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## Razvoj regionalnih središč rasti in vpliv na regionalno rast: primer tajske severovzhodne regije

V članku se preučujeta prostorsko-gospodarska podoba in neenakost na Tajskem na državni in regionalni ravni, pri čemer je posebna pozornost namenjena severovzhodni regiji med letoma 1987 in 2007. Avtor se v članku osredotoča na: 1. preučevanje gospodarskih razmer in neenakosti na državni ravni in v severovzhodni regiji na podlagi Theilovega indeksa neenakosti; 2. določanje regionalnih središč rasti in satelitskih mest na podlagi teorije polov rasti kot idejnega okvira in analize prostorske interakcije ter 3. analizo razmerja med regionalnimi središči rasti in satelitskimi mesti z vidika vpliva na rast in neenakost. Ugotavlja, da severovzhodna regija z vidika bruto domačega proizvoda in tudi bruto regionalnega proizvoda na prebivalca zaostaja za drugimi regijami, zato je bila izbrana za raziskavo. Na podlagi prostorske analize so bila mesta Nakhon Ratčasima, Khon Kaen, Udon Thani in Ubon Ratčathani določena za regionalna središča rasti. Vsako ima svoje območje vpliva (ali satelitska mesta),

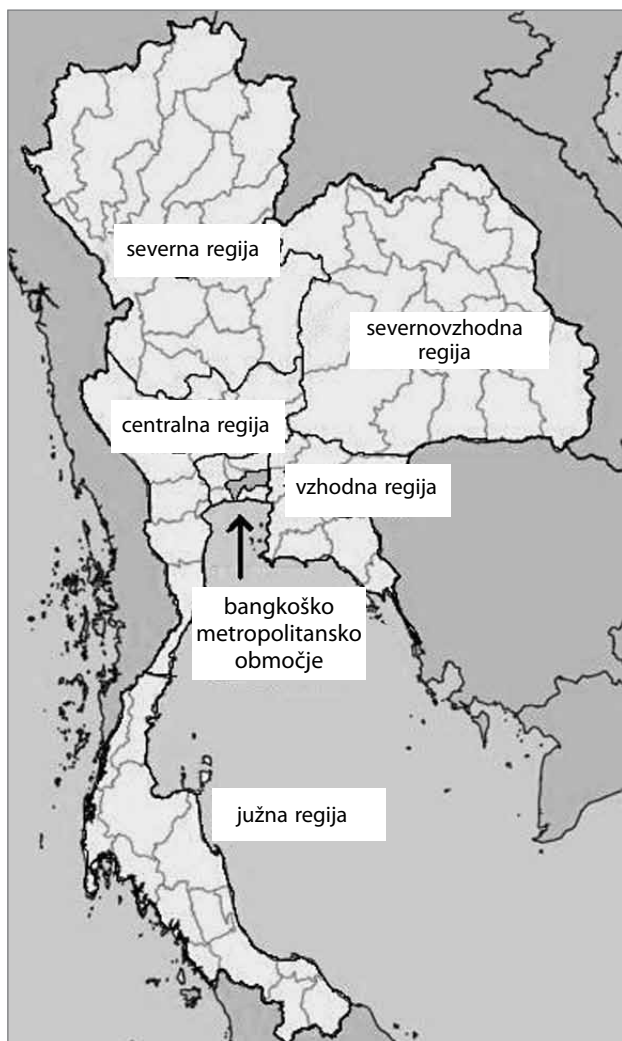
skupno območje regionalnih središč rasti in satelitskih mest pa je opredeljeno kot podregija. Razvoj regionalnih središč rasti ima na podlagi gospodarskih in družbenih odnosov neposreden vpliv na gospodarsko rast podregije: urbanizacijo, industrijski razvoj, rast na prebivalca, število visokošolskih ustanov in podobno. Kljub temu pa je ta rast negativno povezana z gospodarsko enakostjo provinc v podregiji. Očitno je, da se neenakost pogloblja. Avtor v članku predlaga, da bi za doseganje trajnega pozitivnega vpliva regionalnih središč rasti na gospodarsko rast in enakost morali izboljšati industrijske povezave med temi središči in njihovimi satelitskimi mesti. Če bo ta proces dovolj močan, se bo rast z regionalnih središč razširila tudi na sosednja območja in pospešila njihov razvoj.

**Ključne besede:** regionalni gospodarski razvoj in neenakost, pol rasti, regionalna središča rasti, regionalna decentralizacija

## 1 Uvod

Tajska se nahaja v jugovzhodni Aziji (glej sliko 1) in velja za državo v razvoju, v kateri danes na površini 513.120 km<sup>2</sup> živi 65 milijonov prebivalcev. Upravno je razdeljena na 76 provinc in metropolo Bangkok, ki je njeno glavno mesto. Province se združujejo v šest regij. Leta 1961 je Tajska uvedla prvi nacionalni razvojni načrt in s tem naredila prvi korak v obdobje sodobnega razvoja. Že več kot petdeset let tako spodbuja razvoj infrastrukture, svobodno podjetništvo, politike, ki podpirajo naložbe, izvozne panoge in prostorski razvoj. V obdobju sodobnega razvoja je bila uvedena politika gospodarske decentralizacije in zmanjšanja regionalnih neenakosti. Mednje spada tudi prostorska politika, ki se osredotoča na tri področja: razvoj in upravljanje urbanega sistema, strategijo regionalnih središč rasti in globalni prostorski razvoj. Članek se osredotoča na strategijo regionalnih središč rasti kot gibalno regionalnega razvoja.

Pri raziskavi smo zaradi razpoložljivih podatkov za referenčno obdobje uporabili obdobje med letoma 1987 in 2007.



Slika 1: Zemljevid Tajske (vir: Sang-arun, 2012)

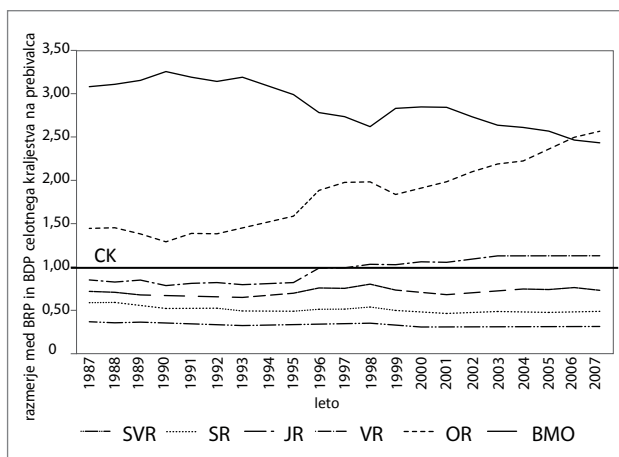
Leta 2007 je bruto domači proizvod (BDP) na Tajskem znašal 4,26 bilijona THB<sup>[1]</sup> (približno 0,13 bilijona USD), njegova povprečna rast v zadnjih dvajsetih letih pa je bila 5,81 % na leto. Prostorsko lahko BDP razdelimo na bruto regionalni proizvod (BRP) šestih regij (severovzhodne, severne, južne, vzhodne in osrednje regije ter bangkoškega metropolitanskega območja). Bangkoško metropolitansko območje z okolico ima najvišji BDP, in sicer 1,87 bilijona THB (43,96 % vsega BDP oziroma približno 0,06 bilijona USD) s povprečno letno stopnjo rasti 5,38 % v obdobju 1987–2007. Trenutno ima tudi visok BRP na prebivalca: 313.979 THB (9.812 USD). Razlog za tako visoke vrednosti na tem območju je pomemben položaj, ki ga ima v državi metropola Bangkok. V večini raziskav gospodarske neenakosti in porazdelitve prihodkov na Tajskem (Ikemoto in Limskul, 1987; Kaothien, 1991; Deolalikar, 2002; Tinakorn, 2002; Glassman in Sneddon, 2003) so omenjene razlike med bangkoškim metropolitanskim območjem in okolico (v nekaterih primerih pa celo samo metropolo Bangkok) ter drugimi regijami v kraljestvu. Slika 1 prikazuje zemljevid Tajske in njenih regij.

Če primerjamo BRP na prebivalca v posamezni regiji z BDP na prebivalca v celotnem kraljestvu, lahko ugotovimo, da je imela severovzhodna regija med letoma 1987 in 2007 najnižji povprečni količnik neenakosti, in sicer 0,33. To pomeni, da je bil v tem obdobju BRP severovzhodne regije za več kot trikrat manjši od BDP na prebivalca. Količnik je seveda najvišji na bangkoškem metropolitanskem območju in v njegovi okolici, zaradi česar lahko sklepamo, da je to najrazvitejše, severovzhodna regija pa najslabše razvito območje. Slika 2 prikazuje gibanje količnika neenakosti na podlagi BRP na prebivalca posamezne regije med letoma 1987 in 2007.

Zgornje ugotovitve kažejo, da bi bilo zanimivo podrobneje preučiti regionalna središča rasti in gospodarski razvoj severovzhodne regije. Cilj članka je raziskati vpliv regionalnih središč rasti na gospodarski razvoj in neenakost severovzhodne regije oziroma 1. preučiti gospodarsko strukturo in neenakost na ravni celotne države in severovzhodne regije; 2. določiti regionalna središča rasti in njihova satelitska mesta ter 3. analizirati razmerje med regionalnimi središči rasti in satelitskimi mesti z vidika vpliva na rast in neenakost.

## 2 Teorija in metodologija

V raziskavah regionalnih središč rasti se pogosto uporablja teorija polov rasti. Prvič jo je omenil François Perroux (1955), ki je trdil, da »se rast ne pojavlja povsod ob istem času, ampak se z različno jakostjo pokaže na točkah ali polih rasti in se širi po različnih poteh z različnimi končnimi učinki na celotno družbo«. Zaradi tega je pol (ali jedro) rasti gonilna gospodarska enota (Malul idr., 2012). Ko se v njem pojavijo spremembe, to



**Slika 2:** Razmerje med BRP in BDP celotnega kraljestva na prebivalca (CK = 1,0) (vir: urad nacionalnega odbora za gospodarski in družbeni razvoj, 2011)

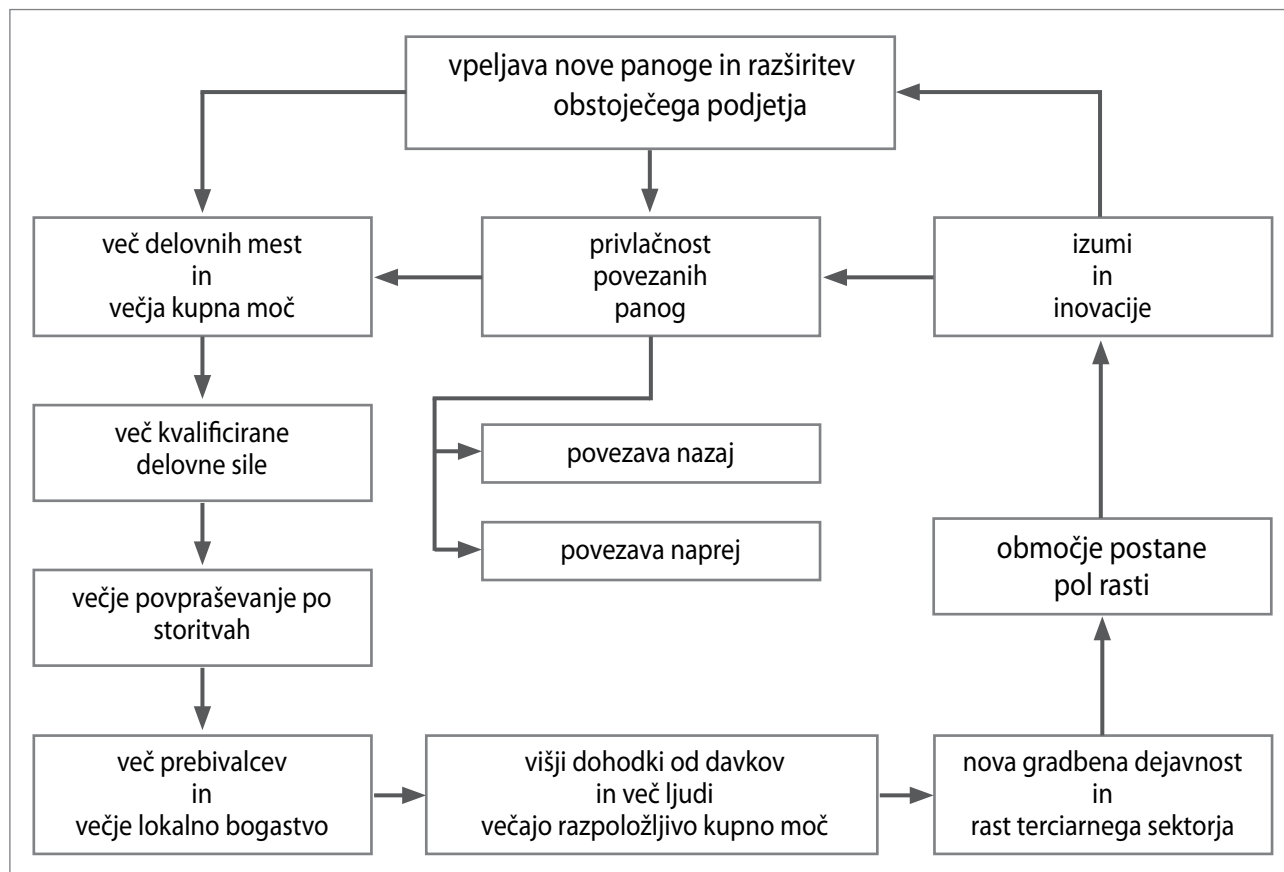
Opomba: Izračunano na podlagi bruto domačega in regionalnega proizvoda in proizvoda province; SVR = severovzhodna regija, SR = severna regija, JR = južna regija, VR = vzhodna regija, OR = osrednja regija in BMO = bangkoško metropolitansko območje, CK = celotno kraljestvo.

povzroči spremembe v drugih enotah. V tistem času pri polih ni šlo za območja v prostorskem smislu, ampak za industrijske grozde. Ta pojem ustreza tudi zamisli o »neuravnoteženi rasti«, ki jo je razvil Albert O. Hirschman (1958) in se nanaša

na naložbe v nekatere vodilne panoge ter gospodarske povezave »naprej in nazaj« (ang. *backward and forward linkages*).

