (19)
2	PT. Mulia Offset Packindo	Printing	Semarang city (33)
3	PT. Meta Prima Sejahtera (Sampoerna Tbk)	Cigarettes	Semarang city (33)
4	PT Techpack Asia - Albea Group	Plastic Packaging	Demak (21)
5	PT Luxindo Nusantara	Eyeglass Frames	Semarang city (33)
6	PT. Primatexco	Textile	Batang (25)
7	PT. SC Garments	Textile	Klaten (10)
8	PT. Inti Baja	Steel	Semarang city (33)
9	PT. Adhi Karya V	Construction	Central Java and Yogyakarta

Professional Organization and Research Center in University

No	Research Center/ Professional Organization	Region/Area (code)
1	Center of Planning and Regional Development Studies Gajah Mada University, Yogykarta (3 persons)	Yogyakarta (40)
2	Program Study of Urban and Regional Planning, Diponegoro University, Semarang	Semarang city (33)
3	HATHI –Himpunan Ahli Hidrolik Indonesia (Indonesian Association of Hydraulics Engineering)	Central Java, Semarang city
4	INKINDO –Ikatan Nasional Konsultan Indonesia (Association of Indonesian Consultants)	Central Java, Semarang city
5	IAI (Ikatan Arsitek Indonesia) Association of Indonesian Architects	Central Java, Semarang city

Government Agency

No	Agency	Area (code)
1	Dinas* Bina Marga Jawa Tengah (Central Java Highways Agency)	Central Java Province, Semarang city
2	Balitbangda – Badan Penelitian dan Pengembangan Daerah Jawa Tengah (Central Java Research and Development)	Central Java Province, Semarang city
3	Disnakertrans – Dinas Tenaga Kerja dan Transmigrasi Jawa Tengah (Central Java Manpower and Transmigration Agency)	Central Java Province, Semarang city
4	Disperindag – Dinas Perdagangan dan Perindustrian Jawa Tengah (Central Java Industry and Trade Agency	Central Java Province, Semarang city
5	BPMD –Badan Penanaman Modal Daerah Jawa Tengah (Central Java Investment Agency)	Central Java Province, Semarang city
6	Dinas Cipta Karya dan Tata Ruang Jawa Tengah (Human Settlements and Spatial Planning Agency)	Central Java Province, Semarang city
7	Dinas PSDA –Pengelolaan Sumber Daya Air, Jawa Tengah (Central Java Water Resources Management)	Central Java Province, Semarang city
8	Bakorwil III*-Badan Koordinasi Wilayah III (Regional Coordination Agency)	Pekalongan city (26)
9	Dinas Tata Kota, Temanggung (City Planning Agency)	Temanggung (23)
10	Dinas ESDM – Dinas Energi dan Sumber Daya Mineral Temanggung (Energy and Mineral Resources Agency)	Temanggung (23)
11	BAPPEDA – Badan Perencanaan dan Pembangunan Daerah Temanggung Regional Development Planning Agency	Temanggung (23)
12	BAPPEDA Wonosobo (Regional Development Planning Agency)	Wonosobo (7)
13	Dinas Bina Marga, Wonosobo (Regional Highway Office)	Wonosobo (7)
14	Dinas Pekerjaam Umum bidang Cipta Karya (Human Settlements subpart of Public Work Agency)	Kebumen (5)
15	Dinas Bina Marga, Kebumen (Regional Road Office)	Kebumen (5)
16	Dinas PSDA – Dinas Pengelolaan Sumber Daya Air Kebumen Water Resources Management Agency	Kebumen (5)
17	Dinas Pekerjaan Umum bidang Bina Marga Purworejo (Highway sub division of Public Work Agency)-	Purworejo (6)
18	Dinas Pekerjaan Umum bidang Cipta Karya dan Tata Ruang (Human Settlements and Spatial Planning sub division Public Work Agency)	Purworejo (6)
19	Dinas Pekerjaan Umum bidang perencanaan (Planning, Control and Development subpart of Public Work)	Purworejo (6)
20	Dinas PSDA –Pengelolaan Sumber Daya Air, Purworejo (Water Resources Management Agency)	Purworejo (6)
21	BAPPEDA, Wonogiri Regional Development Planning Agency	Wonogiri (12)
22	Bakorwil II** –Badan Koordinasi Wilayah II Magelang (Regional Coordination Agency)	Magelang city

