



MANSOURA UNIVERSITY
FACULTY OF LETRES

**GLOBAL-LOCAL PRODUCTION NETWORKS
ORGANIZATION OF SAMSUNG ELECTRONICS
CORPORATION: THEORETICAL FRAMEWORK,
SPATIAL PATTERNS, DYNAMICS, STRATEGIES,
AND CASE STUDY**

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GLOBAL-LOCAL PRODUCTION NETWORKS ORGANIZATION OF SAMSUNG ELECTRONICS CORPORATION: THEORETICAL FRAMEWORK, SPATIAL PATTERNS, DYNAMICS, STRATEGIES, AND CASE STUDY

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Abstract

Objective: the study aim is to Shape and designs a framework for global production networks, analyze and explain spatial patterns of the production networks of Samsung Electronics globally and locally, propose and present diverse spatial strategies for supporting Samsung Electronics.

Methods: The study relied on Global production network approach, Statistical techniques such as Revealed comparative advantage analysis, Growth Rate, and Pearson correlation and power coefficient. The study used ARCGIS TECHNIQUES like network analysis and overlay tools.

Results: Spatial Power coefficient of GPN for Samsung Electronics Company shows that Asia and China regions are ranked first and second in terms of the power of Samsung's production networks. The results of the Pearson correlation coefficient analysis indicated that research and development, design centers, suppliers, sales centers, cobalt smelters variables are closely related to production sites in the global production networks of Samsung Electronics over the world

Conclusion: Multi criteria analysis results concluded that the optimum location for decision makers in term of smart Samsung electronics complex is Beni Suef in the first priority and then Giza and Cairo in the second priority.

Key words: Samsung Electronics - Global Production Network-dynamics- spatial strategies

ملخص البحث:

الاهداف: تهدف الدراسة الي تشكيل وتصميم الاطار النظري لشبكات الانتاج العالمية وفقا لما جاء في الدراسات السابقة، تحليل الانماط المكانية لشبكات الانتاج العالمية لشركة سامسونج للإلكترونيات عالميا ومحليا، اقتراح وتقديم استراتيجيات مكانية مناسبة لدعم شركة سامسونج وكيف تحافظ علي التكيف مع متطلبات التنافسية العالمية والمخاطر التي تتعرض لها.

المنهجية: اعتمدت الدراسة علي منهج شبكات الانتاج العالمية واستخدمت التقنيات الاحصائية مثل تحليل الميزة النسبية ومعدل النمو ومعامل ارتباط بيرسون ومعامل القوة. كما استخدمت تقنيات نظم المعلومات الجغرافية مثل تحليل الشبكات وادوات التطابق والنمذجة المكانية.

النتائج: اظهرت نتائج معامل قوة شبكات الانتاج العالمية لشركة سامسونج للإلكترونيات ان اقليم اسيا والصين تاتي في المرتبة الاولى والثانية لهذا التحليل حيث اثرت متغيرات مواقع الانتاج ومعامل البحوث والتطوير والموردين وعدد العاملين وقيمة الاصول والعائدات تأثيرا واضحا في هذه القوة. اظهرت نتائج معامل الارتباط لبيرسون ان متغيرات البحوث والتطوير ومراكز التصميم والموردين ومراكز المبيعات ومصاهر الكوالب والتصدير تؤثرا تأثيرا ملحوظا في بنية شبكات الانتاج العالمية لشركة سامسونج للإلكترونيات.

الخلاصة: انتهت الدراسة الي ان كل من محافظات بني سويف والقاهرة والجيزة تمثل الموقع الامثل لصناع القرار لتوطن مجمع سامسونج الذكي المقترح في مصر وفقا للتحليل متعدد المعايير.

الكلمات المفتاحية: سامسونج للإلكترونيات- شبكات الانتاج العالمية- الديناميات- الاستراتيجيات المكانية

Introduction

- **Study aim is to** Shape and design a framework for global production networks, analyze and interpret spatial patterns of the production networks of Samsung Electronics globally and locally, propose and present diverse spatial strategies for Samsung Electronics development and support.

1- Hypotheses

- Global dynamics, such as: materials and Suppliers network, Research, Development, and Innovation network, Logistics Services network, Labor Union and labor rights, Sales , marketing , and Design network have a clear spatial impact on the global production networks for Samsung Electronics company.

- Local variables, including: Infrastructure, Wages & technical support, Encourage foreign investments, Competitive Landscape, and Samsung retail network have limited impact on the global production networks for Samsung Electronics.
- Samsung Electronics Egypt has the potential to more expand internationally.

2- Previous studies

- Oya, C. & Schaefer, F. 2021. The politics of labor relations in global production networks: Collective action, industrial parks, and local conflict in the Ethiopian apparel sector. This article investigates the evolving politics of labor agency when new manufacturing locations are incorporated into existing global production networks. It finds that many industrial conflicts arise from the collision of the productivity imperatives of manufacturing firms tied into demanding, but low value-added, segments of global production networks with the expectations of workers with little prior experience in industrial jobs.
- Lanza, G. et al, 2019, Global production networks: Design and operation. A framework for creating and operating GPNs is introduced to close this gap. It organizes influencing factors, problems, and facilitators, as well as the requirement for decision-making supports. The state of the art in GPN design and operation is examined.
- Yeung, H. & Coe, N. 2015. Toward a Dynamic Theory of Global Production Networks. The purpose of this paper is to contribute to the reframing of existing GPN-GVC debates and the development of a more dynamic theory of global production networks that can better explain the emergence of various firm-specific activities, strategic network effects, and territorial outcomes in the global economy.
- Coe, N. Dicken, P. and Hess, M. 2008. Global production networks: realizing the potential. The potential of one interpretive framework—the global production networks (GPN) perspective—for analyzing the global economy and its consequences on territorial development is critically analyzed in this paper.
- Yeung, H. 2006. Situating Regional Development in the Competitive Dynamics of Global Production Networks: An East Asian Perspective. This article demonstrates that regional development is inextricably linked to the changing dynamics of global production networks. While most of the previous literature on East Asia focuses on the state as the primary engine of national and regional economic development.
- Hess, M. & Coe, N. 2006. Making connections: global production networks, standards, and embeddedness in the mobile-telecommunications industry. This paper is proposed that the mobile telecommunications sector should be understood as a collection of multi-scalar manufacturing and distribution networks connecting firms, organizations, and customers in geographically dispersed manner.