Leta 1966 je Jacques Raoul Boudeville vpeljal še pojem prostora. Prostorski pol rasti pomeni glavno območje gospodarskega zgoščanja, ki svoje razvojne sile širi na okoliško obrobje (Darwent, 1969). Imenuje se središče rasti, pri čemer se »središče« običajno nanaša na mesto ali mestno območje. Kot središče rasti lahko mesto razvoj ali rast na obrobje širi pod dvema pogojevoma. Najprej se mora samo razviti oziroma oblikovati svoje razvojne sile, nato pa jih mora razširiti na svoje območje vpliva z gospodarskimi, infrastrukturnimi ali celo družbenimi povezavami.

V 70. letih 20. stoletja so teorijo polov rasti uporabili za regionalni razvoj na Tajskem, in sicer kot del politike regionalnih središč rasti v štirih regijah. Prvotni cilji politike so bili razvoj regionalnega gospodarstva, zmanjšanje neenakosti med regijami in omejitev čezmerne urbanizacije bangkoškega metropolitanskega območja. Vključeno je bilo pet regionalnih središč rasti: Čjang Maj v severni regiji, Songkhla v južni regiji, Čon Buri v vzhodni regiji ter Nakhon Ratčasima in Khon Kaen v severovzhodni regiji. Politika je pospeševala gospodarski, industrijski, infrastrukturni, družbeni razvoj in decentralizacijo in zmanjševala regionalne neenakosti. Razvoj novih panog in



**Slika 3:** Gospodarska kumulativna vzročnost pola rasti (vir: barcelonsko središče za terenske raziskave, 2011)

gospodarstva v regionalnih središčih rasti spodbuja zgoščanje dodatne industrijske dejavnosti prek kumulativne vzročnosti oziroma multiplikativnega učinka, kot je prikazano na sliki 3.

Kot središče rasti je mesto gibalo regionalnega razvoja, vendar lahko v primerih enosrediščnega državnega ali regionalnega urbanega sistema povzroči regionalne neenakosti. Večja enosrediščnost povzroči še več neenakosti. Zato je večsrediščni urbani sistem primernejši in lahko celo pomaga zmanjšati regionalno neenakost (Sandberg in Meijers, 2006). Zato je hipoteza naše raziskave taka: razvoj regionalnih središč rasti v severovzhodni regiji izboljšuje regionalno gospodarsko rast in zmanjšuje neenakosti.

## 2.1 Analiza regionalne rasti in neenakosti

Pri raziskavi smo uporabili te podatke: bruto domači proizvod (BDP), bruto regionalni proizvod (BRP), bruto proizvod province (BPP) in podatke o prebivalstvu na teh ravneh za obdobje 1987–2007. Skupna stopnja letne rasti je izračunana za gospodarsko rast. Za merjenje regionalne gospodarske neenakosti smo uporabili Theilovo dvostopenjsko metodo dekompozicije (Akita, 2000), kot je prikazano v enačbi 1:

$$T_p = \sum_i \sum_j \left( \frac{Y_{ij}}{Y} \right) \log \left( \frac{Y_{ij}/Y}{N_{ij}/N} \right)$$

pri čemer je

- $T_p$  splošna gospodarska neenakost,
- $Y_{ij}$  bruto proizvod province  $j$  v regiji  $i$ ,
- $Y$  skupni bruto proizvod vseh provinc,
- $N_{ij}$  prebivalstvo province  $j$  v regiji  $i$ ,
- $N$  skupno prebivalstvo vseh provinc,

če je za merjenje gospodarske neenakosti med provincami regije  $i$   $T_{pi}$  opredeljen, kot sledi (enačba 2):

$$T_{pi} = \sum_j \left( \frac{Y_{ij}}{Y_i} \right) \log \left( \frac{Y_{ij}/Y_i}{N_{ij}/N_i} \right)$$

lahko Theilov indeks  $T$  v enačbi 1 razstavimo v enačbo 3:

$$\begin{aligned} T_p &= \sum_i \left( \frac{Y_i}{Y} \right) T_{pi} + \sum_i \left( \frac{Y_i}{Y} \right) \log \left( \frac{Y_i/Y}{N_i/N} \right) = \\ &= \sum_i \left( \frac{Y_i}{Y} \right) T_{pi} + T_{MR} = \\ &= T_{ZR} + T_{MR} \end{aligned}$$

pri čemer je

- $Y_i$  skupni bruto proizvod regije  $i$ ,
- $N_i$  skupno prebivalstvo regije  $i$ ,
- $T_{ZR}$  gospodarska neenakost znotraj regije,
- $T_{MR}$  gospodarska neenakost med regijami.

Pri enačbi 3 gre za navadno enostopenjsko Theilovo dekompozicijo neenakosti, pri čemer je splošna gospodarska neenakost  $T_p$  vsota gospodarske neenakosti znotraj regije ( $T_{ZR}$ ) in gospodarske neenakosti med regijami ( $T_{MR}$ ). Pri tem je neenakost znotraj regije ponderirano povprečje gospodarske neenakosti med provincami posamezne regije ( $T_{pi}$ ). Theilov indeks ( $T_p$ ), opredeljen v enačbi 1, kot uteži uporablja deleže dohodka, zato je občutljiv na spremembe v bogatejših provincah.

## 2.2 Določitev regionalnih središč rasti

Šesti nacionalni načrt gospodarskega in družbenega razvoja (1987–1991) v severovzhodni regiji določa tri središča rasti, vendar ne opredeljuje njihovih območij vpliva oziroma satelitskih mest. Zato smo morali izvesti empirično analizo, pri kateri smo uporabili metodo razvrščanja mest. Enota analize je provinca<sup>[2]</sup>, v preglednici 1 pa so prikazane različne spremenljivke, uporabljene pri razvrščanju. Enačba 4 je regresijska enačba standardne vrednosti (ang. *z-score*):

$$X = a_1 Z_1 + a_2 Z_2 + a_3 Z_3 + \dots + a_i Z_i$$

pri čemer je

- $X$  vrednost regionalnih središč rasti,
- $a_i$  utež (vrednost posameznega faktorja, izračunano s faktorsko analizo spremenljivk, prikazanih v preglednici 1, smo v analizi uporabili kot utež),
- $Z_i$  standardna vrednost posamezne spremenljivke.

Območja vpliva regionalnih središč rasti smo določili z analizo gostote, v kateri so upoštevane prostorske interakcije. Na ta način smo določili območje vsakega regionalnega središča rasti in njegova satelitska mesta kot podregijo. Enačba analize gostote je prikazana v enačbi 5:

$$r_{ij} = \frac{\sqrt{N_i Y_i} \sqrt{N_j Y_j}}{d_{ij}^2}$$

pri čemer je

- $r_{ij}$  prostorska interakcija med regionalnim središčem rasti  $i$  in satelitskim mestom  $j$ ,
- $N_i$  prebivalstvo regionalnega središča rasti  $i$ ,
- $N_j$  prebivalstvo satelitskega mesta  $j$ ,
- $Y_i$  BPP regionalnega središča rasti  $i$ ,
- $Y_j$  BPP satelitskega mesta  $j$ ,
- $d_{ij}$  razdalja med  $i$  in  $j$ .

### 2.3 Vpliv razvoja regionalnih središč rasti na analizo regionalne rasti

Zgornje teoretične utemeljitve in hipoteza nakazujejo povezavo med razvojem regionalnih središč rasti ter regionalno gospodarsko rastjo in neenakostjo. Regionalna središča rasti imajo dinamično funkcijo spodbujanja regionalne rasti in zmanjševanja regionalnih neenakosti. Za uporabo teh povezav smo razvili model multiple regresije, kot je prikazano v enačbi 6:

$$GR_{it} = a_1 + b_1 URB_{jt} + b_2 GRPC_{jt} + b_3 ARG_{jt} + b_4 MAN_{jt} + b_5 TRAD_{jt} + b_6 TRAN_{jt} + b_7 INV_{jt} + b_8 LOA_{jt} + b_9 UNI_{jt} + u_i$$

pri čemer je

- $i$  podregija  $i$ ,
- $j$  regionalno središče rasti  $j$ ,
- $t$  trajanje raziskave, 1987–2007,
- $u_i$  naključna napaka,
- $a_1$  konstanta,
- $b_n$  regresijski koeficient ( $n = 1, \dots, 9$ ),
- $GR_{it}$  gospodarska rast,
- $URB_{jt}$  stopnja urbanizacije,
- $GRPC_{jt}$  stopnja rasti bruto proizvoda središča rasti na prebivalca,
- $AGR_{jt}$  stopnja rasti kmetijskega proizvoda,
- $MAN_{jt}$  stopnja rasti bruto proizvoda v proizvodnem sektorju,
- $TRAD_{jt}$  stopnja rasti trgovine,
- $TRAN_{jt}$  stopnja rasti bruto proizvoda v prometu,
- $INV_{jt}$  stopnja rasti industrijskih naložb,
- $LOA_{jt}$  stopnja rasti kreditov, ki jih odobrijo komercialne banke,
- $UNI_{jt}$  število visokošolskih ustanov.

Model vsebuje enačbo splošne rasti, pri kateri rast gospodarstva podregije opredeljujejo različni dejavniki. V tej raziskavi smo

za idejni okvir uporabili teorijo rasti polov, zato smo določili devet neodvisnih spremenljivk, ki izražajo razvoj regionalnih središč rasti. Eden glavnih pojmov teorije rasti polov je urbani razvoj, zato lahko stopnja urbanizacije izraža »urbano vlogo« posameznega regionalnega središča rasti. K temu smo dodali še stopnjo rasti bruto regionalnega proizvoda na prebivalca v regionalnih središčih rasti, da bi preučili kupno moč središč rasti, ki izraža raven gospodarske izmenjave na tem območju. Model vključuje tudi dejavnik obsega trgovine. Kmetijski razvoj ima še vedno pomembno vlogo v severovzhodni regiji in

**Preglednica 1:** Spremenljivke razvrščanja mest

Kategorija	Spremenljivka
	mestno območje
	delež mestnega območja v regiji
fizične lastnosti in infrastruktura (7 spremenljivk)	delež industrijskega območja v regiji
	delež dolžine cest v regiji
	delež porabe elektrike v regiji
	delež porabe vode v regiji
	delež registriranih vozil v regiji
	število prebivalcev
	gostota prebivalstva
	število mestnih prebivalcev
prebivalstvo in delovna sila (7 spremenljivk)	delež mestnih prebivalcev v regiji
	delež zaposlene delovne sile v provinci
	delež zaposlene industrijske delovne sile v provinci
	delež delovne sile v storitvenem sektorju province
	delež BPP na prebivalca v regiji
	delež BPP v industrijskem sektorju v regiji
	delež BPP v storitvenem sektorju v regiji
	delež tovarn v regiji
gospodarstvo (11 spremenljivk)	delež industrijskega kapitala v regiji
	delež podjetij v regiji
	delež regionalnega proračuna
	delež davčnih prihodkov v regiji
	delež depozitov v regiji
	delež kreditov v regiji
	število visokošolskih ustanov
	delež visoko izobraženih v regiji
javni sektor (5 spremenljivk)	delež prebivalcev s srednješolsko izobrazbo v regiji
	število zdravstvenih ustanov s posteljami
	število prebivalcev na zdravnika

Opomba: na podlagi podatkov za leto 2007

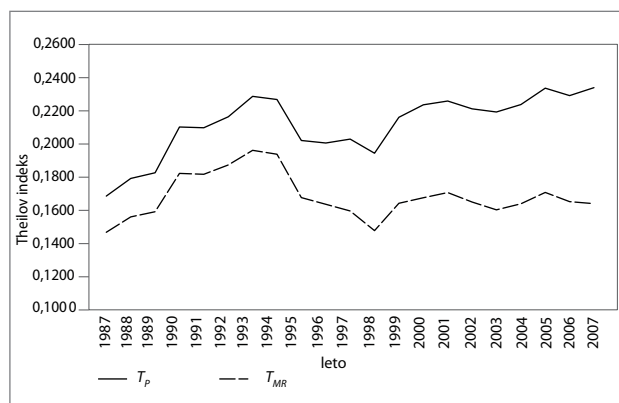
med kmetijskimi proizvodi so tudi surovine, ki se uporabljajo v kmetijstvu in živilski industriji na mestnem območju. Poleg tega je industrijski razvoj pomemben dejavnik pola rasti, ki vpliva na regionalno stopnjo rasti. Bruto proizvod v proizvodnem sektorju, industrijske naložbe, bruto proizvod v prometu in odobreni krediti so prav tako sestavni del enačbe. Zadnja spremenljivka, število visokošolskih ustanov, izraža stopnjo človeškega kapitala in prelivanje znanja.

### 3 Rezultati in razprava

#### 3.1 Nacionalna in regionalna rast in neenakost

V preučevanem času je bila Tajska hitro rastoča država, kar je dokazovala tudi visoka letna stopnja realnega BDP. V tem dolgem obdobju je šla država skozi različne gospodarske faze: od čudežnih let v prvem desetletju do krize leta 1997 in okrevanja v poznejših letih. Prvi del preučevanega obdobja (1987–1996) je bil čas čudežne rasti s približno 9,5-odstotno letno stopnjo gospodarske rasti. Vrhunec je dosegla leta 1988, ko je znašala 13,29 %. Leta 1997 pa je državo nepričakovano udarila gospodarska kriza. Leto pozneje je rast padla na najnižjo stopnjo, in sicer -10,51 %. Po tem šoku se je rast med letoma 1999 in 2007 počasi izboljšala in dosegala povprečno letno stopnjo 5,05 %. Od leta 1987 do leta 2007 je bila tako povprečna letna rast 5,81-odstotna.

