Relevant Trends And Emerging Opportunities For Industry-driven R&D Activities

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National Nanotechnology Initiative

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Benefits and Applications

After more than 20 years of basic nanoscience research and more than fifteen years of focused R&D under the NNI, applications of nanotechnology are delivering in both expected and unexpected ways on nanotechnology's promise to benefit society.

Nanotechnology is helping to considerably improve, even revolutionize, many technology and industry sectors: information technology, homeland security, medicine, transportation, energy, food safety, and environmental science, and among many others. Described below is a sampling of the rapidly growing list of benefits and applications of nanotechnology.

Everyday Materials and Processes

TECHNOLOGICAL ACCELERATION

BY 2020 THERE WILL BE CLOSE TO SEVEN TIMES THE NUMBER OF CONNECTED DEVICES AS PEOPLE ON THE PLANET[5]

THE VOLUME OF HEALTH DATA WORLDWIDE IS PROJECTED TO BALLOON TO 2.3 EXABYTES (2.3 BILLION GIGABYTES) BY 2020 – GROWING

48%

PER YEAR AND OUTPACING THE GROWTH OF BIG DATA OVERALL[8]

BY 2050 THERE WILL BE JUST TWO WORKING AGE PEOPLE PER ONE ELDERLY PERSON IN EUROPE[9]

DEMOGRAPHIC CHANGE AND DYNAMIC POPULATIONS

1.5 MILLION PEOPLE ARE ADDED TO THE GLOBAL URBAN POPULATION EVERY WEEK[11]

AFRICA'S POPULATION IS SET TO DOUBLE BY

2050

THE E7 ARE PREDICTED TO OVERTAKE THE G7 BY 2030

BY 2030

MULTI-POLARITY

CATASTROPHIC EVENTS SUCH AS GEOPOLITICAL CONFLICT, ENVIRONMENTAL DISASTER, OR ECONOMIC CRISES HAVE THE POWER TO DISRUPT ANY TREND