3- Methodology and techniques

In economic geography, the transition from rigid, centralized production plants to networked production (Lanza et al, 2019:823), and significant progress has been made in building a sophisticated theoretical framework for understanding territorial formation and economic development in the global economy over the previous twenty years (Hess & Yeung, 2006: 1193).

Global production network defined as the globally organized nexus of interconnected functions and operations, comprising interconnected economic and noneconomic actors coordinated by a global lead firm and producing goods or services across multiple geographic locations for international markets (Yeung & Coe, 2015:32, Canfei, & Shengjun, 2017).

Moreover, GPN 1.0 has interrelated concept of value creation, transformation, and capture, power, and embeddedness. GPN 2.0 purposes to interpret why and how three competitive dynamics—optimizing cost-capability ratios, sustaining market development, and working with financial discipline—interact with firms and non-firm actors under uncertain market conditions to generate four different actor-specific strategies for organizing global production networks: intra-firm coordination, inter-firm control, inter-firm partnership, and extra-firm bargaining (Yeung & Coe, 2015; 29,32). see fig.1.

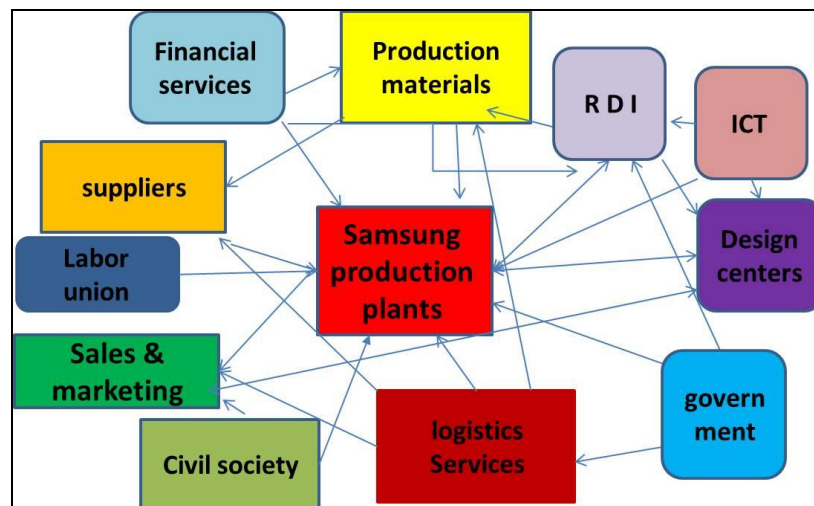


Fig.1. Samsung's Global Production Network Model

Source: Author's Data is based on Yeung & Coe, 2015; 32, Canfei & Shengjun, 2017.

Statistical techniques

RCA Revealed comparative advantage analysis relates the export-import-relation of one sub-sector and the export-import-relation of all sectors in one region: $RCA_{ij} = \frac{1}{4} \ln \left(\frac{x_{ij}/m_{ij}}{(S_{xij}/S_{mij})} \right) * 100$, with RCA_{ij} Revealed comparative advantage of subspace i in subsector j, x_{ij} Export value of subspace i in subsector j, m_{ij} Import value of subspace i in subsector j (Meyer et al, 2012: 124).

Growth Rate: $(A/B) (1/N-1) - 1) X 100$

A= the end value, B= the initial value, N= the number of years

SPSS- Analyze- regression - linear

ARCGIS TECHNIQUES

- Network analysis tools
- Spatial analyst tools

4- Data source

- **Samsung Electronics Corporation Reports**

- 1- Samsung Electronics corporation,2020, Samsung Electronics' Responsible Minerals Report, Seoul.
- 2- Samsung Electronics Corporation, 2014, 2017, 2020, Samsung Electronics' Business Report, Seoul.
- 3- Samsung Electronics corporation,2020, Samsung Electronics' Sustainability Report, Seoul.

- **Published legal documents**

- 1- Ministry of Investment and International Cooperation, Investment Law No. 72 of 2017.
- 2- Consumer Protection Law, Law No. 181 of 2018, Official Gazette No. 37.

3- Presidential Decree No. 184 of 2013 issuing the customs tariff, Official Gazette Issue 12, 21 March 2013.

– **Industrial Development Authority Reports**

1- Field visits statistics for the Kom Abu Radi industrial area, unpublished data June, 2021.

2- Samsung Electronics Egypt S.A.E, Industrial Register, unpublished data, 2021.

3- Engineering industries, Egypt, Industrial Register, Unpublished data, 2022.

– **Investment Office, Beni Suef Governorate Reports**

1- The executive situation of the Kom Abu Radi industrial zone, unpublished data, 2019.

2- General plan of the Abu Radi industrial area, unpublished data, scale 1: 15000, 2019.

– **Maps & satellite images**

Sensor	Pixel size	Bands	Date
LAND SAT8	30,30	11	25-2-2019

Source: <https://earthexplorer.usgs.gov/>

- Egyptian Survey Authority: 1990, Al wasta Topographic Map, 1: 50000, Cairo.

– **Field study, observation, survey, and interview**

- **Pilot study**, 23 March 2022. **Second visit** 29 June 2022, update land use map of kom Abu Radi industrial area using GPS.

- **Third visit**: interview with engineers in Samsung plant 8 September, 2022.

- Omer Ibrahim, Engineer of Samsung electronics Egypt, interview, 6 July 2022.

- Mohamed fathy, Director of production, Samsung electronics Egypt, interview, 8 September, 2022.