Trend regionalne rasti se ujema z nacionalno rastjo. V dveh regijah je opazna izjemna rast, saj je njuna stopnja višja od nacionalnega povprečja, in sicer v vzhodni (9,02-odstotna letna povprečna rast) in osrednji regiji (7,54-odstotna povprečna letna rast). Njuno rast poganja industrializacija. Sledijo jima bangkoško metropolitansko območje (z letno povprečno stopnjo rasti 5,38 %), južna regija (5,21 %), severovzhodna regija (4,49 %) in severna regija (4,03 %).

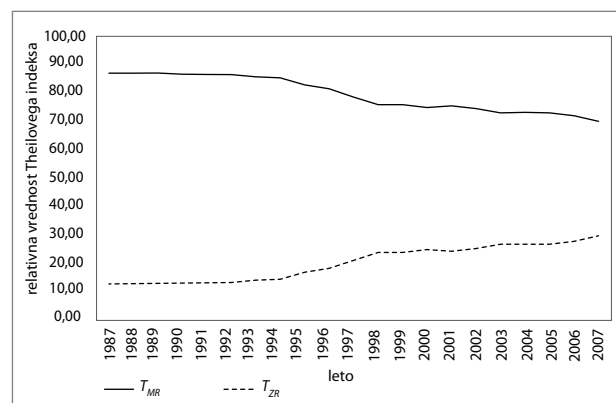


**Slika 4:** Splošna neenakost ( $T_p$ ) in neenakost med regijami ( $T_{MR}$ ) (vir: urad nacionalnega odbora za gospodarski in družbeni razvoj, 2011)

Opomba: Izračunano na podlagi bruto domačega in regionalnega proizvoda in proizvoda provinc;  $T_p$  = splošna neenakost in  $T_{MR}$  = neenakost med regijami.

Če pogledamo nacionalno in regionalno neenakost, prikazano na sliki 4, lahko ugotovimo, da se je splošna neenakost ( $T_p$ ) v preučevanem obdobju večala v povprečju za 1,65 % na leto. Ta rezultat se ujema z izsledki drugih raziskav (na primer Nopkhun, 2005; Boonyamanond, 2007; Wisawaisun, 2009). Opisana smer razvoja se ujema z neenakostjo med regijami ( $T_{MR}$ ), ki se ni občutno povečala, saj je njena povprečna letna stopnja rasti znašala samo 0,56 %. Nacionalna in regionalna neenakost sta bili najnižji v začetnem obdobju in med gospodarsko krizo. Na Tajskem je tako ves čas obstajala prostorska gospodarska neenakost, predvsem med fazo čudežne rasti in okrevanja. Stopnja neenakosti se je med krizo še posebej povečala. Če povzamemo: večja gospodarska rast v zadnjih dvajsetih letih je prispevala k višjim prihodkom, vendar se ni razširila na vse regije. Regije z višjo rastjo so bile za gospodarsko krizo občutljivejše kot druge regije. Prostor med črtama predstavlja neenakost znotraj regije ( $T_{ZR}$ ), ki se je v preučevanem obdobju povečala. To je prikazano na sliki 5, ki ponazarja relativne vrednosti Theilovega indeksa. Zgornja črta,  $T_{MR}$ , je močno padla, medtem ko se je spodnja črta,  $T_{ZR}$ , dvignila. Na podlagi teh podatkov lahko trdimo, da je regionalna decentralizacija v razvoju sodobne Tajske učinkovita, saj  $T_{MR}$  pada. Koristi od nacionalne gospodarske rasti nima samo bangkoško metropolitansko območje kot najrazvitejša regija v državi, ampak tudi druge regije, na primer vzhodna in osrednja. Kljub temu ima ta uspeh določene stranske učinke, med drugim večjo neenakost znotraj posamezne regije. Državno gospodarstvo je torej napredovalo, vendar samo na določenih območjih v posameznih regijah. Tajska se tako sooča z novo težavo, in sicer z neenakostjo znotraj regij.

Kot je prikazano na sliki 6, je neenakost znotraj regije v skupini A (v katero spadajo indeksi bangkoškega metropolitanskega območja ter osrednje in vzhodne regije) večja kot v skupini



**Slika 5:** Relativne vrednosti Theilovega indeksa (vir: urad nacionalnega odbora za gospodarski in družbeni razvoj, 2011)

Opomba: Izračunano na podlagi bruto domačega in regionalnega proizvoda in proizvoda provinc;  $T_{MR}$  = neenakost med regijami in  $T_{ZR}$  = neenakost znotraj regije.

B (severovzhodna, severna in južna regija). Kot smo že omenili, je gospodarska rast v skupini A absolutno višja kot v skupini B. To je očitno na nacionalni ravni, ki se sooča z neenakostjo znotraj regij, in tudi na regionalni ravni, zlasti na območjih z visoko rastjo. Ti podatki kažejo, da gospodarska rast nikakor ne obstaja povsod, saj imajo korist od nje samo nekatera območja v posamezni regiji (to so običajno mestna in industrijska območja).

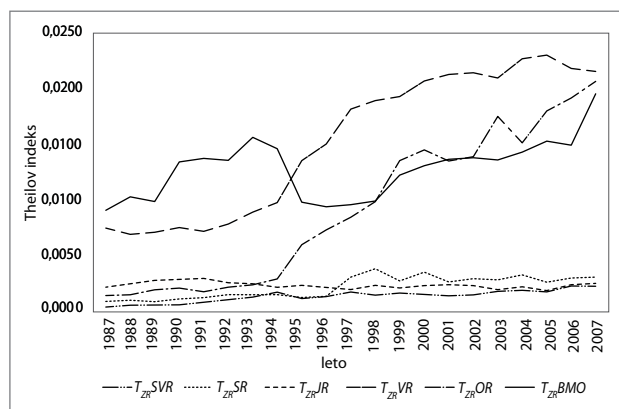
### 3.2 Regionalna središča rasti in podregije

Rezultati razvrščanja mest so prikazani na sliki 7. Izstopajo rezultati provinc Nakhon Ratčasima, Khon Kaen, Udon Thani in Ubon Ratčathani. Točka A je točka na krivulji, ki deli graf na dva dela, kot sledi: 1. prva skupina: najboljše štiri province so Nakhon Ratčasima, Khon Kaen, Udon Thani in Ubon Ratčathani, ki so tudi regionalna središča rasti; 2. druga skupina: preostale province so Buri Ram, Surin, Roj Et, Kalasin, Sakon Nakhon, Čajaphum, Si Sa Ket, Maha Sarakham, Nong Khaj, Loei, Nakhon Phanom, Nong Bua Lam Phu, Mukdahan, Jasothon in Amnat Čaroen, ki so satelitska mesta.

Na sliki 8 so prikazane prostorske interakcije med prvo in drugo skupino, na podlagi katerih lahko določimo štiri podregije (glede na število regionalnih središč rasti):

#### 1. zgornja severovzhodna podregija (ZSVPR)

Središče rasti je Udon Thani, njegova satelitska mesta pa so Loei, Nong Khaj, Sakon Nakhon in Nong Bua Lam Phu. Podregija obsega 43.852,044 km<sup>2</sup>, leta 2007 pa je imela 4.659.509 prebivalcev. Bruto proizvod v podregiji (BPPR) je bil leta 2007 83,6 milijarde THB (približno 2,7 milijarde USD). Od tega je bilo 19,1 % bruto proizvoda ustvarjeno v kmetijskem sektorju, 17,5 % v industriji in 63,4 % v storitvenem sektorju, med letoma 1987 in 2007 pa je pov-



**Slika 6:** Neenakost znotraj regije ( $T_{ZR}$ ) (vir: urad nacionalnega odbora za gospodarski in družbeni razvoj, 2011)

Opomba: Izračunano na podlagi bruto domačega in regionalnega proizvoda in proizvoda provinc; SVR = severovzhodna regija, SR = severna regija, JR = južna regija, VR = vzhodna regija, OR = osrednja regija in BMO = bangkoško metropolitansko območje.

prečna letna stopnja rasti znašala 4,05 %. Udon Thani je središče rasti in ima 1.530.686 prebivalcev; je šesta največja provinca na Tajskem. Njen bruto proizvod znaša 31,8 milijarde THB (približno 1 milijardo USD), večina tega pa je ustvarjena v storitvenem sektorju.

#### 2. osrednja severovzhodna podregija (OSVPR)

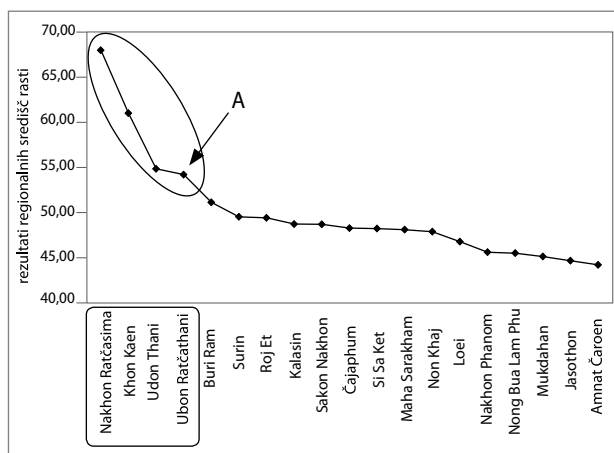
Središče rasti je Khon Kaen, njegova satelitska mesta pa so Kalasin, Roj Et, Maha Sarakham in Nakhon Phanom. Podregija obsega 36.936,537 km<sup>2</sup>, leta 2007 pa je imela 5.671.621 prebivalcev. Bruto proizvod podregije je leta 2007 znašal 135,4 milijarde THB (približno 4,4 milijarde USD). Ima najbolj razvito gospodarstvo v državi. V kmetijstvu ustvari 15,4 % bruto proizvoda, v industriji 34,7 % in v storitvenem sektorju 49,9 %. Med letoma 1987 in 2007 je njena povprečna letna stopnja rasti znašala 5,23 %. Khon Kaen ima 1.752.414 prebivalcev in je četrta največja provinca na Tajskem. Njen bruto proizvod znaša 70 milijard THB (približno 2,3 milijarde USD), največ tega pa se ustvari v industriji.

#### 3. spodnja severovzhodna podregija 1 (SSVPR 1)

Središče rasti je Nakhon Ratčasima, njegova satelitska mesta pa so Buri Ram, Čajaphum in Surin. Je največja podregija, saj obsega 51.719,192 km<sup>2</sup> in ima 6.581.233 prebivalcev (leta 2007). Leta 2007 je njen bruto proizvod znašal 133,5 milijarde THB (približno 4,3 milijarde USD), in sicer 21 % v kmetijstvu, 25,4 % v industriji in 53,6 % v storitvenem sektorju. Povprečna letna stopnja rasti med letoma 1987 in 2007 je znašala 4,39 %. Nakhon Ratčasima ima 2.552.894 prebivalcev in je tako druga največja provinca na Tajskem. Njen bruto proizvod znaša 68,9 milijarde THB (približno 2,2 milijarde USD), največ tega pa ustvari v storitvenem sektorju.

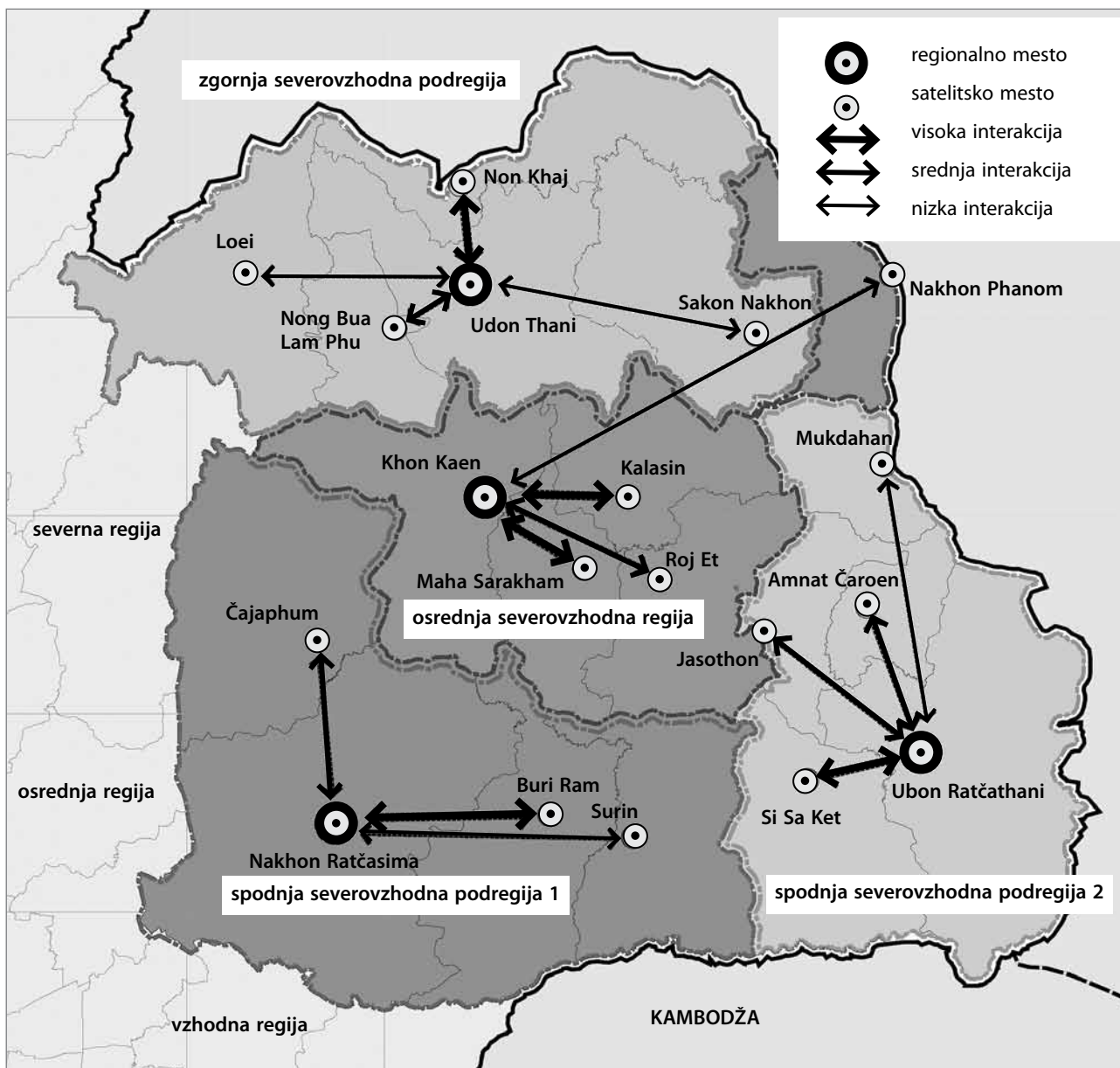
#### 4. spodnja severovzhodna podregija 2 (SSVPR 2)

Središče rasti je Ubon Ratčathani, njegova satelitska mesta



**Slika 7:** Rezultati razvrščanja mest

Opomba: Izračun na podlagi regresije standardne vrednosti je uporabljen v enačbi 4; točka A je točka na krivulji, ki deli graf na dva dela.