SUSTAINABILITY

CLIMATE CHANGE IS HAPPENING FASTER THAN PREDICTED

TWO-THIRDS OF THE WORLD'S MIDDLE CLASS WILL BE LIVING IN ASIA

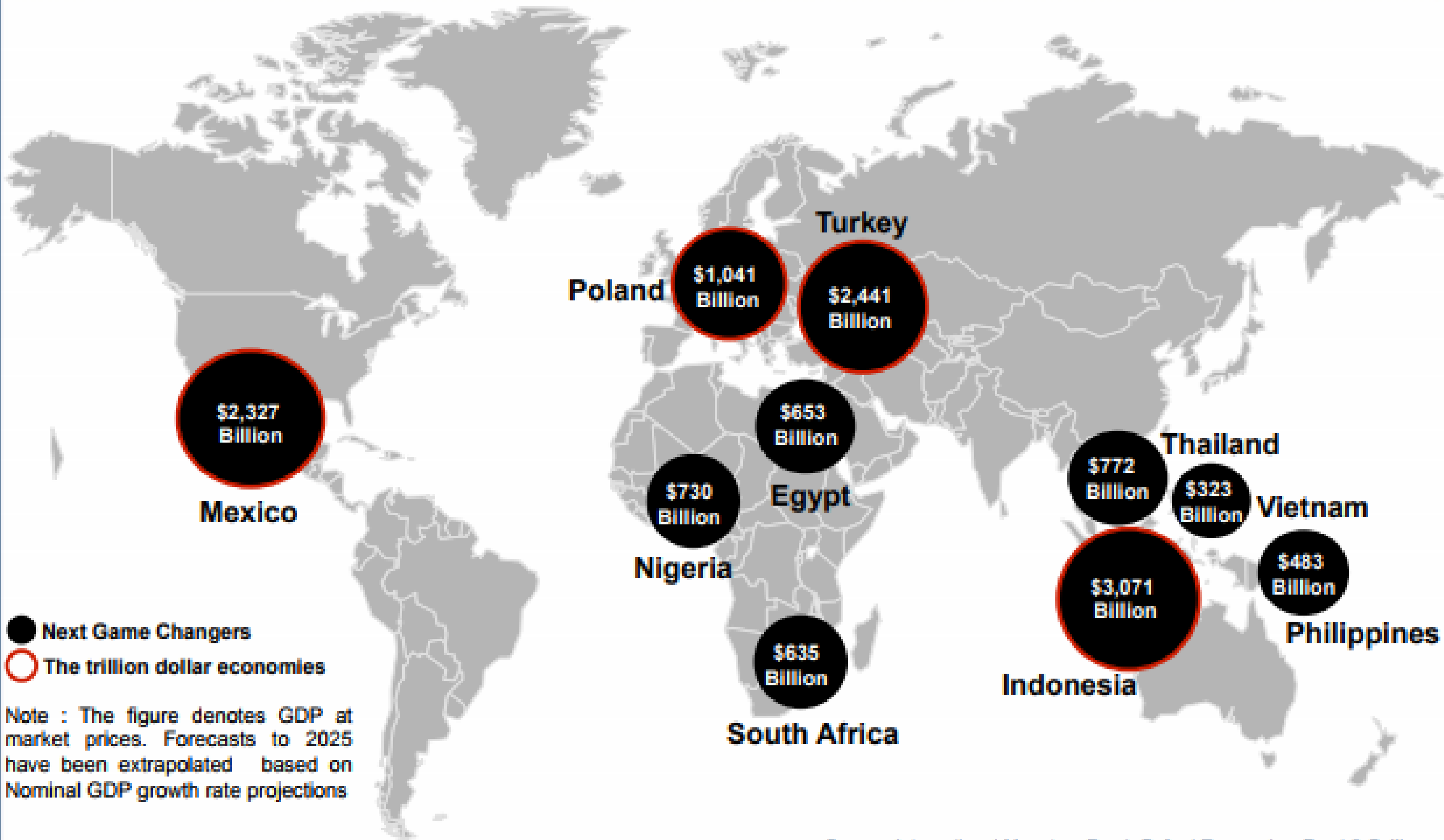
75%

OF THE WORLD'S LARGE CITIES ARE LOCATED ON COASTS AND SEA LEVEL RISES THREATEN MEGACITIES FROM NEW YORK AND TOKYO TO CAIRO AND MUMBAI

Rapid urbanisation | Climate change and resource scarcity | Shift in global economic power | Demographic and social change | Technological breakthroughs

The Next Game Changers in 2025 (Beyond BRICSs)

High GDP growth, improved FDIs, and rapid industrialization to give rise to a new lot of emerging countries, beyond BRIC nations, that contend to become next decade's economic leaders