II- Samsung global production network organization

1- Major subsidiaries network of Samsung electronics

Samsung Electronics comprises 241 subsidiaries across the world responsible for sales and production. Samsung has 55 subsidiaries in **North America**; it operates 75 subsidiaries **In Europe and CIS**. It has 19 subsidiaries in **Middle East and Africa** for product manufacturing and sales. Samsung has 30 subsidiaries in **Asia** (ex-China). Samsung Electronics manages 33 subsidiaries in **China**; The Company maintains its corporate headquarters and 29 consolidated subsidiaries in **South Korea** (Samsung Business Report, 2020:27). **See fig.2.**

2- Production network

Samsung Electronics products divided into Consumer Electronics (CE) including TVs, Monitor, Refrigerator, Washer & Dryer, Air conditioners, Ultrasound System, etc. IT & Mobile Communications (IM): HHP, network systems, PC, etc. Device Solutions (DS): DRAM, SSDs, NAND Flash, mobile APs, image sensors, etc. OLED panels for smartphones, LCD panels for TVs and monitors, LCD monitor panels, etc, Harman Division Digital cockpit, telematics, speakers, etc.

Although Samsung's organizational strategy for the 90's revolves around consolidation, the strategy for its physical production facilities involves increasing movement offshore-Internationalization of Production and establish its own distribution channels (Kim, 1997:30). With internationalization of production, subsidiaries extend to Europe, Americas, Africa, and Middle East.

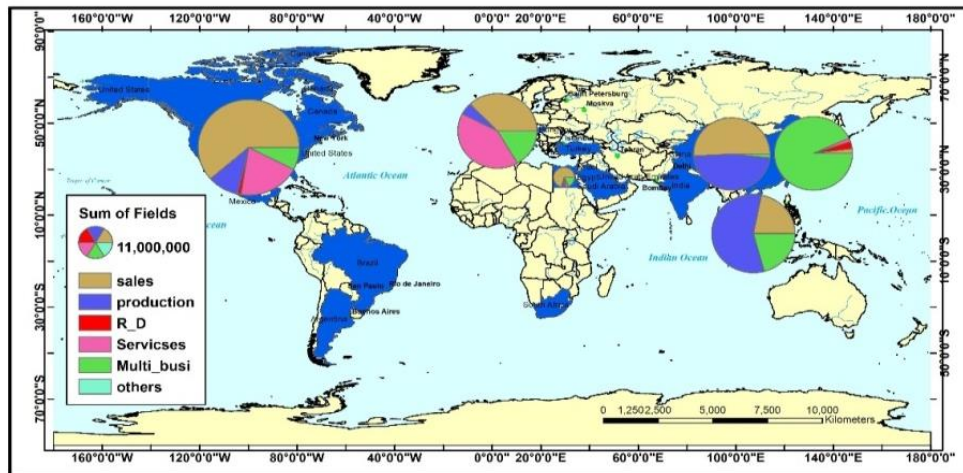


Fig. 2. Major subsidiaries of Samsung electronics over the world by business and assets value, 2020 (KRW million)

Source: Author's Data is based on Samsung Electronics Corporation, 2020, Samsung Electronics Business Report, Seoul

Samsung's Production network contains 37 sites over the world, 7 sites are situated in South Korea, The Korean production sites are situated in Suwon, Gumi 1.2, Gwangju, Giheung, Hwaseong, Pyeongtaek, and onyang. There are 12 production sites in china, the most important location are Beijing, Hong Kong, Shanghai, Xian (2), and Suzhou (4), Tianjin (3), Dongguan, Shenzhen, and Huizhou. Asia has 8 sites, two sites in India, Malaysia (2), Vietnam (2), Indonesia, and Thailand, one plant is located in CIS –Kaluga south Moscow, one site is situated in Egypt - Middle East and Africa, three plants are concentrated in Europe in Hungary, Slovakia and Poland, 5 sites in Americas located in The United States, Brazil (2) and Mexico (2). See fig.4.

In 2020, the CE Division's output of image devices was 48,244 thousand units (major production sites: Mexico, Vietnam, Brazil, and Hungary). The IM Division's output of HHPs was 249,218 thousand units major production sites: Korea [Gumi], Vietnam, India, and Brazil. The DS Division's memory output (1 GB equivalent) was 1,230,287 million (major production sites: Korea [Hwaseong, Pyeongtaek] and China). The DP Division's output of display panels was 5,977 thousand units (major production sites: Korea [Cheonan, Asan], China). The Harman Division's Digital cockpit output was 6,116 thousand units. (Samsung Electronics Business Report, 2020:39).

3- Key production materials and Suppliers network

Worldwide, Samsung Electronics deals with 291 smelters and refineries, including 104 gold smelters in Japan, South Korea, china, USA, Russia, Switzerland, Italy, and South Africa. There are 76 tin smelters in Indonesia, China, Brazil, and USA, 41 tungsten smelters are situated in China, USA, Vietnam, Russia, Japan, South Korea, and Germany, 40 tantalum smelters are concentrated in China, USA, Japan, Brazil, and Germany, and 30 Cobalt smelters are located in china, Canada, Finland, South Korea, and Australia. These minerals are supplied by 225 suppliers. In 2019, all Samsung Electronics Suppliers are working with RMAP-certified smelters which mean Responsible Minerals Assurance Program (Samsung Electronics Corporation, 2020:10).See fig.3 .

A typical configuration of mobile phones, for example, consists of the following proportions of materials: 35.1 plastic (11 glass), 20.2 aluminum, 10.6 steel, 10 copper, 8.6 cobalt, 15.5 gold, and other materials (5 silica, 1 nickel and 1 tin) (Stevens, G& Goosey, M.2009; 67). Proportions of materials of IT and Telecoms Equipment products are 59.9% Metal, 33.3% Plastic, 4.6% Printed Circuit Boards, and 15.4% glass. Consumer Equipment Items including

TVs, radios Proportions of its materials are 53.5% Metal, 26.5% Plastic, 4.6% Printed Circuit Boards, and 2.2% glass. (Stevens, G& Goosey, M.2009; 56-58).