Slika 8: Podregije (vir: Sang-arun, 2012)

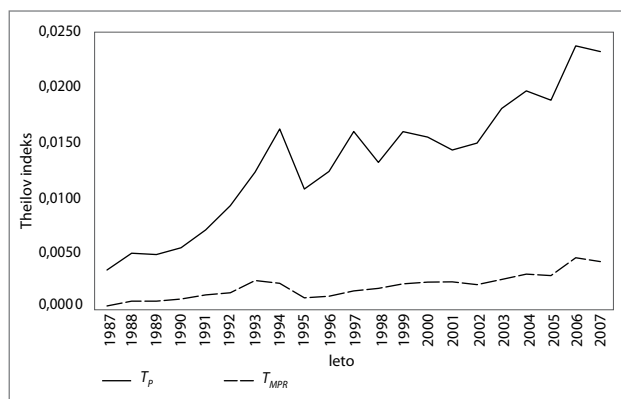
pa so Mukdahan, Si Sa Ket, Amnat Čaroen in Jasothon. Podregija obsega 36.624.331 km<sup>2</sup> in ima 4.473.284 prebivalcev (leta 2007). Njen bruto proizvod je leta 2007 znašal 72,6 milijarde THB (približno 2,3 milijarde USD), in sicer 21,2 % v kmetijstvu, 14,1 % v industriji in 64,7 % v storitvenem sektorju. Povprečna letna stopnja rasti je med letoma 1987 in 2007 znašala 3,95 %. Ubon Ratčathani ima 1.785.709 prebivalcev in je tretja največja provinca na Tajskem. Njen bruto proizvod znaša 31,8 milijarde THB (približno 1 milijardo USD), največ tega pa ustvari v storitvenem sektorju.

Večji del gospodarstva v podregijah temelji na storitvenem sektorju, izjema je samo osrednja severovzhodna podregija. Khon Kaen je edino industrijsko središče rasti. Analiza podregij v

severovzhodni regiji kaže, da ima osrednja severovzhodna podregija najvišjo letno stopnjo gospodarske rasti, ki v povprečju znaša 5,23 % (več kot stopnja rasti severovzhodne regije). Sledijo ji spodnja severovzhodna podregija 1 (4,39-odstotna stopnja rasti), zgornja severovzhodna podregija (4,03 %) in spodnja severovzhodna podregija 2 (3,95 %).

Na sliki 9 je prikazana regionalna neenakost. Splošna neenakost ( $T_p$ ) in neenakost med podregijami ( $T_{MPR}$ ) sta se v preučevanem obdobju povečali.  $T_p$  se je celo čezmerno povečala. Prostor med črtama je velik, in sicer zaradi neenakosti med podregijami, ki je prikazana na sliki 10. Očitno je, da sta indeksa osrednje severovzhodne podregije in spodnje severovzhodne podregije 1 (skupina C) višja kot indeksa zgornje severovzhodne podregije in spodnje severovzhodne podregije.





**Slika 9:** Splošna neenakost ( $T_p$ ) in neenakost med podregijami ( $T_{MPR}$ ) (vir: urad nacionalnega odbora za gospodarski in družbeni razvoj, 2011)

Opomba: Izračunano na podlagi bruto domačega in regionalnega proizvoda in proizvoda provinc;  $T_p$  = splošna neenakost in  $T_{MPR}$  = neenakost med podregijami.

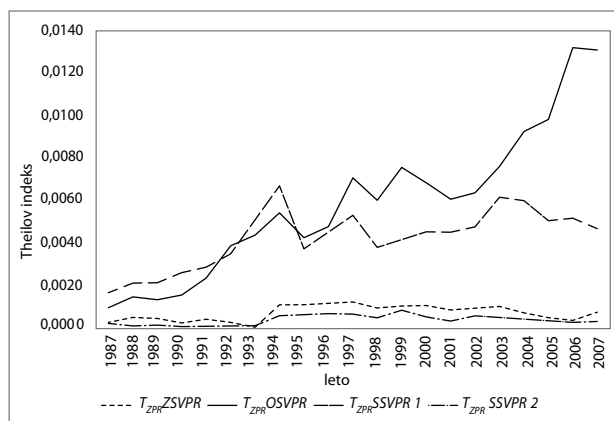
je 2 (skupina D). Kot smo že omenili, ima skupina C absolutno višjo gospodarsko rast kot skupina D. Višja rast v preučevanem obdobju se tako ni razširila na vse podregije.

### 3.3 Vpliv razvoja regionalnih središč rasti na regionalno rast

Za vsako kategorijo smo izračunali regresijski koeficient,  $R^2$ ,  $t$ -statistiko,  $F$ -statistiko in verjetnost vpliva razvoja regionalnih središč rasti na regionalno rast za vsak regresijski model.  $R^2$  je ocena napovedne moči niza neodvisnih spremenljivk glede regionalne rasti, koeficient pa izraža napovedno moč posamezne spremenljivke.

#### 3.3.1 Zgornja severovzhodna podregija

Rezultati za to podregijo so prikazani v preglednici 2. Vrednosti vseh spremenljivk mesta Udon Thani razen industrijskih naložb in števila visokošolskih ustanov so bile statistično pomembne. Rezultati kažejo, da sta rast bruto proizvoda na prebivalca in stopnja urbanizacije pomembna dejavnika rasti podregije. Vsi koeficienti razen koeficienta bruto proizvoda v prometnem sektorju so pozitivni. To kaže, da poteka razvoj mesta Udon Thani in podregije v isti smeri. Kupna moč, merjena na podlagi letne stopnje rasti bruto proizvoda province na prebivalca, urbanizacija in stopnja rasti trgovine v mestu Udon Thani so najbolj neposredno povezane z rastjo podregije. To se ujema z dejstvom, da gospodarstvo mesta Udon Thani temelji na storitvenem sektorju. Razvojna politika te podregije bi morala spodbujati te dejavnike, obenem pa izboljšati druge dejavnike, zlasti industrijo in prevoz. Poleg tega ima zaradi svoje lokacije v podregiji velik gospodarski potencial mejno območje, ki je neposredno povezano z laoško prestolnico Vientian.



**Slika 10:** Neenakost znotraj podregije ( $T_{ZPR}$ ) (vir: urad nacionalnega odbora za gospodarski in družbeni razvoj, 2011)

Opomba: Izračunano na podlagi bruto domačega in regionalnega proizvoda in proizvoda provinc; ZSVPR = zgornja severovzhodna podregija, OSVPR = osrednja severovzhodna podregija, SSVPR 1 = spodnja severovzhodna podregija 1 in SSVPR 2 = spodnja severovzhodna podregija 2.

Prav tako bi morali v podregiji spodbujati izvozno naravnano industrijsko dejavnost.

#### 3.3.2 Osrednja severovzhodna podregija

Rezultati za to podregijo so predstavljeni v preglednici 3. Vrednosti vseh spremenljivk v mestu Khon Kaen, razen stopnje rasti kreditov, ki jo odobrijo komercialne banke, so bile statistično pomembne. Rezultati kažejo, da sta stopnja urbanizacije in stopnja rasti bruto proizvoda na prebivalca pomembna dejavnika rasti podregije. Predznak večine koeficientov je pozitiven, kar potrjuje, da poteka razvoj mesta Khon Kaen v isti smeri kot razvoj podregije. Na podlagi teh izsledkov so urbanizacija, kupna moč, izmerjena na podlagi letne stopnje rasti BPP, in stopnja rasti kmetijskega proizvoda najbolj neposredno povezane z rastjo podregije. Kljub temu industrijski dejavniki nimajo velikega vpliva na njeno rast, čeprav je Khon Kaen edino središče rasti, ki temelji na industrijskem gospodarstvu. Industrijski razvoj mesta Khon Kaen ni povezan z industrijo njegovih satelitskih mest. Zato bi se morala politika razvoja osredotočiti na razvoj industrijskih povezav med mestom Khon Kaen in satelitskimi mesti.

#### 3.3.3 Spodnja severovzhodna podregija 1

Rezultati za to podregijo so predstavljeni v preglednici 4. Vrednosti vseh spremenljivk razvoja mesta Nakhon Ratčasima, razen bruto proizvoda v prometnem sektorju, so bile statistično pomembne. Rezultati kažejo, da sta število visokošolskih ustanov in stopnja urbanizacije pomembna dejavnika rasti podregije. Vsi koeficienti razen industrijskih naložb imajo pozitiven predznak, kar kaže, da razvoj mesta Nakhon Ratčasima poteka v isti smeri kot razvoj celotne podregije. Izobrazba prebivalcev,

**Preglednica 2:** Rezultati regresije modela zgornje severovzhodne podregije

Odvisna spremenljivka: $GR_{jt}$			
neodvisna spremenljivka	koeficient	t-statistika	verjetnost
<i>konstanta</i>	-0,977272	-0,689964	0,5023
$URB_{jt}$	0,140487	1,795415	0,0959**
$GRPC_{jt}$	0,563848	6,616486	0,0000*
$AGR_{jt}$	0,083692	2,103003	0,0555**
$MAN_{jt}$	0,048633	1,428097	0,1768***
$TRAD_{jt}$	0,085936	1,782901	0,0980**
$TRAN_{jt}$	-0,001993	-1,371473	0,1934***
$INV_{jt}$			
$LOA_{jt}$	0,020708	1,279176	0,2232***
$UNI_{jt}$			

$R^2 = 0,941239$ ;  $F$ -statistika = 29,74790;  $p(F$ -statistika) = 0,00000

Opomba: (\*), (\*\*) in (\*\*\*) pomenijo statistično pomembnost na ravneh 0,01, 0,10 in 0,20; neodvisna spremenljivka  $TRAN_{jt}$  (bruto proizvod v prometnem sektorju) se lahko razlikuje od spremenljivke, opisane v poglavju 2.3; vrednosti  $INV_{jt}$  in  $UNI_{jt}$  nista statistično pomembni.

**Preglednica 3:** Rezultati regresije modela osrednje severovzhodne podregije

Odvisna spremenljivka: $GR_{jt}$			
neodvisna spremenljivka	koeficient	t-statistika	verjetnost
<i>konstanta</i>	18,36988	2,910001	0,0131
$URB_{jt}$	0,320150	2,830178	0,0152**
$GRPC_{jt}$	0,177264	1,633023	0,1284***
$AGR_{jt}$	0,147627	3,714547	0,0030*
$MAN_{jt}$	0,057473	2,315967	0,0391**
$TRAD_{jt}$	0,131304	4,117769	0,0014*
$TRAN_{jt}$	-2,632152	-3,701508	0,0030*
$INV_{jt}$	-0,117191	-2,836449	0,0150**
$LOA_{jt}$			
$UNI_{jt}$	-1,138338	-1,631862	0,1287***

$R^2 = 0,953642$ ;  $F$ -statistika = 30,85697;  $p(F$ -statistika) = 0,00000

Opomba: (\*), (\*\*) in (\*\*\*) pomenijo statistično pomembnost na ravneh 0,01, 0,10 in 0,20; neodvisna spremenljivka  $TRAN_{jt}$  (bruto proizvod v prometnem sektorju kot delež realnega bruto proizvoda regionalnega središča rasti) se lahko razlikuje od spremenljivke, opisane v poglavju 2.3; vrednost spremenljivke  $LOA_{jt}$  ni statistično pomembna.

**Preglednica 4:** Rezultati regresije modela spodnje severovzhodne podregije 1

Odvisna spremenljivka: $GR_{jt}$			
neodvisna spremenljivka	koeficient	t-statistika	verjetnost
<i>konstanta</i>	-14,15167	-3,534184	0,0041
$URB_{jt}$	0,207815	1,619519	0,1313***
$GRPC_{jt}$	0,177058	1,507416	0,1576***
$AGR_{jt}$	0,176278	4,253901	0,0011*
$MAN_{jt}$	0,071064	2,667839	0,0205**
$TRAD_{jt}$	0,135486	3,197426	0,0077*
$TRAN_{jt}$			
$INV_{jt}$	-0,098640	-2,691138	0,0196**
$LOA_{jt}$	0,115277	2,376101	0,0350**
$UNI_{jt}$	2,904115	3,237447	0,0071*

$R^2 = 0,969475$ ;  $F$ -statistika = 47,64066;  $p(F$ -statistika) = 0,00000

Opomba: (\*), (\*\*) in (\*\*\*) pomenijo statistično pomembnost na ravneh 0,01, 0,10 in 0,20; neodvisna spremenljivka  $INV_{jt}$  (industrijske naložbe kot delež realnega bruto proizvoda regionalnega središča rasti) se lahko razlikuje od spremenljivke, opisane v poglavju 2.3; vrednost spremenljivke  $TRAN_{jt}$  ni statistično pomembna.