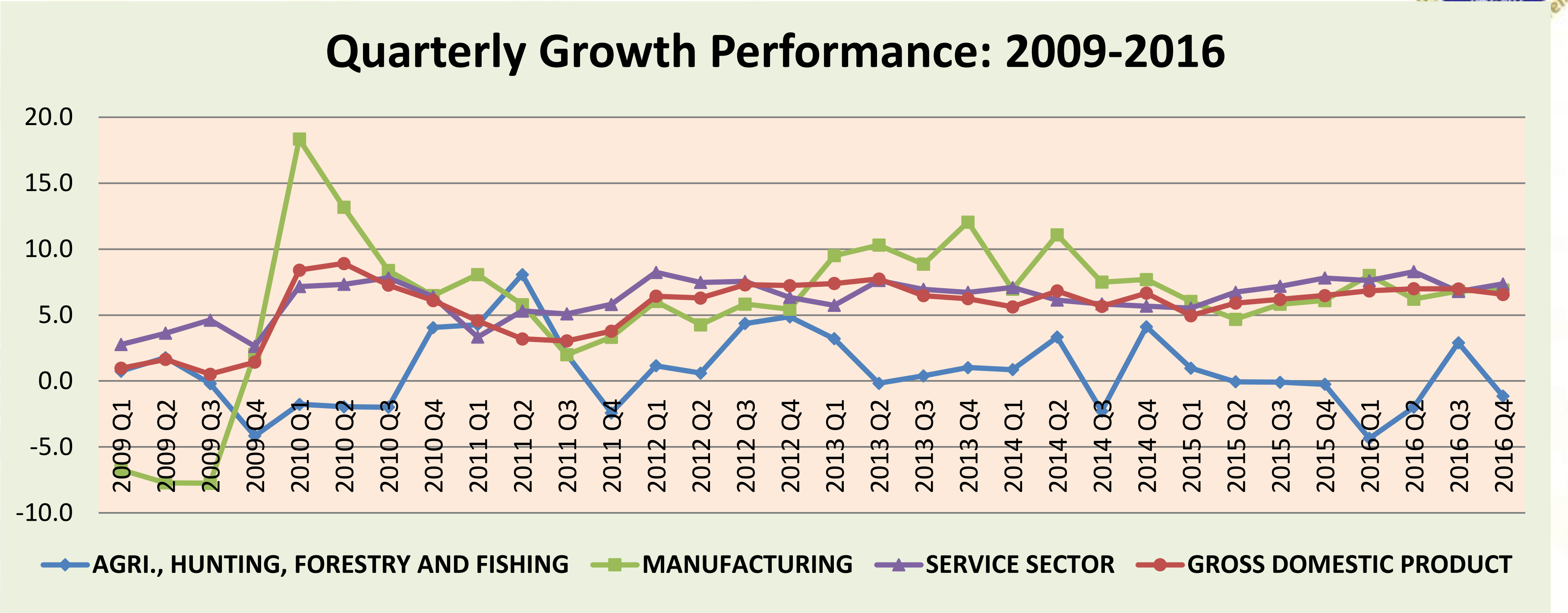


- Next Game Changers
- The trillion dollar economies

Note : The figure denotes GDP at market prices. Forecasts to 2025 have been extrapolated based on Nominal GDP growth rate projections

Source: International Monetary Fund. Oxford Economics, Frost & Sullivan,

Part 1: Current State of Industries Performance, Structure, Employment



- Amid economic & global uncertainty, PH has grown by 6.3% in the last 7 years (2010 to 2016)
- 2016: China 6.7%, Vietnam 6.2% , **Philippines 6.8%**
- PH impressive growth: a new growth area, Asia's new economic tiger