*Dinas is Provincial Sub-Project Management

**Central Java has three regional coordination agency (bakorwil). Bakorwil 1 comprises Pati, Semarang city, Semarang, Salatiga city, Demak, kudus, Jepara, Rembang, Blora. Bakorwil 2 comprises Surakarta city, Magelang, Boyolali, Sragen, Karanganyar, Klaten, Sukoharjo, Wonogiri, Magelang, Temanggung, Wonosobo, Purworejo. Bakorwil 3 comprises Pekalongan, Pekalongan city, Banyumas, Purwokerto, Cilacap, Kebumen, Slawi, Tegal, Pemalang, Batang, Brebes.

4. The Cities and Regencies Code

No	Regencies/ Cities	No	Regencies/ Cities
1	Cilacap	21	Demak
2	Banyumas	22	Semarang
3	Purbalingga	23	Temanggung
4	Banjarnegara	24	Kendal
5	Kebumen	25	Batang
6	Purworejo	26	Pekalongan
7	Wonosobo	27	Pemalang
8	Magelang	28	Tegal
9	Boyolali	29	Brebes
10	Klaten	30	Magelang city
11	Sukoharjo	31	Surakarta city
12	Wonogiri	32	Salatiga city
13	Karanganyar	33	Semarang city
14	Sragen	34	Pekalongan city
15	Grobogan	35	Tegal city
16	Blora	36	Kulon Progo
17	Rembang	37	Bantul
18	Pati	38	Gunung Kidul
19	Kudus	39	Sleman
20	Jepara	40	Yogyakarta city

5. Source of Raw Data

Indonesia

Population Census

National Population Census 1990, Statistic Indonesia – Sensus Kependudukan Nasional, 1990, Badan Pusat Statistik (BPS), Indonesia
National Population Census 1995, Statistic Indonesia – Sensus Kependudukan Nasional, 1995, Badan Pusat Statistik (BPS), Indonesia
National Population Census 2000, Statistic Indonesia – Sensus Kependudukan Nasional, 2000, Badan Pusat Statistik (BPS), Indonesia
National Population Census 2010, Statistic Indonesia – Sensus Kependudukan Nasional, 2010, Badan Pusat Statistik (BPS), Indonesia

Socio Economic Report

Gross Domestic Regional Product of Regencies and Municipalities in Indonesia 1980-1983, Statistics Indonesia– *Produk Domestik Regional Bruto (PDRB) per Kabupaten Kota di Indonesia 1980-1983, Badan Pusat Statistik (BPS) Indonesia*
Gross Domestic Regional Product of Regencies and Municipalities in Indonesia 1983-1993, Statistics Indonesia – *Produk Domestik Regional Bruto (PDRB) per Kabupaten Kota di Indonesia 1983-1993, Badan Pusat Statistik (BPS) Indonesia*

Financial Data of Regency and Municipalities Government 1993-2005, Directorate General of Fiscal Balance, Finance Ministry of Indonesia – *Data Keuangan Daerah 1993, Direktorat Jenderal Perimbangan Keuangan (DPJK), Kementrian Keuangan Indonesia,* available online in *http://www.djpk.depkeu.go.id/?page_id=321*
Financial Data of Regency and Municipalities Government 2005-2010, Directorate General of Fiscal Balance, Finance Ministry of Indonesia – *Data Keuangan Daerah 2005, Direktorat Jenderal Perim-*

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[1] Before 2007, the labor data was inserted in national socio-economic survey (SUSENAS)