Preglednica 5: Rezultati regresije modela spodnje severovzhodne podregije 2

Odvisna spremenljivka: $GR_{it}$			
neodvisna spremenljivka	koeficient	t-statistika	verjetnost
<i>konstanta</i>	-4,941407	-5,101931	0,0002
$URB_{it}$			
$GRPC_{it}$	0,395837	14,45285	0,0000*
$AGR_{it}$	0,140841	9,064837	0,0000*
$MAN_{it}$			
$TRAD_{it}$	0,241668	11,90070	0,0000*
$TRAN_{it}$	-0,741904	-2,375647	0,0336**
$INV_{it}$	0,019072	2,353492	0,0350**
$LOA_{it}$	-0,042014	-4,529871	0,0006*
$UNI_{it}$	2,929630	5,166554	0,0002*
$R^2 = 0,988847$ ; $F$ -statistika = 164,6548; $p(F$ -statistika) = 0,00000			

Opomba: (\*), (\*\*) in (\*\*\*) pomenijo statistično pomembnost na ravneh 0,01, 0,10 in 0,20; neodvisni spremenljivki  $TRAN_{it}$  (bruto proizvod in prometnem sektorju kot delež realnega bruto proizvoda regionalnega središča rasti) in  $LOA_{it}$  (posojila, ki jih odobrilo komercialne banke, kot delež realnega bruto proizvoda regionalnega središča rasti) se lahko razlikujeta od spremenljivk, opisanih v poglavju 2.3; vrednost spremenljivk  $URB_{it}$  in  $MAN_{it}$  ni statistično pomembna.

merjena na podlagi števila visokošolskih ustanov, urbanizacija in kupna moč mesta Nakhon Ratčasima, so najbolj neposredno povezane z rastjo podregije. Ni čudno, da ima izobrazba najpomembnejšo vlogo v razvoju podregije, saj je Nakhon Ratčasima izobraževalno središče severovzhodne podregije. Zato bi se morala strategija razvoja osredotočati na oblikovanje povezav med visokim šolstvom in razvojem podregije, zlasti njene industrije in sorodnih panog.

### 3.3.4 Spodnja severovzhodna podregija 2

Rezultati za to podregijo so predstavljeni v preglednici 5. Vrednosti vseh spremenljivk razvoja mesta Ubon Ratcathani, razen stopnje urbanizacije in stopnje rasti bruto proizvoda v proizvodnem sektorju, so bile statistično pomembne. Rezultati kažejo, da sta število visokošolskih ustanov in stopnja rasti bruto proizvoda na prebivalca pomembna dejavnika rasti podregije. Večina koeficientov ima pozitiven predznak, kar pomeni, da poteka razvoj mesta Ubon Ratcathani v isti smeri kot razvoj vse podregije. Izobrazba prebivalcev, kupna moč in stopnja rasti trgovine v mestu Ubon Ratcathani so med seboj najbolj neposredno povezane. To se ujema z dejstvom, da gospodarstvo mesta Ubon Ratcathani in vse podregije temelji na storitveni dejavnosti.

## 4 Sklep

V članku je z metodo najmanjših kvadratov analiziran vpliv regionalnih središč rasti kot gibala gospodarske rasti regij in podregij. Večina dejavnikov razvoja regionalnih središč rasti je pozitivno povezana z rastjo podregije. V zgornji severovzhodni podregiji je najpomembnejši dejavnik kupna moč prebivalcev,

medtem ko je za osrednjo severovzhodno podregijo najpomembnejša stopnja urbanizacije. V spodnji severovzhodni podregiji 1 ima največji vpliv na gospodarsko rast število visokošolskih ustanov, ki ima pomembno vlogo tudi v spodnji severovzhodni podregiji 2. V vseh podregijah se neenakost povečuje, zlasti v osrednji severovzhodni podregiji in spodnji severovzhodni podregiji 1. Rezultati analize kažejo, da razvoj središč rasti vpliva na rast podregij, vendar ta gospodarska rast ne zmanjšuje neenakosti; to lahko vidimo v osrednji severovzhodni podregiji in spodnji severovzhodni podregiji 1. Za podregije z visoko stopnjo gospodarske rasti je značilna tudi velika notranja neenakost. Iz tega lahko sklepamo, da je v zadnjem času prostorski razvoj regionalnih središč rasti povzročil pozitivno gospodarsko rast, vendar se ta rast ni enakomerno porazdelila. Posledica tega je, da neenakost še vedno obstaja, kar se ne sklada s teorijo in z uporabljenim političnim okvirom.

Politike regionalne decentralizacije so pomemben dejavnik na nacionalni ravni, vendar bi bilo treba oblikovati boljše strategije. Strategije središč rasti ni treba opustiti, vendar pa bi jo morali izboljšati s spodbujanjem gospodarskega povezovanja med regionalnimi središči rasti in njihovimi satelitskimi mesti, kot tudi z drugimi območji z večjim potencialom. Vlada bi morala oblikovati posebne strategije za regije, ki najbolj zaostajajo (severovzhodna in severna regija); te nove strategije bi morale temeljiti na prostorskih potencialih vsake regije. Poleg tega bi morali natančno upoštevati tudi neenakost znotraj regij. Uravnoteženo politiko je treba oblikovati za vse vidike razvoja, pri čemer je cilj doseči ravnotežje tako med gospodarskimi sektorji kot tudi prostorsko in socialno ravnotežje. V severovzhodni regiji bi morali vzpostaviti tudi gospodarske povezave med regionalnimi središči rasti in njihovimi satelitskimi mesti, pri čemer bi morala tudi vsaka podregija imeti svojo posebno stra-

regijo. Glavni cilj razvojne politike v zgornji severovzhodni podregiji in spodnji severovzhodni podregiji 2 bi morala biti povezava trgovine in drugih sektorjev. Industrijske povezave bi bilo treba oblikovati v osrednji severovzhodni podregiji in spodnji severovzhodni podregiji 1. Poleg tega bi morali oblikovalci politike določiti podregije, v katerih je treba izboljšati prometno in drugo infrastrukturo ter zagotoviti naložbene priložnosti in možnosti najema posojil. Tak močni proces bo razširil rast regionalnih središč rasti na okoliška območja in pospešil njihov razvoj.

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## Opombe

[1] THB = tajski bat.

[2] V severovzhodni regiji je 19 provinc: Khon Kaen, Udon Thani, Loei, Nong Khai, Mukdahan, Nakhon Phanom, Sakon Nakhon, Kalasin, Nakhon Ratčasima, Čajaphum, Jasothon, Ubon Ratčathani, Roj Et, Buri Ram, Surin, Maha Sarakham, Si Sa Ket, Nong Bua Lam Phu in Amnat Čaroen.

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## Development of regional growth centres and impact on regional growth: A case study of Thailand's Northeastern region

This study investigates the spatial economic structure and inequality in Thailand at the national and regional levels, with a particular focus on the Northeastern region in the period from 1987 to 2007. The study has three main points: 1) examination of the economic structure and inequality at the national level and in the Northeastern region according to the Theil index, 2) determination of regional growth centres and satellite towns by using growth pole theory as a conceptual framework and incorporating spatial interaction analysis and 3) analysis of the relationship between regional growth centres and satellite towns with regard to the impact on growth and inequality. The results show that the Northeastern region is definitely the lagging region in the nation, by both gross domestic product (GDP) and gross regional product (GRP) per capita. It was therefore selected for a case study. Spatial analysis identified Nakhon Ratchasima, Khon Kaen, Udon Thani and Ubon Ratchathani as regional growth centres. Each of them has its own sphere of influence (or satellite towns), and the total area of regional growth

centres and satellite towns are classified as sub-regions. The development of regional growth centres has a direct impact on sub-regional economic growth through economic and social relationships: urbanisation, industrial development, per capita growth, the number of higher educational institutes and so on. However, such growth negatively correlates with economic equality among the provinces in a sub-region. The inequality trend is obviously on an upswing. This study suggests that industrial links between regional growth centres and their satellite towns should be improved in order for regional growth centre development to have a consistently desirable effect on both economic growth and equality. Such a strong process means that the growth of regional growth centres will spread, leading to the development of their surrounding areas.

**Keywords:** regional economic growth and inequality, growth pole, regional growth centres, regional decentralisation

## 1 Introduction

Thailand is a developing country in southeast Asia (see Figure 1). It has a population of 65 million and an area of 513,120 km<sup>2</sup>. In terms of administrative divisions, it consists of seventy-six provinces and Bangkok as the capital. All of these divisions are grouped into six regions. In 1961, Thailand took the first step towards modern development by launching its first national development plan. It has promoted infrastructure development, a free-enterprise economy, pro-investment policies, export industries and spatial development for more than fifty years. Policies to decentralise the economy and reduce regional inequalities have been implemented. One of these policies is the spatial policy, which has focused on three areas: urban system development and management, regional growth centre strategy and world-region spatial development. This study focuses on the regional growth centre strategy as an engine for regional development.



Figure 1: Map of Thailand (source: Sang-arun, 2012).

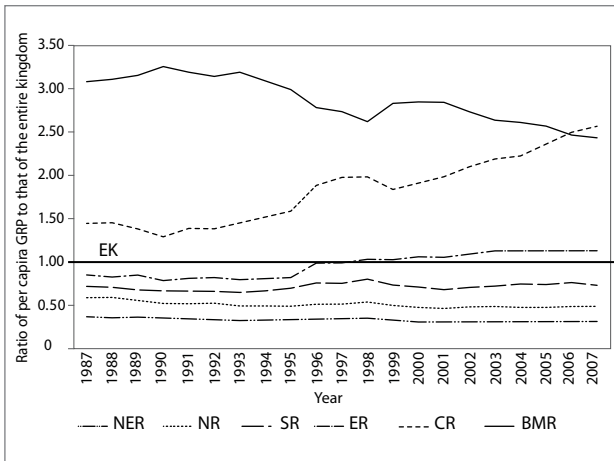
This study examines the period from 1987 to 2007 because of the availability of a constant dataset at the beginning of the study. In 2007, Thailand's gross domestic product (GDP) was THB 4.26 trillion<sup>[1]</sup> (about USD 0.13 trillion) and had been growing at the average rate of 5.81% for more than twenty years. This volume could be spatially divided into the gross regional product (GRP) of six regions (Northeastern, Northern, Southern, Eastern, Central and Bangkok metropolitan). The volume of the Bangkok metropolitan region is the highest, at THB 1.87 trillion (43.96% of GDP and about USD 0.06 trillion), with an average annual growth rate of 5.38% between 1987 and 2007; at present it also has a high per capita GRP at THB 313,979 (USD 9,812). These high values of the Bangkok metropolitan region have persisted because of the primarily urban situation of the Bangkok metropolitan region. It is not surprising that most studies of economic inequality and income distribution in Thailand (Ikemoto & Limskul, 1987; Kaothien, 1991; Deolalikar, 2002; Tinakorn, 2002; Glassman & Sneddon, 2003) have mentioned the disparity between the Bangkok metropolitan region (and only the Bangkok metropolitan region in some cases) and the remaining regions of the country. Figure 1 shows the map of Thailand and its regions.

Comparing the per capita GRP of each region with entire country's GDP per capita, the inequality ratio of the Northeastern region is the worst, at an average of 0.33 for 20 years (from 1987 to 2007). This means that the Northeastern region's per capita GRP is less than one-third of the GDP per capita. Certainly, the ratio of the Bangkok metropolitan region is the highest, and so it is the leading region. At the same time, the Northeastern region lags the most. Figure 2 shows the trend of the inequality ratio in per capita GRP for all regions from 1987 to 2007.

From the observation above, it is of interest to investigate the Northeastern region in greater detail regarding regional growth centres and economic development. This study explores the impact of regional growth centres on the economic growth and inequality of the Northeastern region on the following issues. First, it examines economic structure and inequality at both the national level and for the Northeastern region. Second, it determines regional growth centres and satellite towns. Finally, it analyses the relationship between regional growth centres and satellite towns with regard to the impact on growth and inequality.

## 2 Theory and methodology

The growth pole theory is usually referred to in studies about regional growth centres. It was first mentioned in François Perroux (1955), who stated that "[g]rowth does not appear eve-



**Figure 2:** Ratio of per capita GRP to that of the entire country (EK = 1.0) (source: Office of the National Economic and Social Development Board, 2011).