Economic Performance by Sector

MAJOR SECTOR	Share to Total GVA (%)				Growth Rate (%)			
	2013	2014	2015	2016	2013	2014	2015	2016
Agriculture, Forestry and Fishing	**10.5**	**10.0**	**9.5**	**8.8**	**1.1**	**1.7**	**0.1**	**-1.3**
Industry	**32.9**	**33.3**	**33.4**	**33.8**	**9.2**	**7.8**	**6.0**	**8.0**
Manufacturing	**22.8**	**23.2**	**23.2**	**22.8**	**10.3**	**8.3**	**5.7**	**7.0**
Construction	**5.7**	**5.7**	**5.9**	**6.2**	**9.6**	**7.2**	**11.6**	**13.7**
Services	**56.7**	**56.6**	**57.1**	**57.5**	**6.8**	**6.2**	**6.8**	**7.5**
Trade/Repair of Vehicles, Motorcycles, Personal/Household Goods	**16.6**	**16.5**	**16.7**	**16.8**	**6.2**	**5.8**	**7.1**	**7.3**
Financial Intermediation	7.1	7.2	7.2	7.3	12.6	7.2	6.1	7.7
Real Estate, Renting & Biz Activity	**10.9**	**11.2**	**11.3**	**11.6**	**8.9**	**8.7**	**7.1**	**8.9**
Other Services	10.3	10.1	10.3	10.4	4.9	4.0	7.9	7.5

Source: National Income Accounts, Current Labor Statistics. Philippine Statistics Authority

- Manufacturing comprises the bulk of industry, though its growth has been remarkable, its share to GDP has remained unchanged
- Agriculture’s GDP contribution has been falling; its growth has lagged behind
- Though we are considered a service-oriented economy, this is highly concentrated in trade &repair of vehicles, motorcycle, personal goods; real estate, renting & business activity is far second

Manufacturing Structure

Industry Sector	2015	2016		Industry Sector	2015	2016
Food manufactures	**34.3**	**34.7**		Rubber and plastic products	1.4	1.7
Beverage industries	**4.1**	**4.2**		Non-metallic mineral products	2.4	2.3
Tobacco	0.3	0.3		Basic metal industries	2.0	2.6
Textile manufactures	1.8	1.6		Fabricated metal products	1.2	1.2
Wearing apparel	1.8	1.7		Machinery except electrical	1.8	2.1
Footwear, leather	0.4	0.4		Office, accounting, computing	1.2	1.6
Wood, bamboo, cane	1.0	1.1		Electrical machinery	2.1	2.2
Paper	0.9	0.9		**Radio, television, communication equipment**	**17.7**	**16.2**
Publishing, printing	1.0	1.0		Transport equipment	1.8	2.1
Petroleum	2.8	2.6		Furniture & fixtures	5.1	4.7
Chemical	**12.5**	**12.8**		Miscellaneous manufactures	2.3	2.1

- Manufacturing has been largely dominated by food manufacturing followed by radio, TV, & communication equipment; chemical & chemical products; furniture; & beverage
- Food manufactures and radio, TV & communication equipment & apparatus have been driving manufacturing growth

Agriculture, Forestry, & Fishing Performance

MAJOR SECTOR	Share to Total GVA (%)				Growth Rate (%)			
	2013	2014	2015	2016	2013	2014	2015	2016
Agriculture, Forestry and Fishing	**10.5**	**10.0**	**9.5**	**8.8**	**1.1**	**1.7**	**0.1**	**-1.3**
Agriculture, Hunting, and Forestry	**8.5**	**8.2**	**7.8**	**7.2**	**1.2**	**2.1**	**0.6**	**-0.7**
a. Agriculture	8.5	8.1	7.7	7.2	1.0	2.1	0.8	-0.6
Palay	2.1	2.1	1.9	1.7	2.2	2.8	-4.3	-2.9
Corn	0.6	0.6	0.5	0.5	-0.4	5.1	-3.3	-4.0
Coconut including copra	0.4	0.4	0.4	0.3	-2.8	-4.6	0.1	-6.1
Sugarcane	0.2	0.2	0.2	0.2	-6.9	1.7	-7.4	-0.7
Banana	0.5	0.5	0.4	0.4	-6.3	2.7	2.3	-2.0
Mango	0.2	0.2	0.2	0.2	6.2	8.1	4.5	-10.1
Pineapple	0.2	0.2	0.2	0.2	2.8	2.2	2.7	1.2
Coffee	0.0	0.0	0.0	0.0	-11.7	-4.2	-5.3	-4.9
Cassava	0.1	0.1	0.1	0.1	6.3	7.6	6.9	1.6
Rubber	0.0	0.0	0.0	0.0	0.4	1.9	-11.3	-8.6
Other crops	0.6	0.6	0.6	0.5	0.2	0.7	0.8	-2.9
Livestock	1.4	1.3	1.3	1.3	1.8	1.0	3.8	4.6
Poultry	1.2	1.1	1.1	1.0	4.2	0.4	5.7	1.3
Agricultural activities and services	0.7	0.7	0.7	0.7	0.6	4.5	6.2	3.8
b. Forestry	0.1	0.1	0.1	0.0	39.8	2.6	-26.7	-14.7
Fishing	**1.9**	**1.8**	**1.7**	**1.5**	**0.7**	**-0.2**	**-1.8**	**-4.0**

Source: National Income Accounts, Philippine Statistics Authority

- Food manufacturing performance has not been matched by the AFF sector
- Growth in agriculture has remained low (negative in 2016); declining share to GDP
- Except palay, livestock, poultry, fishing; marginal contribution of other crops despite large potentials for high value crops (rubber, cacao, coffee, coconut, mangoes, etc)