Samsung has 190 suppliers in 80% of Samsung electronics transaction volume who agreed to be disclosed over the world of which 58 suppliers in **South Korea** , 29 suppliers in **Vietnam**, 27 suppliers in **USA**, 24 suppliers in **China**, **Japan** has 14 suppliers, **Singapore** 10 suppliers , **Taiwan** 8 suppliers, **Hong Kong** 7 suppliers, **Germany** 3 suppliers, **Mexico** 2 suppliers. In addition, there is one supplier for each of UK, India, Malaysian, Switzerland, Thailand, Netherlands, Philippine, and Brazil (Samsung Electronics Corporation, 2020).

For the CE Division, key materials comprise display panels (23% of total of purchase price) Key production materials, which are supplied by AUO from Hsinchu, Taiwan and other companies. Key materials for the IM Division include camera modules and mobile AP (17.2%), (16.4%) respectively and Display panel (5.5%), which are supplied by Semco, from Suwon-Si, Gyeonggi-Do, Korea, Laguna, Philippines, Thai Nguyen, Vietnam, Tianjin, China, Guangdong, China, and Jiangsu Province, China, Qualcomm and others.

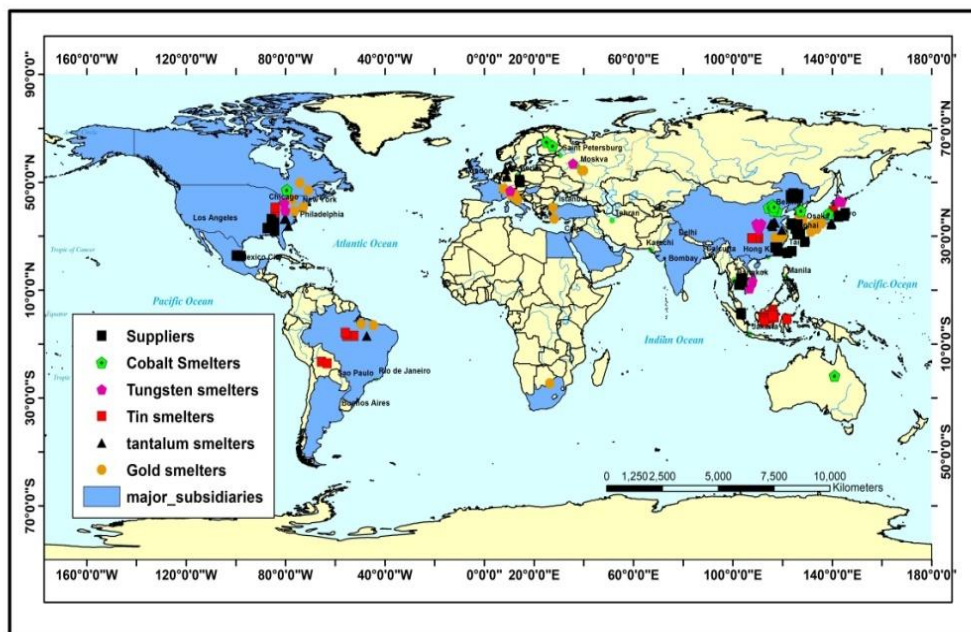


Fig.3. spatial patterns of Global Smelters, Refineries, and Suppliers of Samsung Electronics, 2020

Source: Author's Data is based on Samsung Electronics 'Responsible Minerals Report, Seoul, 2020

For the DS Division, key materials include Wafer(8.1%), chemicals(6.8%), FPCAs (8.8%), windows(8.1%), POL (5.5%) with suppliers including SK Siltron, in Burghausen, Germany, and Singapore, Soulbrain, in Gyeonggi-Do, Korea, Xi'an, China, BH, Apple, Dong Woo Fine-Chem. from Jeollabuk-Do, Gyeonggi-do, Korea, Xi'an, China Etc. key materials for the Harman division, include SoC products (8.1%) and memory products for in-vehicle solutions(6.3%), which are supplied by NVidia, from California, USA, Avnet, etc.(Samsung Business Report,2020:38). Moreover, Samsung Electronics presents 741 KRW 100 million as Supplier Incentive in Monetary Value (Samsung Electronics Sustainability Report 2020:117).

4- Research, Development, and Innovation network

Initially, Samsung organized a US R&D task force for DRAM chip development that consisted of five Korean– American with Ph. D.s in electronic engineering who had semiconductor design experience at major US semiconductor companies (Lee & Slater, 2007: 251). Thus, Samsung is leading the global market by continuously developing creative and innovative products and the future technology through shifting its way of thinking and understanding customer demand.

Samsung electronics Research & Development network consist of 38 centers of which six centers in north America, one center in Latin America, three centers in Europe, two centers in CIS, eight centers in china, four centers in south Korea, two centers in Japan, four centers in middle east, four centers in south west Asia, four centers in south east Asia see fig.4.

Therefore, Research & Development R&D is a key influence for companies to continue success. The Scoreboard with R&D intensity has to 10% or more of sales total, R&D investments of at least €1bn and employees participated in R&D 40% or more. Samsung firm was ordered the first by the European Commission in terms of industrial R&D investments between the global companies. See table 1. In 2020, R&D expenses/sales ratio was 9% in 2020 Increased from 7.7% in 2018 (Samsung Business Report, 2020).