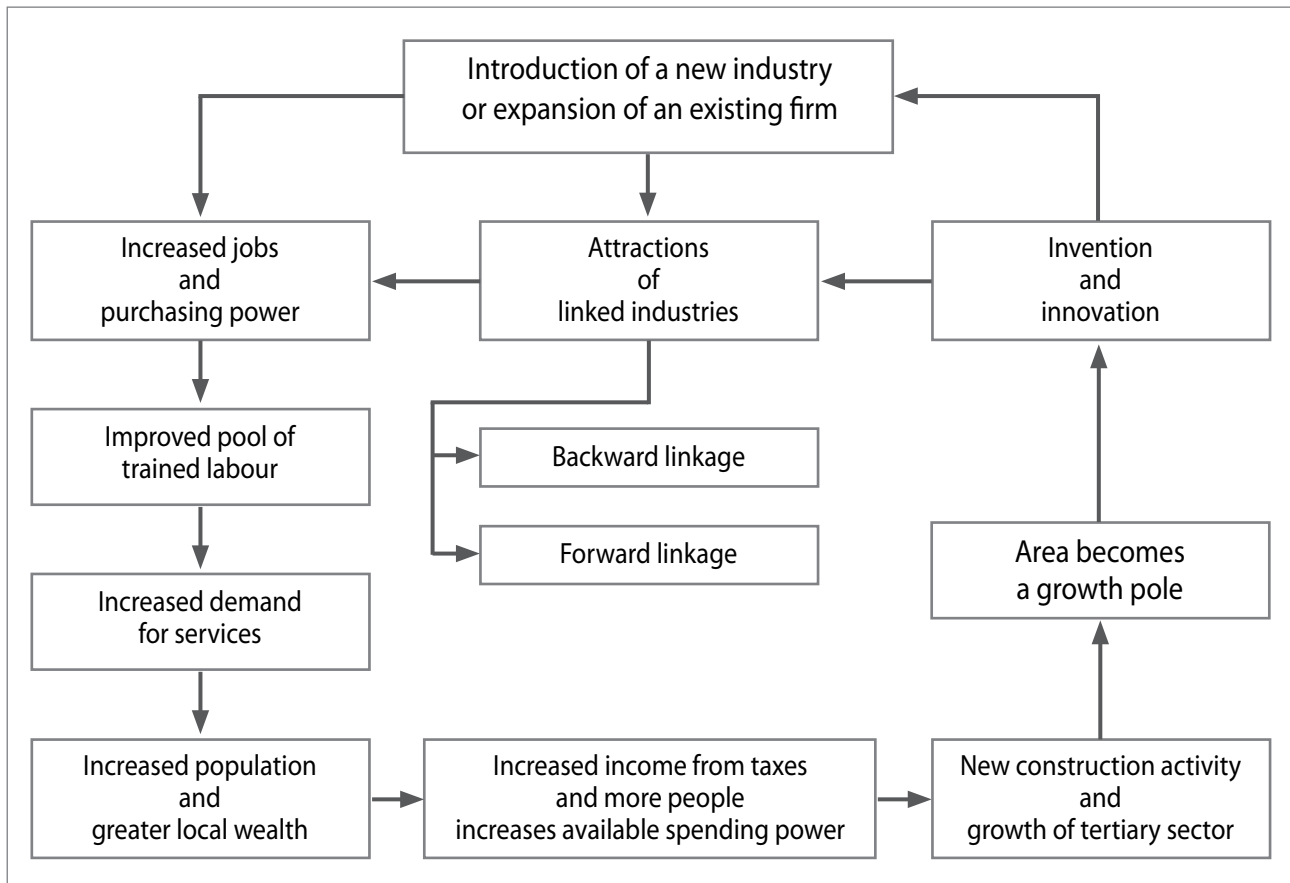
Note: Calculated from gross domestic, regional and provincial product; NER = Northeastern region, NR = Northern region, SR = Southern region, ER = Eastern region, CR = Central region and BMR = Bangkok metropolitan region, EK = entire kingdom.

seems to be a propulsive economic unit (Malul et al., 2012). When developments or changes occur in the pole, it will cause change in the other units as well. At that time, the pole was not involved with space, but with industrial clustering. This concept is also consistent with the “unbalanced growth” proposition of Albert O. Hirschman (1958), who took into account investment in some leading sectors, and backward and forward economic links.

Jacques Raoul Boudeville (1966) introduced the space concept in the 1960s. The spatial growth pole refers to the core area of economic agglomeration that has spread its development forces to the surrounding periphery (Darwent, 1969). It is called the growth centre, and this centre usually refers to a city or urban area. The city, as a growth pole, could lead development or growth to its periphery under two conditions. First, the city has to develop itself or make its own development forces. Second, it should spread the forces to its sphere of influence through links; these may be economic, infrastructure or even social.

rywhere at the same time; it becomes manifest at points or poles of growth, with variable intensity; it spreads through different channels, with variable terminal effects on the whole of the economy.” For this reason, the growth pole (or core)

In the 1970s, growth pole theory was applied to regional development in Thailand through regional growth centre policy in four regions. The initial objectives of this policy were to develop the regional economy, to reduce regional inequalities and to



**Figure 3:** The growth pole’s economic cumulative causation (source: Barcelona Field Studies Centre, 2011).

restrict the over-urbanisation of the Bangkok metropolitan region. There were five primary regional growth centres: Chiang Mai in the Northern region, Songkhla in the Southern region, Chon Buri in the Eastern region, and Nakhon Ratchasima and Khon Kaen in the Northeastern region. This policy absolutely drives economic development and decentralisation, industrial development, infrastructure development, social development and regional inequality reduction. The development of new industry or economic activity in the regional growth centres encourages the concentration of further industrial activity via “cumulative causation” or a multiplier effect, as shown in Figure 3.

The city as a growth pole is an engine for regional development, but it may cause regional inequality in cases in which the pattern of the national or regional urban system is monocentric development. More monocentricity increases inequality. Thus, a polycentric pattern of urban systems is appropriate and can also combat regional inequality (Sandberg & Meijers, 2006). Therefore the hypothesis of this study is that development of the Northeastern region's regional growth centres causes greater regional economic growth and also reduces inequality.

### 2.1 Regional growth and inequality analysis

This study uses the following data: gross domestic product (GDP), gross regional product (GRP) and gross provincial product (GPP), as well as the population data for these levels from 1987 to 2007. The compound annual growth rate is calculated for economic growth. For regional economic inequality, a one-stage Theil decomposition method (Akita, 2000) is applied, as shown in Equation 1:

$$T_p = \sum_i \sum_j \left(\frac{Y_{ij}}{Y}\right) \log \left(\frac{Y_{ij}/Y}{N_{ij}/N}\right)$$

Where

- $T_p$  = overall economic inequality
- $Y_{ij}$  = gross product of province  $j$  in region  $i$
- $Y$  = total gross product of all provinces
- $N_{ij}$  = population of province  $j$  in region  $i$
- $N$  = total population of all provinces

If  $T_{pi}$  is defined as follows, to measure between-province economic inequality for region  $i$  as shown in Equation 2:

$$T_{pi} = \sum_j \left(\frac{Y_{ij}}{Y_i}\right) \log \left(\frac{Y_{ij}/Y_i}{N_{ij}/N_i}\right)$$

then the Theil index  $T$  in Equation 1 can be decomposed into Equation 3:

$$\begin{aligned} T_p &= \sum_i \left(\frac{Y_i}{Y}\right) T_{pi} + \sum_i \left(\frac{Y_i}{Y}\right) \log \left(\frac{Y_i/Y}{N_i/N}\right) = \\ &= \sum_i \left(\frac{Y_i}{Y}\right) T_{pi} + T_{BR} = \\ &= T_{WR} + T_{BR} \end{aligned}$$

Where

- $Y_i$  = total gross product of region  $i$
- $N_i$  = total population of region  $i$
- $T_{WR}$  = within-region economic inequality
- $T_{BR}$  = between-region economic inequality

Equation 3 is the ordinary one-stage Theil inequality decomposition, in which the overall economic inequality  $T_p$  is the sum of the within-region component ( $T_{WR}$ ) and the between-region component ( $T_{BR}$ ), where the within-region component is the weighted average of inter-province economic inequality for each region ( $T_{pi}$ ). The Theil index ( $T_p$ ), defined by Equation 1, employs income shares as weights. It is therefore sensitive to changes in richer provinces.

### 2.2 Identification of regional growth centres

Although there are three growth centres in the Northeastern region, as mentioned in the Sixth National Economic and Social Development Plan (1987–1991), their zones of influence (or satellite towns) are not specified. Empirical analysis is therefore required, and urban ranking is the chosen method. Provinces<sup>[2]</sup> are the units of analysis and the variables for the ranking are shown in Table 1. The  $Z$ -score regression equation is used as Equation 4:

$$X = a_1Z_1 + a_2Z_2 + a_3Z_3 + \dots + a_iZ_i$$

Where

- $X$  = regional growth centre score
- $a_i$  = weight (factor loading, computed by factor analysis of variables shown in Table 1, is used as the weight in this analysis)
- $Z_i$  =  $Z$ -score of each variable



Regional growth centres' sphere of influence is determined by using gravity analysis to consider spatial interaction. Thus the area of each regional growth centre and its satellite towns is defined as the sub-region. The equation for the gravity analysis is shown in Equation 5:

$$r_{ij} = \frac{\sqrt{N_i Y_i} \sqrt{N_j Y_j}}{d_{ij}^2}$$

Where

- $r_{ij}$  = spatial interaction of regional growth centre  $i$  and satellite town  $j$
- $N_i$  = population of regional growth centre  $i$
- $N_j$  = population of satellite town  $j$
- $Y_i$  = GPP of regional growth centre  $i$
- $Y_j$  = GPP of satellite town  $j$
- $d_{ij}$  = distance between  $i$  and  $j$

### 2.3 Impact of regional growth centre development on regional growth analysis

The theory and hypothesis above indicate a relationship between the development of regional growth centres and regional economic growth and inequality. Regional growth centres are regarded as a dynamic function for promoting regional growth and reducing regional inequality. In order to apply these relations, this study sets up a multiple regression model as shown in Equation 6:

$$GR_{it} = a_1 + b_1URB_{jt} + b_2GRPC_{jt} + b_3ARG_{jt} + b_4MAN_{jt} + b_5TRAD_{jt} + b_6TRAN_{jt} + b_7INV_{jt} + b_8LOA_{jt} + b_9UNI_{jt} + u_i$$

Where

- $i$  = sub-region
- $j$  = regional growth centre
- $t$  = period of study, 1987–2007
- $u_i$  = random error term
- $a_1$  = constant
- $b_n$  = regression coefficient, ( $n = 1, \dots, 9$ )
- $GR_{it}$  = economic growth
- $URB_{jt}$  = urbanisation rate
- $GRPC_{jt}$  = growth rate of per capita gross growth centre product
- $AGR_{jt}$  = growth rate of agricultural product
- $MAN_{jt}$  = growth rate of manufacturing product
- $TRAD_{jt}$  = growth rate of trade volume
- $TRAN_{jt}$  = growth rate of transportation product
- $INV_{jt}$  = growth rate of industrial investment
- $LOA_{jt}$  = growth rate of loans granted by commercial banks
- $UNI_{jt}$  = number of institutes of higher education

This model presents the general growth equation, in which the growth of the sub-regional economy is defined by various factors. However, in this study the growth pole theory is a conceptual framework, and so nine independent variables were defined that can express the developments of regional growth centres. One of the main concepts of the growth pole is urban-based development, and so the urbanisation rate can potentially represent the “urban role” of each regional growth centre. The growth rate of gross regional growth centres' prod-

**Table 1:** Variables for urban ranking.

Category	Variable
Physical and infrastructure (7 variables)	Urban area
	Regional percentage of urban area
	Regional percentage of industrial area
	Regional percentage of road length
	Regional percentage of electricity consumption
	Regional percentage of water consumption
	Regional percentage of vehicles registered
Population and labour (7 variables)	Population
	Population density
	Urban population
	Regional percentage of urban population
	Provincial percentage of employed labour force
	Provincial percentage of employed industrial labour force
	Provincial percentage of employed services labour force
Economy (11 variables)	Regional percentage of GPP per capita
	Regional percentage of GPP in industrial sector
	Regional percentage of GPP in service sector
	Regional percentage of factories
	Regional percentage of industrial capital
	Regional percentage of businesses
	Regional percentage of budgets
Regional percentage of revenue tax	
Public services (5 variables)	Regional percentage of deposits
	Regional percentage of loans
	Number of higher education institutes
	Regional percentage of higher-educated persons
	Regional percentage of high-school-educated persons
	Number of medical establishments with beds
	Population per medical personnel

Note: Data in 2007 are collected for variables.

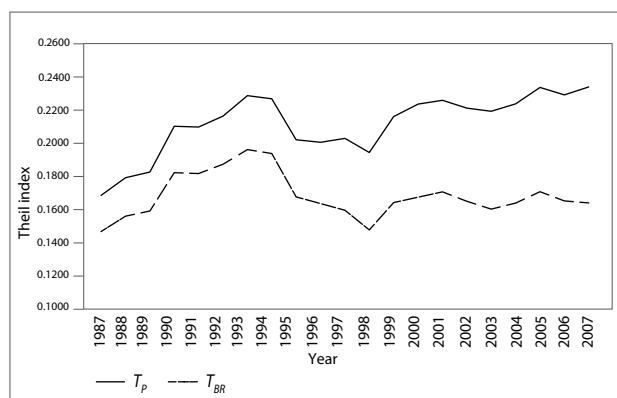
uct per capita is added to investigate the purchasing power of the growth centres, which expresses the level of economic exchange in the area. This also involves another factor: trade volume. Agricultural development still plays an important role in the Northeastern region and some of its products are raw materials for agriculture or the food industry in the urban area. Furthermore, industrial development is a significant factor of the growth pole and should influence the regional growth rate. Thus, the manufacturing product, industrial investment and involved factors, transportation product and loans granted also enter into the equation. The last variable, the number of institutes of higher education, represents the human capital level and knowledge spill-over.

### 3 Result and discussion

#### 3.1 National and regional growth and inequality

During the period of the study, Thailand was a fast-growing nation, evidenced by a high annual growth rate of real GDP. However, over this long period, there were several economic situations: from the miracle years in the first decade, to the crisis in 1997, to the recovery in the later years. The first part of study period (1987–1996) was the miracle growth time, at approximately 9.50% per year. It reached a peak in 1988 at 13.29%. Unexpectedly, the economic crisis struck in the first year of the second decade, in 1997. Growth fell to its lowest at –10.51% the following year. After the shock, from 1999 to 2007, growth quietly recovered with an annual average of 5.05%. Thus, from 1987 to 2007, the annual average rate of growth was 5.81%.

The regional growth trend seems to match the national level. There are two remarkable growth regions that exceed the national growth rate: the Eastern region (at an annual average of 9.02%) and the Central region (at an annual average of 7.54%).

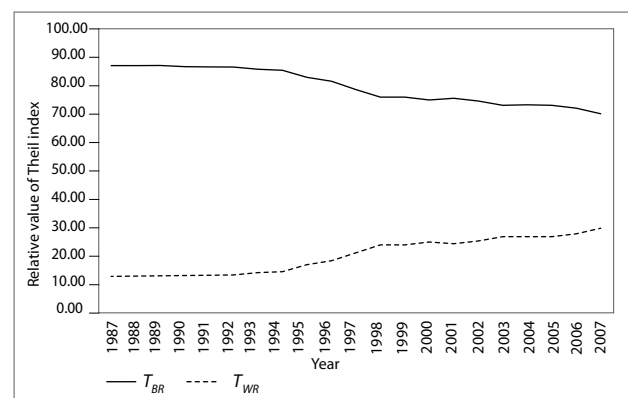


**Figure 4:** Overall inequality ( $T_p$ ) and between-region inequality ( $T_{BR}$ ) (source: Office of the National Economic and Social Development Board, 2011).