Services Performance

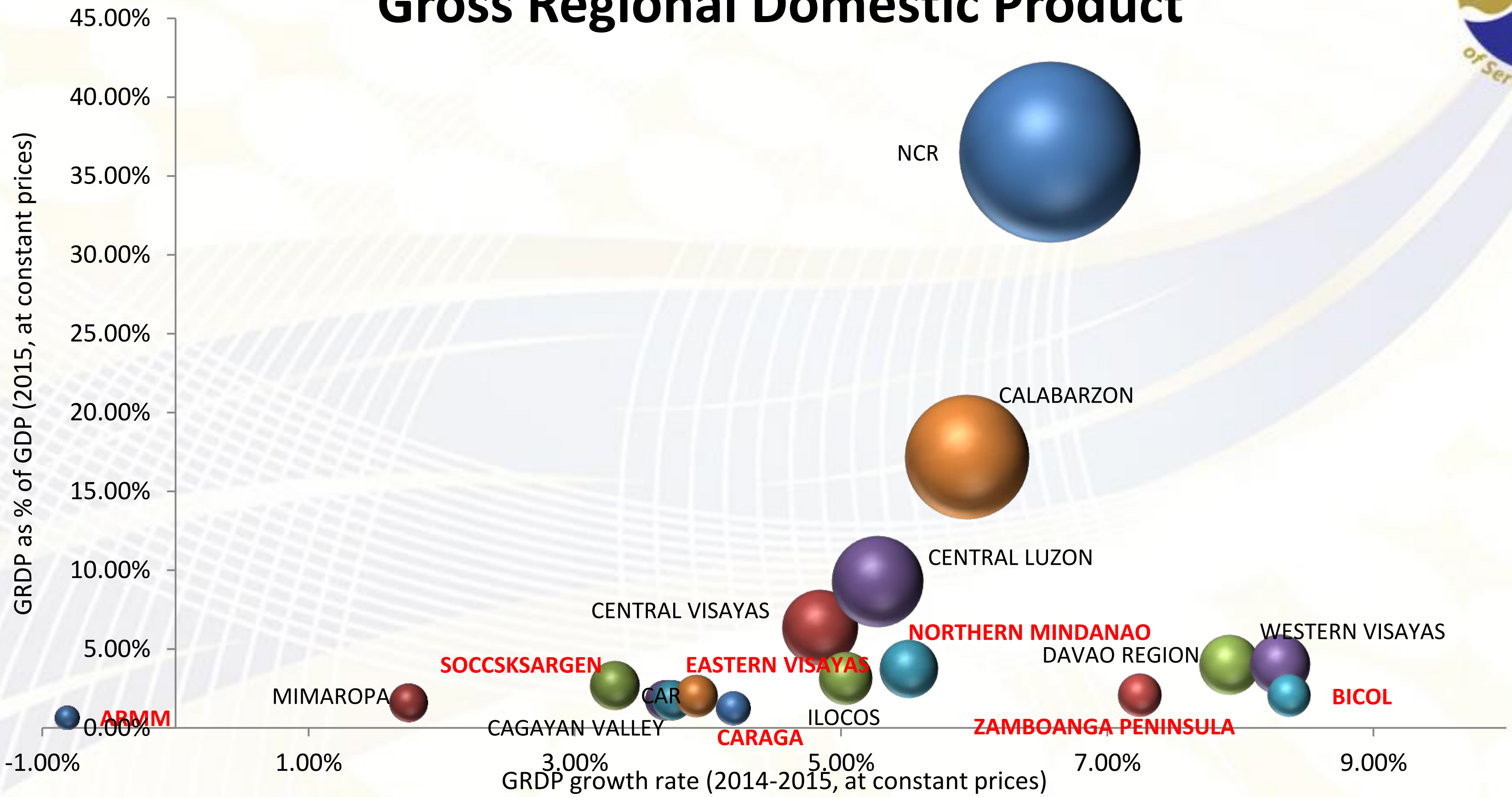
MAJOR SECTOR	Share to Total GVA (%)				Growth Rate (%)			
	2013	2014	2015	2016	2013	2014	2015	2016
Agriculture, Forestry and Fishing	**10.5**	**10.0**	**9.5**	**8.8**	**1.1**	**1.7**	**0.1**	**-1.3**
Industry	**32.9**	**33.3**	**33.4**	**33.8**	**9.2**	**7.8**	**6.0**	**8.0**
Services	**56.7**	**56.6**	**57.1**	**57.5**	**6.8**	**6.2**	**6.8**	**7.5**
Construction	5.7	5.7	5.9	6.2	9.6	7.2	9.4	12.6
Electricity, Gas and Water Supply	3.3	3.3	3.2	3.3	4.7	3.6	5.5	9.6
Transport, Communication and Storage	7.5	7.5	7.7	7.6	4.8	6.5	8.0	5.9
Trade and Repair of Motor Vehicles, Motorcycles, Personal and Household Goods	16.6	16.5	16.7	16.8	6.2	5.8	7.1	7.3
Financial Intermediation	7.1	7.2	7.2	7.3	12.6	7.2	6.1	7.7
Real Estate, Renting & Business Activity	**10.9**	**11.2**	**11.3**	**11.6**	**8.9**	**8.7**	**7.2**	**9.1**
Public Administration & Defense, Compulsory Social Security	4.2	4.1	3.9	3.9	2.7	4.0	1.2	6.9
Other Services	10.3	10.1	10.3	10.4	4.9	4.0	7.9	7.5