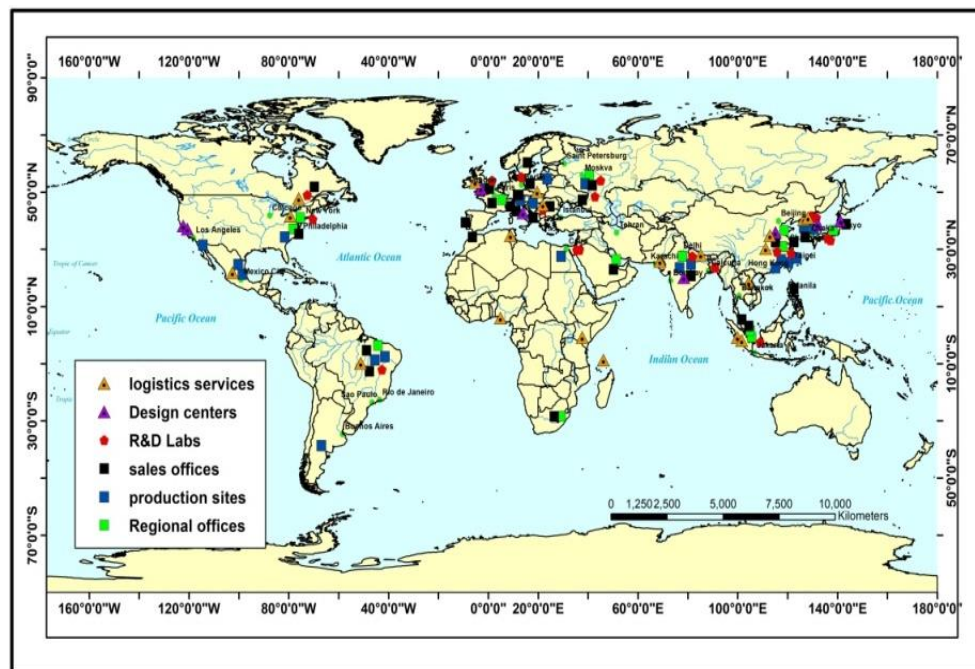


Fig.4. dynamics of Samsung Electronics global production network, 2020

Source: Author's Data is based on, Samsung sustainability Report, 2020

Samsung Advanced Institute of Technology is the central research institute of Samsung Electronics that has been founded to lead the Company into the future and serve as an incubator of cutting-edge technology. The Company manages R&D organizations in the US (SRA), China (SRC-Beijing, SRC-Nanjing, SRC-Guangzhou, SRC Shenzhen, and SSCR), India (SRI-Bangalore and SRI-Delhi), Bangladesh (SRBD), Israel (SRIL and SIRC), Russia (SRR), Japan (SRJ), Samsung Nano radio Design Center (SNDC), Samsung Denmark Research Center ApS (SDRC), Harman International Estonia OU, Harman International Romania SRL, Red Bend Software SAS, to carry out research activities for product development and basic technological research see fig. 4. The Company has established artificial intelligence AI centers in Samsung Cambridge Solution Centre Limited (SCSC

(United Kingdom), Moscow (Russia), Toronto (Canada), Montreal (Canada), and New York (United States).

Table.1. the top 10 companies in the 2018, 2020 R&D Investment Scoreboard

Rank	Company	Country	Sector	R&D (€bn)2018	R&D (€bn)2020	R&D of sales intensity (%)2018
1	SAMSUNG	South Korea	the ICT industry	13.4	15.5	7.2
2	ALPHABET/Google	US	ICT services	13.4	23	14.5
3	VOLKSWAGEN	Germany	Automobiles & other transport	13.1	14.4	5.7
4	MICROSOFT	US	ICT services	12.3	17	13.3
5	HUAWEI	China	the ICT industry	11.3	16.5	14.7
6	INTEL	US	the ICT industry	10.9	12	20.9
7	APPLE	US	the ICT industry	9.7	14.7	5.1
8	ROCHE	Switzerland	Biopharma	8.9	10.5	19.5
9	JOHNSON & JOHNSON	US	Health services	8.8	10	13.8
10	DAIMLER	Germany	Automobiles & other transport	8.7	9.2	5.3

Source: Hernández, H. et al, 2018:.p.57.,Grassano, N., et al, 2021..pp.31-41., KIRBY, W. et al. 2020. .p.3.

Intellectual property activities are an essential part of our R&D strategies—SEC registered its first US patent in 1984 and currently holds 197,749 patents around the world. In 2020, the Company invested KRW 21.2 trillion in R&D and registered 6,648 domestic and 8,520 US patents. These patents are mostly related with smartphones, smart TVs, memory, and system LSI products for the Company’s strategic business products or for future use (Samsung Business Report, 2020).

5- Financial discipline

Leading companies are transferring toward a strategic focus on a finance-driven approach to corporate governance growth and corporate development. Leading companies do not need to base on banks and borrowing institutions to finance their investments and production, but rather turn to the capital markets (yeung &Coe, 2015:38).

In Samsung electronics, Credit risk can originate from transactions with financial institutions which include financial instrument transactions. To minimize such risk, Samsung transacts only with banks which have strong international credit rating, and all new transactions with financial institutions with no prior transaction history are approved, managed and monitored by the Company’s finance team and the local finance center.

Samsung manages its liquidity risk by periodically forecasting projected cash flows and by utilizing regional cash pooling, which permits for the use of internal funds when there is a shortage of cash in a region. The cash pooling program allows sharing of surplus funds among entities and contributes to minimizing liquidity risk. In addition, the Company’s headquarters allocates payment guarantees to overseas subsidiaries to secure credit limit to brace for a potential large-scale liquidity need (Samsung Business Report, 2020:46-48). In 2020, The Samsung's investment was \$29.5 billion, increased from 19.5 billion in 2015 which contained

establishing, adding, and upgrading production lines of the semiconductor and DP businesses (Samsung Business Report, 2015, 2020:42).

6- Logistics Services network

Logistics services can be divided into inbound logistics(raw material handling, inspection of material, warehousing, etc..) and outbound logistics(multifaceted decisions in planning and controlling activities, such as collecting, storing and distributing products to the marketplace) (Jung , 2014: 139). Moreover, logistics costs include transportation and inventory costs (Lanza et al , 2019: 828).