Note: Calculated from gross domestic, regional and provincial product;  $T_p$  = overall inequality and  $T_{BR}$  = between-region inequality.

Industrialisation is presumably driving their growth. The positions of other regions are the Bangkok metropolitan region at 5.38%, the Southern region at 5.21%, the Northeastern region at 4.49% and the Northern region at 4.03%.

Referring to the national and regional inequality in Figure 4, the trend of overall inequality ( $T_p$ ) increased throughout the study period by annual average of 1.65%. This result is related to what other studies have also found (e.g. Nopkhun, 2005; Boonyamanond, 2007; Wisaweisun, 2009). This trend matches between-region inequality ( $T_{BR}$ ) and has not increased much, at an annual average of only 0.56%. These rates were at the bottom in the early years and during the shock of the economic crisis. Thus, all along Thailand has experienced spatial economic inequality, especially during the miracle growth and recovery phases. The inequality rate was particularly affected during the crisis. In sum, higher economic growth over the past twenty years contributed to higher income but did not spread across any region, and regions with higher growth were more sensitive to the economic crisis than other regions. The space between the two lines is within-region inequality ( $T_{WR}$ ), which increased during the time. This situation is illustrated in Figure 5, showing the relative contribution of the Theil index. The upper line,  $T_{BR}$  has fallen significantly, whereas the lower line,  $T_{WR}$  has risen. Based on this evidence, regional decentralisation in modern Thailand's development works effectively because of the decreasing  $T_{BR}$ . Not only the Bangkok metropolitan region, as the peak region of the nation, but also other regions, particularly the Eastern and Central regions, gain the benefits of national growth. However, at the same time, this success has side effects; there is more within-region inequality in each region. Thus, although the national economy grew, such growth was limited to only a few areas of the regions. Thailand therefore has a new inequality dilemma: within-region inequality.



**Figure 5:** Relative value of the Theil index (source: Office of the National Economic and Social Development Board, 2011).

Note: Calculated from gross domestic, regional and provincial product;  $T_{BR}$  = between-region inequality and  $T_{WR}$  = within-region inequality.

In Figure 6, within-region inequality is obviously higher for the Group A region (represented by the indexes of the Bangkok metropolitan region, Central region and Eastern region) than the Group B region (the Northeastern region, Northern region and Southern region). It has already been noted that the economic growth of the Group A region is also absolutely higher than the Group B region. This is clear not only at the national level, which faces within-region inequality, but also at the regional level, particularly in high-growth regions. This evidence shows that economic growth is not spatially apparent overall. Only some areas in each region gain the benefit of economic growth: presumably urban areas or industrial zones.

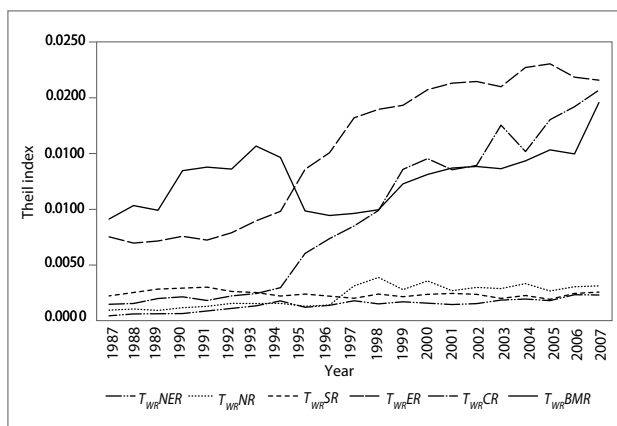
### 3.2 Regional growth centres and sub-regions

The result of urban ranking is shown in Figure 7. The scores for Nakhon Ratchasima, Khon Kaen, Udon Thani and Ubon Ratchathani stand out, and point A in Figure 7 is the sharp curve point, which separates the graph into two parts as follows:

1. Group 1: the top four provinces are Nakhon Ratchasima, Khon Kaen, Udon Thani and Ubon Ratchathani. They are identified as regional growth centres.
2. Group 2: the remainder consists of Buri Ram, Surin, Roi Et, Kalasin, Sakon Nakhon, Chaiyaphum, Si Sa Ket, Maha Sarakham, Nong Khai, Loei, Nakhon Phanom, Nong Bua Lam Phu, Mukdahan, Yasothon and Amnat Charoen. They are identified as satellite towns.

Figure 8 describes spatial interaction between Group 1 and Group 2. Thus there are four sub-regions (by the number of regional growth centres). Their details are as follows:

1. The Upper Northeastern sub-region (UNESR)  
Udon Thani is the growth centre and its satellite towns are Loei, Nong Khai, Sakon Nakhon and Nong Bua Lam Phu.



**Figure 6:** Within-region inequality ( $T_{WR}$ ) (source: Office of the National Economic and Social Development Board, 2011).

Note: Calculated from gross domestic, regional and provincial product; NER = Northeastern region, NR = Northern region, SR = Southern region, ER = Eastern region, CR = Central region and BMR = Bangkok metropolitan region.

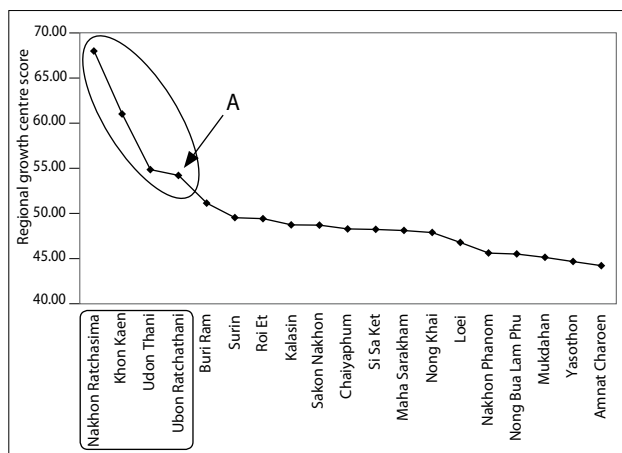
This sub-region covers 43,852.044 km<sup>2</sup> and had a population of 4,659,509 in 2007. In economic terms, the gross sub-regional product (GSRP) in 2007 was THB 83.6 billion (about USD 2.7 billion). This volume represents 19.1% in the agricultural sector, 17.5% in the industrial sector and 63.4% in the service sector, with an average annual growth rate of 4.05% from 1987 to 2007. Udon Thani, as the growth centre, has a population of 1,530,686 and so it is the sixth-largest province in Thailand. Its GPP is THB 31.8 billion (about USD 1.0 billion) and most of it is from the service sector.

#### 2. The Central Northeastern sub-region (CNESR)

Khon Kaen is the growth centre and its satellite towns are Kalasin, Roi Et, Maha Sarakham and Nakhon Phanom. This sub-region covers 36,936.537 km<sup>2</sup> and had a population of 5,671,621 in 2007. In economic terms, the GSRP in 2007 was THB 135.4 billion (about USD 4.4 billion). It is the largest sub-region in terms of economic size. This volume represents 15.4% in the agricultural sector, 34.7% in the industrial sector and 49.9% in the service sector, and had an average annual growth rate of 5.23% from 1987 to 2007. Khon Kaen, as the growth centre, has a population of 1,752,414 and so it is the fourth-largest province in Thailand. Its GPP is THB 70.0 billion (about USD 2.3 billion) and most of it is from the industrial sector.

#### 3. The Lower Northeastern sub-region 1 (LNSR 1)

Nakhon Ratchasima is the growth centre and its satellite towns are Buri Ram, Chaiyaphum and Surin. This sub-region is the largest sub-region, covering 51,719.192 km<sup>2</sup> and with a population of 6,581,233 in 2007. In economic terms, the GSRP in 2007 was THB 133.5 billion (about USD 4.3 billion). This volume represents 21.0% in the agricultural sector, 25.4% in the industrial sector and 53.6% in the service sector and with an average annual growth



**Figure 7:** Result of urban ranking.

Note: The calculation from the Z-score regression is used as Equation 4; point A is the sharp curve point, which separates the graph into two parts.

rate of 4.39% from 1987 to 2007. Nakhon Ratchasima, as the growth centre, has a population of 2,552,894 and so it is the second-largest province in Thailand. Its GPP is THB 68.9 billion (about USD 2.2 billion) and most of it is from the service sector.

4. The Lower Northeastern sub-region 2 (LNSR 2)

Ubon Ratchathani is the growth centre and its satellite towns are Mukdahan, Si Sa Ket, Amnat Charoen and Yasothon. This sub-region covers 36,624,331 km<sup>2</sup> and had a population of 4,473,284 in 2007. In economic terms, GSRP in 2007 was THB 72.6 billion (about USD 2.3 billion). This volume represents 21.2% in the agricultural sector, 14.1% in the industrial sector and 64.7% in the service sector, and had an average annual growth rate of 3.95% from 1987 to 2007. Ubon Ratchathani, as the growth centre, has a pop-

ulation of 1,785,709 and so it is the third-largest province in Thailand. Its GPP is THB 31.8 billion (about USD 1.0 billion) and most of it is from the service sector.

Most of sub-regions' economies are based on the service sector, except for the Central Northeastern sub-region. Khon Kaen is the only industrial growth centre. Analysis of the sub-regions in the Northeastern region shows that the highest economic growth is in the Central Northeastern sub-region, at an annual average of 5.23% (more than the growth rate of the Northeastern region). The positions of the other sub-regions are the Lower Northeastern sub-region 1 at 4.39%, the Upper Northeastern sub-region at 4.03% and the Lower Northeastern sub-region 2 at 3.95%.

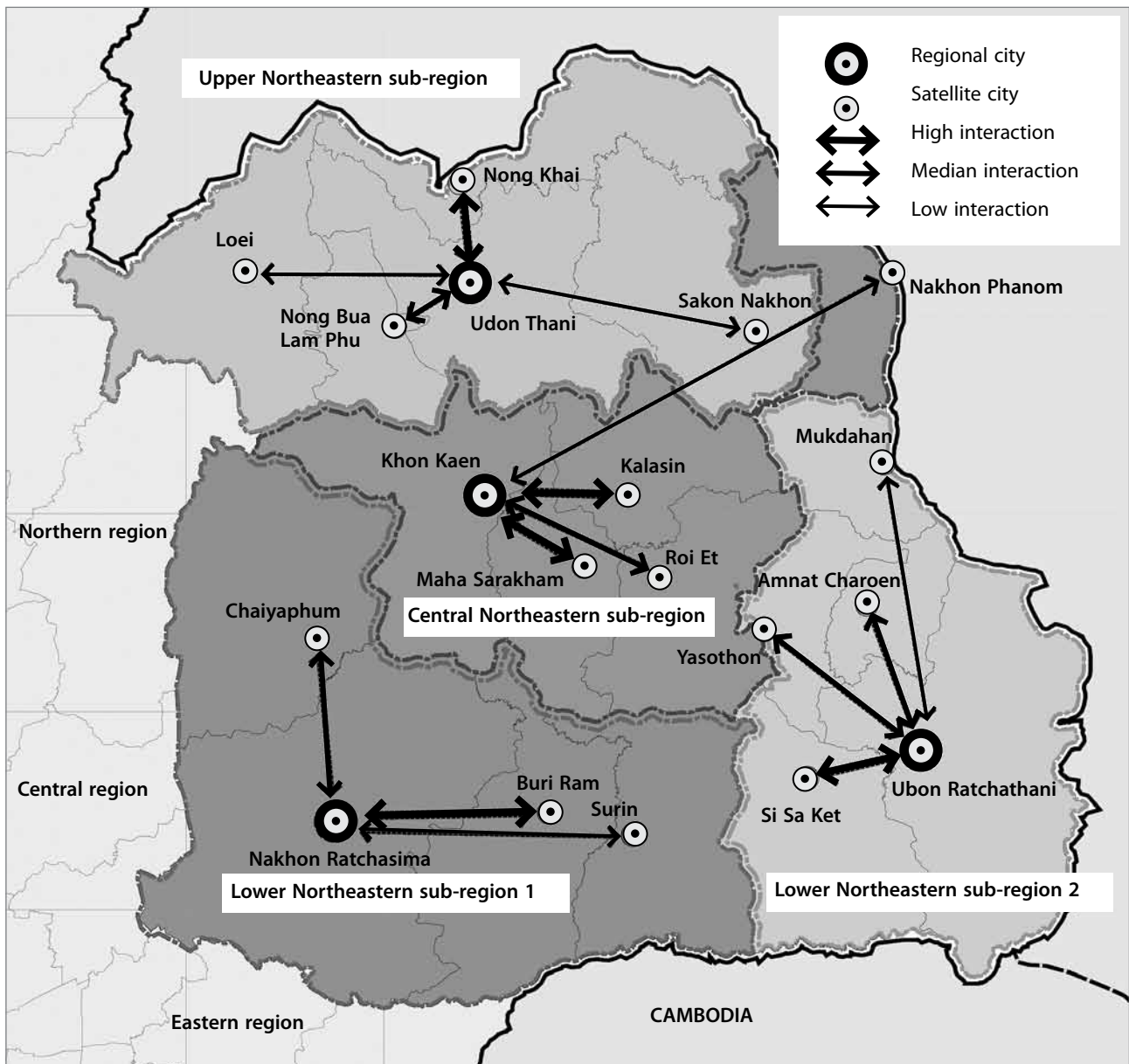


Figure 8: Sub-regions (source: Sang-arun, 2012).