*Growth rates and value added share at constant 2000 prices

Source: National Income Accounts, Current Labor Statistics. Philippine Statistics Authority

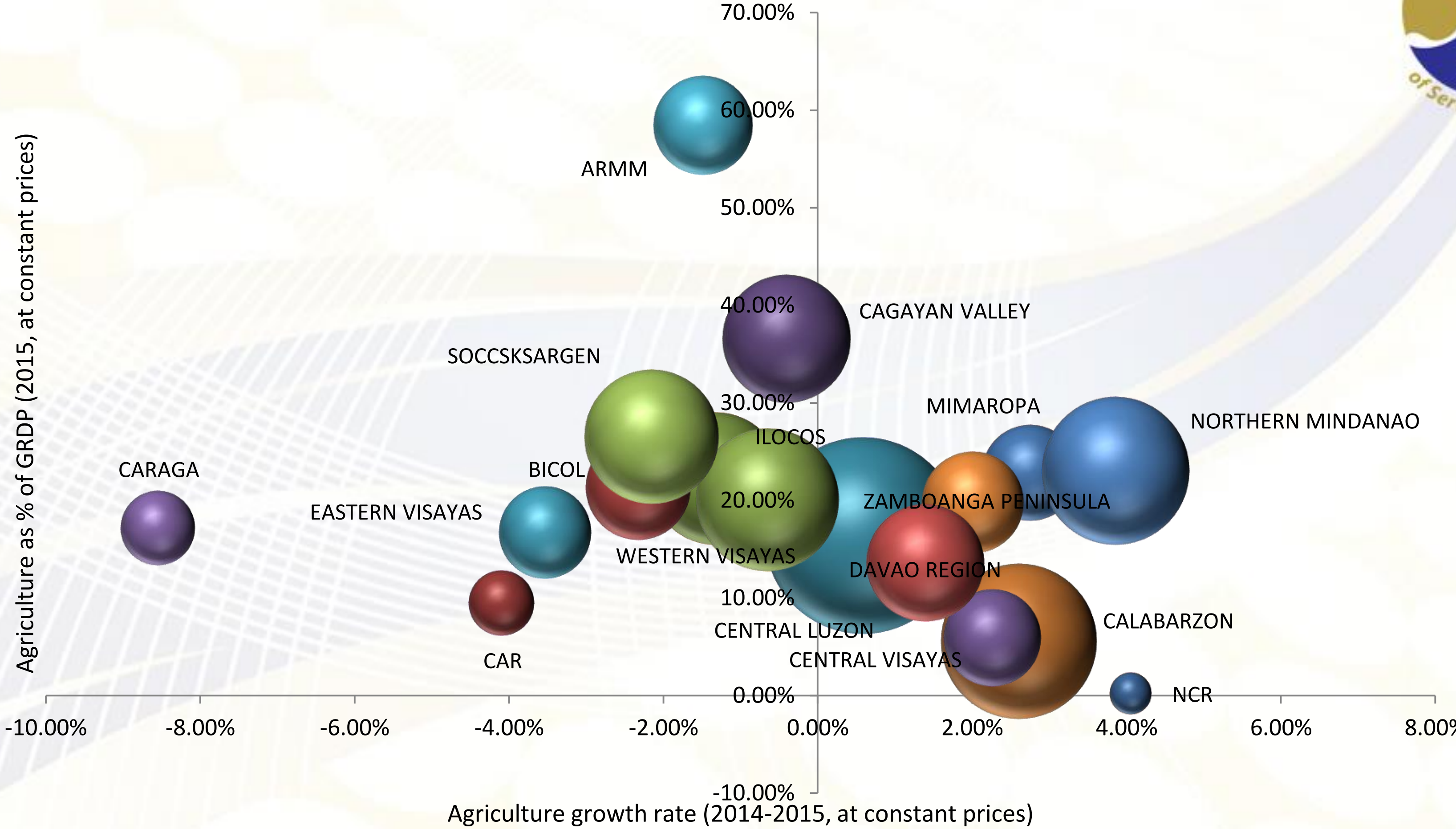
Regional Analysis

Gross Regional Domestic Product



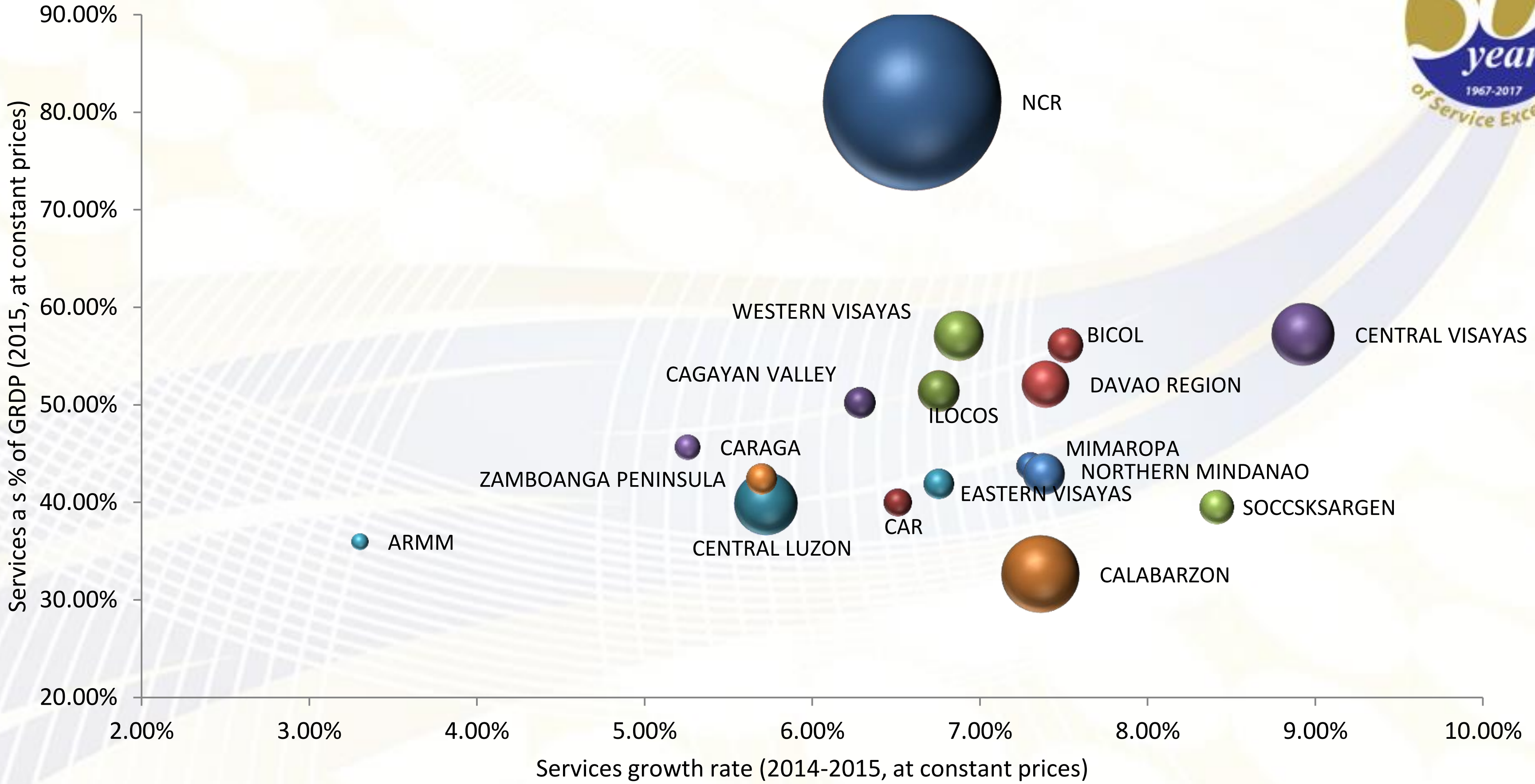
- Geographically, contribution to GDP is highly concentrated in a few regions
- NCR, CALABARZON, & Central Luzon account for 63 % of GDP
- Poverty-stricken regions in Mindanao have the lowest