Samsung electronics have 82 logistics service centers in over the world, of which 13 centers in North America, 11 centers in Latin America, 15 centers in Europe, Commonwealth of Independent States CIS has four centers, four centers in china, one center in japan, 13 centers in middle east, four centers in south west Asia, ten centers in south east Asia, Africa has six centers and the main center is located in south Korea. See fig.4.

Samsung Electronic Logitech is a specialized company which deals with a full range of trade support functions as well as logistics. It negotiates payment collection for Samsung Electronics export products and performs insurance claims where appropriate directly liaising with Samsung Insurance company.

Furthermore, online trading platforms and innovations such as mobile money transfers in the financial and telecommunications sectors are key drivers of observed trends. Business services such as consulting, accounting, legal, and business processing will reduce the transaction costs associated with using the financial market. Clearly, the growing similarity and interdependence between tradable services and manufacturing are evident (Abreha, et al, 2021; 38).

7- Labor Union and labor rights

Recently, economic geographers look to labor costs and labor issues not only as a part of understanding the location of economic activities, but to understand how geographic context makes a difference to how workers behave is made (Herod,2003:341).

All employees must be provided prior to the start of employment with a written employment agreement in their native language that contains a description of terms and conditions of employment as prior agreed to by both parties. Any behaviors of harassment or discrimination based on age, disability, ethnicity, gender, marital status, national origin, political affiliation, race, religion, nationality, sexual orientation, gender identity, union membership, are prohibited.

Table.2.Samsung's¹ Works Councils by Region (2019)

Category	Works Councils (number)	Members of the Works Councils(person)	Represented Employees (person)	Total employees 2019
South Korea	7	190	100,454	102,059
China	10	130	18,300	20,649
Southeast/ Southwest Asia and others	14	261	113,743	121,819
Europe, North America, Central/Latin America	11	120	22,467	14,061 Europe 25,270 Americas
Africa	-	-	-	573
Middle East	-	-	-	3,008
Total	42	701	254,964	287,439

Source: Author's Data is based on Samsung Electronics Sustainability Report 2020:37,114

¹삼 성 Samsung means Triple star greatness, power and survival forever.

Samsung electronics has 42 worksites around the world, works councils operate in accordance with the laws of the respective countries and the requirements of each site. Employees elect their own representatives under the principle of direct and anonymous voting, forming contact channels between employees and directors. See table.2. In particular, the number of grievances regarding working environment decreased by 1,462 (33%) from 4,403 in 2017 to 2,941 in 2019, as part of company efforts to provide a better working environment. in 2019. Training expenditures per person are 1,435 KRW thousand, Training expenditures against sales are 0.06 %, and Training expenditures against remuneration costs are 1.3 % (Samsung Electronics Sustainability Report 2020: 115).

Total employees in Samsung are 109,490; 54% works at DS Division, average length of services years ranges between 10 – 16, average, compensation per employee before income tax is 127 KRW million, male 136 KRW million ,and female 98 KRW million yearly (Samsung Business Report, 2020:215). While Taiwan semiconductor manufacturing company TSMC has 56871 employees worldwide, average year of service 9.1 years in 2020/21,and 47% of total employees have master degree (Taiwan Semiconductor Manufacturing Company, 2021:93).

Samsung electronics has Quality based management strategy. Samsung surpassed Nokia and emerged as one of the world’s two largest smart phone makers along with Apple phones and then Huawei provides an attractive brand-building opportunity. As Samsung’s Hybrid Management System adopted American style strategy and Human Resources, while company preserved Japanese style of operations management (Jung, 2014:_138).

8- Sales , marketing , and Design network

Generally, the market for electronic industries is characterized by oligopoly competition, which means that the market is dominated by a small number of companies (Yeung & Coe, 2015:39).

Fig. 5 indicated that Samsung sales decrease due to world financial crisis in 2007/2008. In 2010, sales increase because investment to become the leader in production of Dynamic Random Access Memory (DRAM) chips, liquid-crystal display screens LCD and mobile telephones have paid off handsomely (Canadian Embassy, 2012:8). In 2016, sales decrease again due to fall sales of TV product and Mobile Devices (Samsung Business Report, 2016; 37).