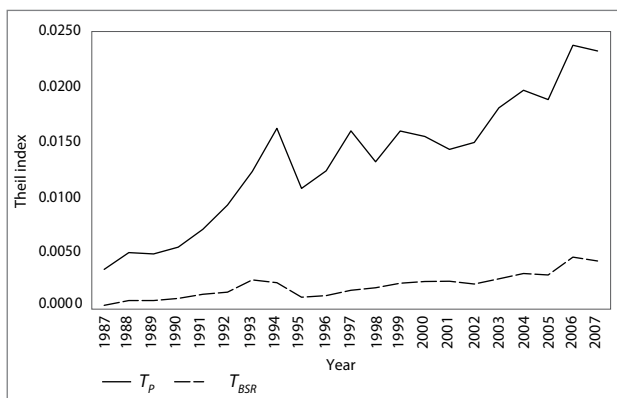
Figure 9 shows regional inequality. The trends of both overall inequality ( $T_p$ ) and between-sub-regional inequalities ( $T_{BSR}$ ) increased throughout the time of the study.  $T_p$  has excessively increased. Moreover, the space between these lines is widely separated from each other because of within-sub-region inequality, as shown in Figure 10. The indexes of the Central Northeastern sub-region and Lower Northeastern sub-region 1 (referred to as Group C) are obviously higher than the Upper Northeastern sub-region and the Lower Northeastern sub-region 2 (referred to as Group D). As already mentioned, the economic growth of Group C is also absolutely higher than Group D. Thus the higher growth during this period did not spread across any sub-regions.

### 3.3 Impact of regional growth centre development on regional growth

The findings for each category yield a regression coefficient,  $R^2$ ,  $t$ -statistic,  $F$ -statistic and probabilities for regression models on the impact of regional growth centre development on regional growth.  $R^2$  assesses the predictive power of the set of independent variables on regional growth, and the coefficient is the unique predictive power of each variable.

#### 3.3.1 Upper Northeastern sub-region

The findings for this sub-region are presented in Table 2. All aspects of Udon Thani, except for industrial investment and the number of higher education institutes, were statistically significant. The results show that the growth rate of gross product per capita and the urbanisation rate are important factors for sub-region growth. The sign of all coefficients is plus (+), except for the transportation product volume. This shows that the development of the Udon Thani growth centre



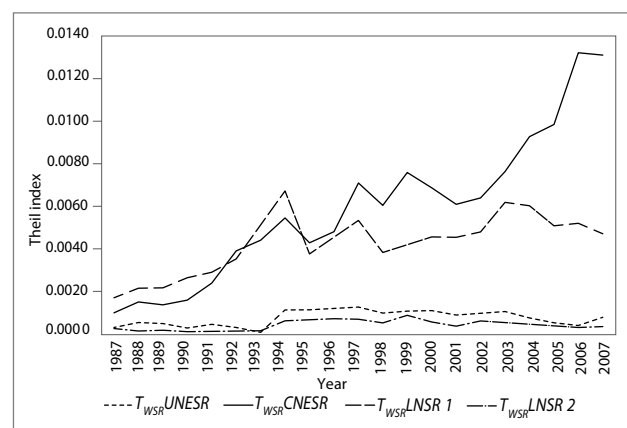
**Figure 9:** Overall inequality ( $T_p$ ) and between-sub-regional inequality ( $T_{BSR}$ ) (source: Office of the National Economic and Social Development Board, 2011).

Note: Calculated from gross domestic, regional and provincial product;  $T_p$  = overall inequality and  $T_{BSR}$  = between-sub-regional inequality.

has the same direction as the growth of the sub-region. Based on these findings, Udon Thani's purchasing power measured by annual per capita GPP growth rate, urbanisation and the growth rate of trade volume are most directly correlated to the growth of the sub-region. The result corresponds to the service sector economic base of Udon Thani. It is possible to design the development policy for this sub-region by promoting these factors and also by improving other factors, especially industry and transportation. Moreover, the spatial potential of the sub-region is the border area, which is directly connected to Vientiane, the capital of Laos. Export-oriented industrial development should be promoted for this sub-region.

#### 3.3.2 Central Northeastern sub-region

The findings for this sub-region are presented in Table 3. All aspects of Khon Kaen's development, except for the growth rate of loans granted by commercial banks, were statistically significant. The findings reveal that the urbanisation rate and growth rate of gross product per capita are important factors for sub-region growth. The sign of most coefficients is plus (+). This shows that the development of Khon Kaen has the same direction as the growth of the sub-region. Based on these findings, Khon Kaen's urbanisation, the purchasing power measured by annual per capita GPP growth rate and the growth rate of agricultural volume are the most directly correlated to the growth of the sub-region. However, industrial factors have only a slight impact on this growth, even if Khon Kaen is the only growth centre based on an industrial economy. It shows that the industrial development of Khon Kaen is not linked to the industry of its satellite towns. Thus, developing industrial links between Khon Kaen and its satellite towns should be the main policy.



**Figure 10:** Within-sub-region inequality ( $T_{WSR}$ ) (source: Office of the National Economic and Social Development Board, 2011).

Note: Calculated from gross domestic, regional and provincial product; UNESR = Upper Northeastern sub-region, CNESR = Central Northeastern sub-region, LNSR 1 = Lower Northeastern sub-region 1 and LNSR 2 = Lower Northeastern sub-region 2.

**Table 2:** Regression results for the Upper Northeastern sub-region model.

Dependent variable: $GR_{it}$			
Independent variable	Coefficient	t-statistic	Probability
<i>constant</i>	-0.977272	-0.689964	0.5023
$URB_{it}$	0.140487	1.795415	0.0959**
$GRPC_{it}$	0.563848	6.616486	0.0000*
$AGR_{it}$	0.083692	2.103003	0.0555**
$MAN_{it}$	0.048633	1.428097	0.1768***
$TRAD_{it}$	0.085936	1.782901	0.0980**
$TRAN_{it}$	-0.001993	-1.371473	0.1934***
$INV_{it}$			
$LOA_{it}$	0.020708	1.279176	0.2232***
$UNI_{it}$			

$R^2 = 0.941239$ ;  $F$ -statistic = 29.74790;  $p(F$ -statistic) = 0.00000

Note: (\*), (\*\*) and (\*\*\*) signify statistical significance at the 0.01, 0.10 and 0.20 levels; the independent variable  $TRAN_{it}$  (transportation product volume) may be different from the variable mentioned in section 2.3; there is no statistical significance for  $INV_{it}$  and  $UNI_{it}$ .

**Table 3:** Regression results for the Central Northeastern sub-region model.

Dependent variable: $GR_{it}$			
Independent variable	Coefficient	t-statistic	Probability
<i>constant</i>	18.36988	2.910001	0.0131
$URB_{it}$	0.320150	2.830178	0.0152**
$GRPC_{it}$	0.177264	1.633023	0.1284***
$AGR_{it}$	0.147627	3.714547	0.0030*
$MAN_{it}$	0.057473	2.315967	0.0391**
$TRAD_{it}$	0.131304	4.117769	0.0014*
$TRAN_{it}$	-2.632152	-3.701508	0.0030*
$INV_{it}$	-0.117191	-2.836449	0.0150**
$LOA_{it}$			
$UNI_{it}$	-1.138338	-1.631862	0.1287***

$R^2 = 0.953642$ ;  $F$ -statistic = 30.85697;  $p(F$ -statistic) = 0.00000

Note: (\*), (\*\*) and (\*\*\*) signify statistical significance at the 0.01, 0.10 and 0.20 levels; the independent variable  $TRAN_{it}$  (transportation product as a percentage of real gross regional growth centre product) may be different from the variable mentioned in section 2.3; there is no statistical significance for  $LOA_{it}$ .

**Table 4:** Regression results for the Lower Northeastern sub-region 1 model.

Dependent variable: $GR_{it}$			
Independent variable	Coefficient	t-statistic	Probability
<i>constant</i>	-14.15167	-3.534184	0.0041
$URB_{it}$	0.207815	1.619519	0.1313***
$GRPC_{it}$	0.177058	1.507416	0.1576***
$AGR_{it}$	0.176278	4.253901	0.0011*
$MAN_{it}$	0.071064	2.667839	0.0205**
$TRAD_{it}$	0.135486	3.197426	0.0077*
$TRAN_{it}$			
$INV_{it}$	-0.098640	-2.691138	0.0196**
$LOA_{it}$	0.115277	2.376101	0.0350**
$UNI_{it}$	2.904115	3.237447	0.0071*

$R^2 = 0.969475$ ;  $F$ -statistic = 47.64066;  $p(F$ -statistic) = 0.00000

Note: (\*), (\*\*) and (\*\*\*) signify statistical significance at the 0.01, 0.10 and 0.20 levels; the independent variable  $INV_{it}$  (industrial investment as a percentage of real gross regional growth centre product) may be different from the variable mentioned in section 2.3; there is no statistical significance for  $TRAN_{it}$ .

**Table 5:** Regression results for the Lower Northeastern sub-region 2 model.

Dependent variable: $GR_{it}$			
Independent variable	Coefficient	t-statistic	Probability
<i>constant</i>	-4.941407	-5.101931	0.0002
$URB_{it}$			
$GRPC_{it}$	0.395837	14.45285	0.0000*
$AGR_{it}$	0.140841	9.064837	0.0000*
$MAN_{it}$			
$TRAD_{it}$	0.241668	11.90070	0.0000*
$TRAN_{it}$	-0.741904	-2.375647	0.0336**
$INV_{it}$	0.019072	2.353492	0.0350**
$LOA_{it}$	-0.042014	-4.529871	0.0006*
$UNI_{it}$	2.929630	5.166554	0.0002*

$R^2 = 0.988847$ ;  $F$ -statistic = 164.6548;  $p(F$ -statistic) = 0.00000

**Note:** (\*), (\*\*) and (\*\*\*) signify statistical significance at the 0.01, 0.10 and 0.20 levels; the independent variables  $TRAN_{it}$  (transportation product as a percentage of real gross regional growth centre product) and  $LOA_{it}$  (loans granted by commercial banks as a percentage of real gross regional growth centre product) may be different from the variables mentioned in section 2.3; there is no statistical significance for  $URB_{it}$  and  $MAN_{it}$ .

### 3.3.3 Lower Northeastern sub-region 1

The findings for this sub-region are presented in Table 4. All aspects of Nakhon Ratchasima's development, except for transportation product, were statistically significant. The findings show that number of higher education institutes and the urbanisation rate are important factors for sub-region growth. The sign of all coefficients is plus (+), except for industrial investment. This shows that the development of Nakhon Ratchasima has the same direction as the growth of the sub-region. Based on these findings, Nakhon Ratchasima's education measured by the number of higher educational institutes, urbanisation and purchasing power are most directly correlated to the growth of the sub-region. It is not surprising that education plays the main role for sub-regional development because Nakhon Ratchasima is the educational centre of the Northeastern region. Therefore linking higher education and sub-region development, especially industry and related sectors, should be a strong policy.

### 3.3.4 Lower Northeastern sub-region 2

The findings for this sub-region are presented in Table 5. All aspects of Ubon Ratchathani's development, except for the urbanisation rate and growth rate of manufacturing product, were statistically significant. The findings show that number of higher education institutes and the growth rate of gross product per capita are important factors for sub-region growth. The sign of most coefficients is plus (+). This shows that the development of Ubon Ratchathani has the same direction as the growth of the sub-region. The findings show that Ubon Ratchathani's education, purchasing power and growth rate of trade volume are most directly correlated. This corresponds to the service sector economic base of Ubon Ratchathani and the sub-region.

## 4 Conclusion

The impact of regional growth centres as a driver of (sub)-regional growth is analysed using the least squares estimation method of regression. Most factors of regional growth centre development correlate positively with the growth of the sub-region. In the case of the Upper Northeastern sub-region, the most important factor is people's purchasing power. For the Central Northeastern sub-region, the most important factor is the urbanisation rate. For the Lower Northeastern sub-region 1, the number of higher education institutes is the most influential for growth. For the Lower Northeastern sub-region 2, the number of higher educational institutes seems to be an important factor for sub-region growth. When considered in conjunction with the inequality of each sub-region, it is found that all sub-regions have a tendency toward increasing inequality, especially in the Central Northeastern sub-region and the Lower Northeastern sub-region 1. From the results of the analysis, it is shown that the development of the growth centres has an impact on sub-regional growth but that this economic growth does not reduce inequality, as seen in the Central Northeastern sub-region and Lower Northeastern sub-region 1. The sub-regions with a high rate of economic growth absolutely have extensive within-sub-region inequality. It may be concluded that the spatial development of regional growth centres during the past period has resulted in positive economic growth, but that this growth has not spread evenly. The current effect is lingering inequality. This is inconsistent with the theory and policy framework that has been implemented.

This study suggests that at the national level regional decentralisation policies are an important policy in Thailand, but more strategy is needed. It is not necessary to abandon the

growth centre strategy, but it should be improved by promoting more economic links between regional growth centres and their satellite towns, and also areas with greater potential. The government should design specific policies for the regions lagging behind the most: the Northeastern region and the Northern region. These new policies should be based on the spatial potentials of each region. Furthermore, within-region inequality should be carefully and urgently considered. Balanced policies are required for all development prospects. These balances include not only balance among economic sectors, but also spatial and social balance. For the Northeastern region, the recommendation includes economic links between regional growth centres and their satellite towns. However, each sub-region should have its own specific policy. Linking trade and other service sectors should be the primary policy for the Upper Northeastern sub-region and the Lower Northeastern sub-region 2. Industrial links should be created for the Central Northeastern sub-region and the Lower Northeastern sub-region 1. Moreover, policymakers should identify all sub-regions where improvement of transportation and other infrastructure is necessary and should secure investment opportunities and loans. Such a strong process will spread the growth of regional growth centres and lead to the development of surrounding areas.

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## Notes

<sup>[1]</sup> THB = Thai baht.

<sup>[2]</sup> There are 19 provinces in the Northeastern region: Khon Kaen, Udon Thani, Loei, Nong Khai, Mukdahan, Nakhon Phanom, Sakon Nakhon, Kalasin, Nakhon Ratchasima, Chaiyaphum, Yasothon, Ubon Ratchathani, Roi Et, Buri Ram, Surin, Maha Sarakham, Si Sa Ket, Nong Bua Lam Phu and Amnat Charoen.

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