Agriculture



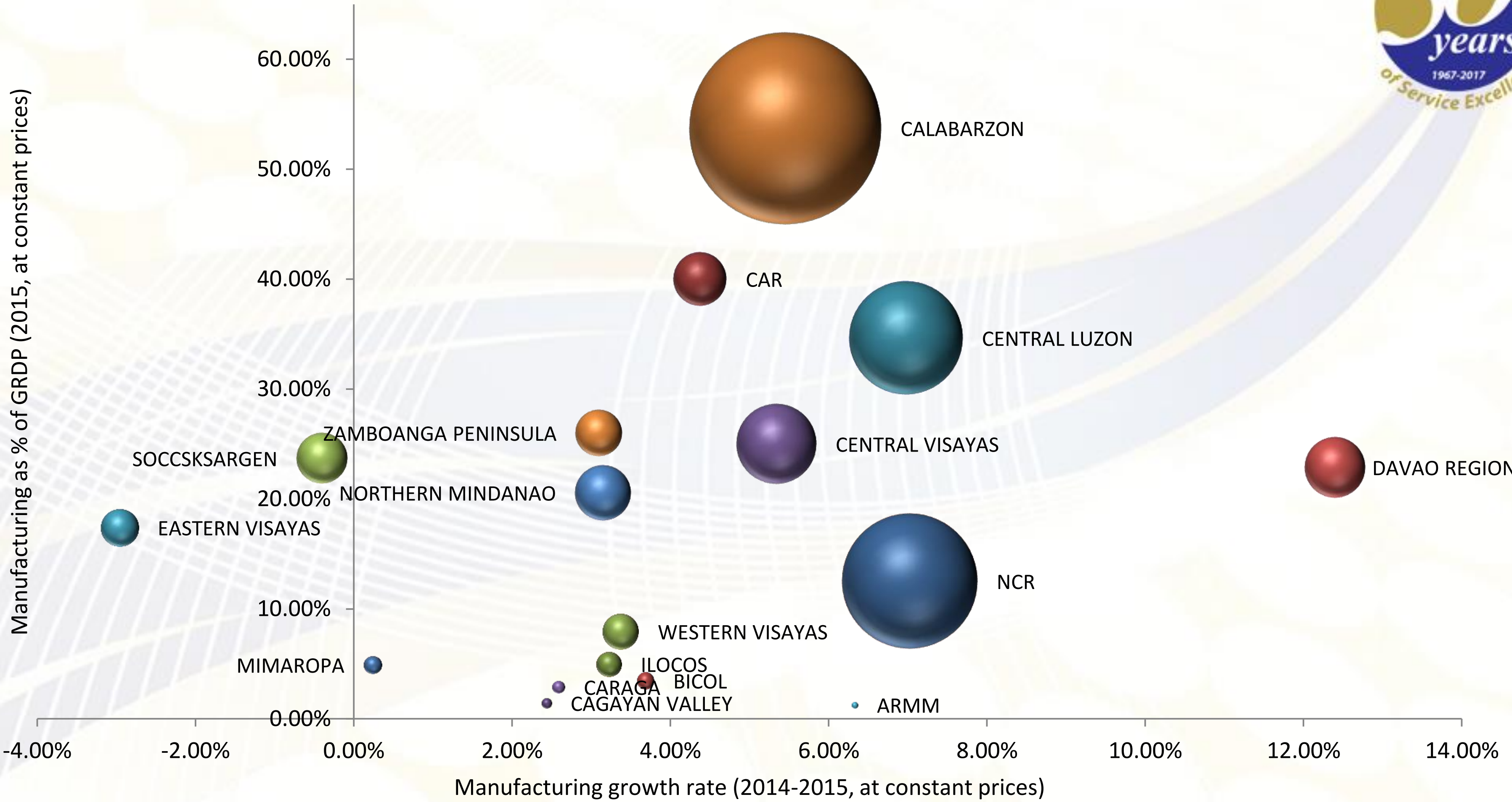
- Except for NCR, our regional economies are still dependent on agriculture, forestry, and fishery
- In terms of size, the largest contributors are led by Central Luzon (16.3%) followed by Northern Mindanao(9.6%,) CALABARZON (9.3%), Western Visayas (8.2%), & Cagayan Valley (7.9%)

Services



- Huge imbalance among the regions in terms of services; services is highly concentrated in highly urbanized NCR accounting for 52% of total
- Outside NCR, services is quite high only in relatively large economic areas led by CALABARZON (9.8%) followed by Central Luzon (6.5%), & Central Visayas (6.4%)

Manufacturing



- Manufacturing activities have been largely confined in CALABARZON (40%) followed by NCR (20%) and Central Luzon (14%)
- Central Visayas (7%) and Davao (4%) trying to catch-up

Challenges to Industry Development & Job Creation

Area	Major Constraints
Regulation	• Complex/costly business procedures • Policy consistency, transparency, predictability • 60-40% foreign equity rule
Infrastructure	• High cost of power, domestic shipping • Lack of ports, airports, road infrastructure
SME	• Access to finance, technology, support for start-ups, product standards, marketing, network links
HRD	• Lack of skilled workers, limited standards & certifications, quality of teachers
Innovation	• Industry-academe linkages, R&D facilities
Supply/value chain	• Weak linkages among manufacturing, agriculture, & services
Manufacturing	• Required Components: Materials, Skills, Energy, Capital, Digital technology

PART 2: Comprehensive National Industrial Strategy

Integrating industries, Closing value/supply chain gaps

- **GVC-focused**
- **FOSTERS INNOVATION & ENTREPRENEURSHIP**
- **Cluster-based industrial strategy**

- **Overall Goal: create globally competitive & innovative industries**
  - Growth oriented action to upgrade industries, move up the value chain
  - Remove obstacles to growth ➔ attract more investments
  - Deepen participation in regional production networks/global value chains
- **Role of Government: Enabler & facilitator to address coordination failures**
  - Address the most binding constraints preventing industries from growing
  - Create proper environment for private sector development

COMPREHENSIVE NATIONAL INDUSTRIAL STRATEGY

EXTERNAL FACTORS: GLOBALIZATION, REGIONAL/BILATERAL/MULTILATERAL TRADING ARRANGEMENTS, GLOBAL & REGIONAL PRODUCTION NETWORKS

AGRICULTURE FISHING, FORESTRY MINING, CONSTRUCTION

MANUFACTURING

SERVICES

INTERNAL FACTORS: GOVERNMENT POLICIES &PROGRAMS – trade & industry INSTITUTIONS, INFRASTRUCTURE, MACRO STABILITY, RULE OF LAW, PEACE & ORDER, POLITICAL CLIMATE

- CNIS links together economic sectors to develop globally competitive & innovative industries with strong domestic & global linkages
    - Address coordination/market failures, gaps in supply/value chain
    - Promote services embedded in manufacturing
    - Build strong regional economies: Regional Industrial Clusters

Underlying Framework

competition, innovation, & productivity growth

COMPETITION ⟷ INNOVATION ⟷ PRODUCTIVITY

- Competition affects productivity through innovation: + relationship between innovation & competition
- Less productive firms will exit the market: - relationship between productivity & firm survival
- Resources reallocated to surviving higher productivity firms that innovate at a faster rate
- With globalization & economic integration, competition increases, role of innovation is crucial
- R&D/Innovation: important ingredient for l-r growth
- Innovation & entrepreneurship: at the heart of the CNIS!