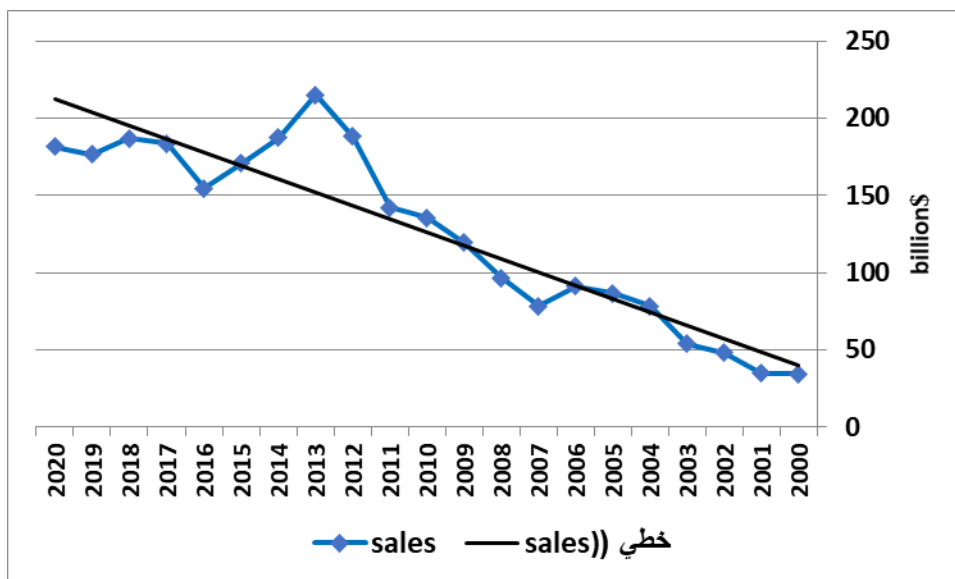
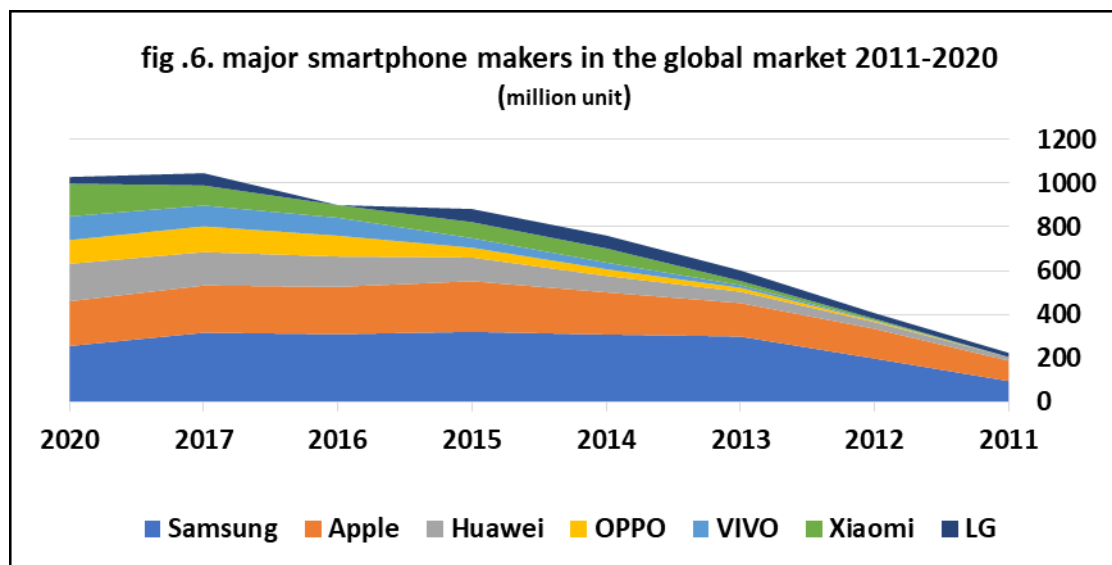


Fig.5. total sales of Samsung Electronics Company over the period 2000-2020

Source: Author's Data is based on Samsung Business Report, 2015, 2018, 2020, Jang et al, 2019; 10

Samsung electronics sales offices network conclude of 52 centers over the world, 12 centers are located in Asia in South Korea, Australia, China (4), Hong Kong, Indonesia, Japan, Malaysia, Philippines, Singapore, Taiwan, Thailand, Vietnam, and India, 16 centers are concentrated in Europe in Hungary, Austria, Serbia, France, Germany, Greece, Romania, Italy, Netherlands, Poland, Portugal, Spain, Sweden, United Kingdom, Czech Republic, and Latvia, 10 centers are situated in middle east and Africa in UAE, Turkey, Jordan, Israel, Morocco, Tunisia, Pakistan, South Africa, Kenya, and Nigeria, seven centers are located in Latin America in Mexico, Argentina, Brazil, Chile, Colombia, Panama, and Peru, three centers in CIS in Russia, Ukraine, and Kazakhstan, three centers in north America: two centers in United states and one center in Canada. See fig. 4.



Source: Author's Data is based on Inomata & Taglioni, 2019, 88, Qualcomm Technologies & Omdia, 2020

Formerly, Samsung announced a global brand strategy: First, it would focus on promoting a single Samsung brand for Samsung Electronics, with emphasis on mobile phones and digital TVs; second, marketing communications would be unified globally; third, the global brand campaign would focus initially on already developed markets; and finally, Samsung would utilize sports marketing as a key brand awareness tool (Karen, 2008:13). Samsung forced to open assembly or production plants in foreign markets, due to deliver targeted products at low cost and short delivery times, low-cost labor or highly- skilled personnel. With the global shift from mass- customization to mass- personalization, that aims to integrate customers and person in the product design phase, the future impact of product service on GPNs require further investigation (Lanza et al ,2019: 824,830).

Samsung recorded total revenue of KRW 236,807.0 billion, an increase of 2.8% year-on-year. Samsung on the top in terms of smartphone sales see fig.6 .Sales channels of Samsung were Wholesale (18%), Retail (30%), Special/direct sales (47%) and others B2B and online channels (5%). Sales by major product were Image devices (13.2%), Mobile devices (45.7%), Memory (26.4%), and Display panels (14.5%). Americas accounting for 28 percent of total sales, followed by China, 26 percent, then Asia and Africa 19%, followed by Europe 14%, and Korea comes the last with 12 percent of total sales in 2020.

In 2005, Samsung design revolution includes creating a user interface UI identity. The company establishes eight global design centers in San Francisco and los Anglos specialized

in mobile design in US, in London, Shanghai, Milan, Seoul, Japan, and Brazil. Each center brings a different cultural insight to Samsung Design; The English are strong in engineering, the Chinese in fine finishes, the Italians in shapes, and the Americans in pragmatism (Karen, 2008:10-16) (Samsung Sustainability Report, 2020).

In Future, there are various imperatives that critical for Samsung's marketing success in the 21st century. Firstly, Samsung has promoted a strong customer-focus which emphasizes on understanding the needs and wants of customers, and future needs. Secondly, Samsung has a strong design philosophy, which is simple and intuitive, efficient and adaptive and eco-friendly designs. Thirdly, it tries to create designs that can reflect users' lifestyles and interact with them (Jung, 2014: 136).

9- Civil society

Civil society is the main result of the shift from government to governance and promotes the involvement of non-governmental organization in the delivery of development policies (painter, 2003:369). civil society is a space which reflects the social division of society or a space for multiple groups to compete for access to decision- makers or a potential location of power outside the state. Civil society captures a set of ideas in relation to decentralization (McIlwaine, 1998:415).