COMPREHENSIVE NATIONAL INDUSTRIAL STRATEGY
TOP FIVE PRIORITIES

Opportunities
- New high level growth trajectory
- Growing middle class
- Political stability
- Young, English speaking workforce
- Rising business confidence
- AEC & FTAs

Manufacturing
- CARS Program

Infrastructure & Logistics

Tourism

7-8% Growth
95-97% Employment

Agribusiness
- High value crops

IT BPM
KPO
From voice to non-voice

Challenges
- Complex regulations
- High cost of power
- Lack of ports, airports, roads
- SMEs' access to finance
- Supply chain gaps

- NEW INDUSTRIAL POLICY
- BOLDER TRADE POLICY
- INTENSIFIED PROMOTION OF INVESTMENTS
- REDUCED REGULATORY BURDEN
- INNOVATION, R&D, & ENTREPRENEURSHIP
- MODERN MSME & START-UP POLICY
- SKILLS TRAINING & HRD

Status of the Manufacturing Sector

Comparative Growth Rates (Average)	Pre-IDP (2007-2011)	Post-IDP (2012-2016)
Manufacturing	**3.8%**	**7.3%**
Services	4.9%	6.9%
GDP	4.6%	6.6%

Computations based on PSA data

From lowest to highest growth rate

Status of the Manufacturing Sector

Gross Value Added (GVA) in Manufacturing by Industry Group

(value in million PHP)

INDUSTRY GROUP	2011 (Pre-IDP)	2016 (Post-IDP)	Growth (2011 vs. 2016)
Food manufactures	494,349	652,709	32.0%
Beverage industries	58,743	79,341	35.1%
Tobacco manufactures	4,844	5,854	20.8%
Wood, bamboo, cane and rattan articles	12,788	20,572	60.9%
Paper and paper products	14,147	16,401	15.9%
Publishing and printing	8,140	18,791	130.8%
Petroleum and other fuel products	50,806	49,689	-2.2%
Textile manufactures	30,763	29,737	-3.3%
Wearing apparel	27,976	31,332	12.0%
Footwear and leather and leather products	5,388	8,110	50.5%
Chemical & chemical products	91,401	242,814	165.7%

Creates stronger demand for agri output

Computations based on PSA data

Status of the Manufacturing Sector

Gross Value Added (GVA) in Manufacturing by Industry Group

(value in million PHP)

INDUSTRY/INDUSTRY GROUP	2011 (Pre-IDP)	2016 (Post-IDP)	Growth (2011 vs. 2016)
Rubber and plastic products	21,845	31,596	44.6%
Non-metallic mineral products	32,991	41,976	27.2%
Basic metal industries	25,869	49,587	91.7%
Fabricated metal products	14,391	21,986	52.8%
Machinery and equipment except electrical	19,908	39,245	97.1%
Office, accounting and computing machinery	17,362	29,090	67.5%
Electrical machinery and apparatus	32,515	42,035	29.3%
Radio, television and communication equipment and apparatus	242,616	305,489	25.9%
Transport equipment	29,565	38,943	31.7%
Furniture and fixtures	39,326	89,898	128.6%
Miscellaneous manufactures	48,599	39,124	-19.5%
GVA IN MANUFACTURING	**1,324,330**	**1,884,320**	**42.3%**

Computations based on PSA data

Top Performing Industries

Industry	Growth (2011 vs. 2016)	IDP Interventions Provided
Chemical & chemical products	165.7%	• Roadmap completed in 2012 • Consulted industries on regulations on controlled chemicals • Held Regulators' Forum • Chemicals CEO Lunch
Publishing and printing	130.8%	• Roadmap completed in 2015 • Nationwide capacity building for printers • Review of legislations affecting the industry
Furniture and fixtures	128.6%	• Roadmap completed in 2012 • Extended support to the National Furniture Congress • International trends workshop for SMEs and design students
Basic metal industries	91.7%	• Copper and copper products roadmap completed in 2012 • Completed pre-feasibility of copper wire rod • Completed of market study on enameled wires • Iron & steel roadmap completed in 2013 • Technical and Economic Feasibility Study to Determine the Most Suitable Ironmaking Technology for the Value-Adding of PH Magnetite Resources

Top Performing Industries

Industry	Ave. Growth (2012-2016)	IDP Interventions Provided
Food manufactures	27.8%	• Completed roadmaps for dried mango, processed shrimps/prawns, carrageenan • Enhancing the Competitiveness of Philippine Coffee Industry
Electronics		
Radio, television and communication equipment and apparatus	25.8%	• Completed roadmap for electronics • Completed IC design roadmap • Workshops on IC Design • Inbound Scoping for the IC Design Faculty Immersion Project • PATHS Project for Electronic Industry
Electrical machinery and apparatus	34.2%	
Machinery and equipment except electrical	50.9%	

Priority Industries & Activities

- Electronic Manufacturing and Semiconductor Manufacturing Service
- Automotive and Auto parts
- Aerospace parts & Aircraft Maintenance, Repair, & Overhaul
- Chemicals
- Shipbuilding & Ship-repair
- Furniture, Garments, GDH
- Tool and Die
- Agri-business
- Construction
- IT-BPM
- Transport and Logistics
- Tourism
- Creative Industries

Thank you!

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