Therefore, Samsung electronics play a vital role as a non-governmental organization; it presents initiatives for community development such as Samsung Smart School is a series of educational initiatives that uses our digital device and contents. In 2019, it offered quality digital education to more than 3.8 million students around the world who have limited access to education resources. Beside, Samsung Software Academy for Youth, and Samsung Tech Institute, which together educated more than 200,000 in around 30 countries from 2013 to 2019 (Samsung Electronics Sustainability Report,2020;72-76).

10- The role of state: the Hard state theory

In social economies, State shapes economic landscape.it seeks to regulate the flows of goods, money, energy, people, and information that produce economic geography. The South Korean government controlled two-thirds of South Korea investment resources during the country's period of most rapid growth in the late 1970s. The model of the authoritarian developmental state identified in South Korea as occupying a key role in promoting economic growth (Painter, 2003: 367).

Samsung bargains with state and non-state institutions e.g., maximizing financial returns through tax concessions, externalizing the costs of labor training to state agencies, avoiding environmental costs through lower regulatory enforcement (Yeung & Coe, 2015: 51). South Korea was imposed Restrictions on technology imports because the policy makers have regarded the accumulation of technological and managerial capabilities by domestic firms as a vital condition for effective industrial upgrading (Said et al, 1995; 14).

In 1989, import quotas on consumer electronics goods were removed. This was a threat to Korean electronics firms, including Samsung. A shift of resources from OEM to own-brand production made matters worse because, unbacked by adequate product development capabilities, it was doomed to failure. In the 1990's, the share of Samsung's sales attributable to own-brand merchandise has actually risen to about 60%, but this is due in large part to an absolute decrease in OEM business (Kim, 1997:19-22). The Korean government shifts from "export-led market expansion" to "FDI-led market expansion", and that national innovation policy from "sectoral targeting" to "diffusion-oriented policies" appear sound.

11-Spatial Power coefficient of GPNs for Samsung Electronics Company

By using 16 variables including: 1- number of regional offices,2- number of sales offices, 3- number of production sites, 4- number of R D labs, 5-number of design centers, 6-number of logistics services, 7-number of suppliers, 8-value of assets, 9-value of sales, 10-number of

employees, 11-value of revenue, 12-number of gold refineries, 13- cobalt smelters ,14-tungsten smelters, 15-tin and 16-tantalum smelters see table 3.

Results of Spatial Power coefficient of GPN for Samsung Electronics Company shows that Asia and China regions are ranked first and second in terms of the power of Samsung's production networks, where production sites, research and development labs, suppliers, number of employees, value of assets and value of revenues are concentrated .The results of the Pearson correlation coefficient analysis indicated that research and development, design centers, suppliers, sales centers, cobalt and tin smelters variables are closely related to production sites see Appendix.1.The relationship between Samsung Egypt and Samsung Korea is dependence, not interdependence fig.7.

Table.3. results of Spatial Power coefficient for Samsung Electronics Company GPNs, 2020

Samsung's regions	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	average	rank
Americas	120	103	97	110	142	148	79	171	162	52	198	99	50	61	35	105	108	3
Europe/CIS	120	216	64	79	71	117	16	105	84	30	114	154	67	61	17	76	86	4
china	78	46	162	126	71	25	63	98	150	43	90	57	300	268	93	143	113	2
South Korea	42	12	97	63	71	-	152	102	72	213	90	61	33	25	-	-	64	5
Asia	162	115	146	158	142	92	189	116	114	254	90	198	50	85	255	76	140	1
Africa/ middle east	78	103	32	63	-	117	-	7	18	7	21	30	-	-	-	-	30	6

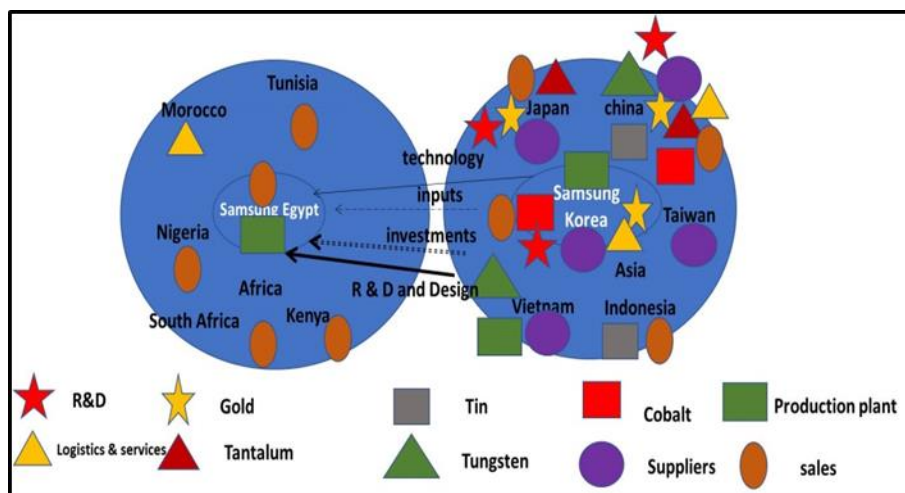


Fig.7.Relationship between Samsung's Electronics GPN in Africa and Asia.2022

Source: Author's Data is based on Coe, et al, 2004:481, Samsung Business Report, 2020.

Field study, 8 sept.2022

III- Samsung Electronics Egypt : local production network organization- case study

1- Spatial characteristics of Abu Radi industrial area

Kom Abu Radi industrial zone was established by Decree No. 207 in 1997 on the Western Desert Road on an area of 655 then 799 faddans, affiliated to Beni Suef Governorate. Lands are allocated free of charge in accordance with Republican Decree No. 370 of 2004. The industrial zone includes 272 projects, divided into 105 operating projects, 59 projects under construction, 54 vacant lands projects, 36 closed projects during visit, and 18 non-operating projects, most of which are food, metal, and electronics industries see fig.8.

Abu Radi industrial area can be accessed through several main roads, The Wasti Bridge over the Nile serves the industrial zone to reach the seaports on the Red Sea, and the Western Desert road connects the industrial area with the Cairo-Alexandria desert road to ports on the Mediterranean Sea.

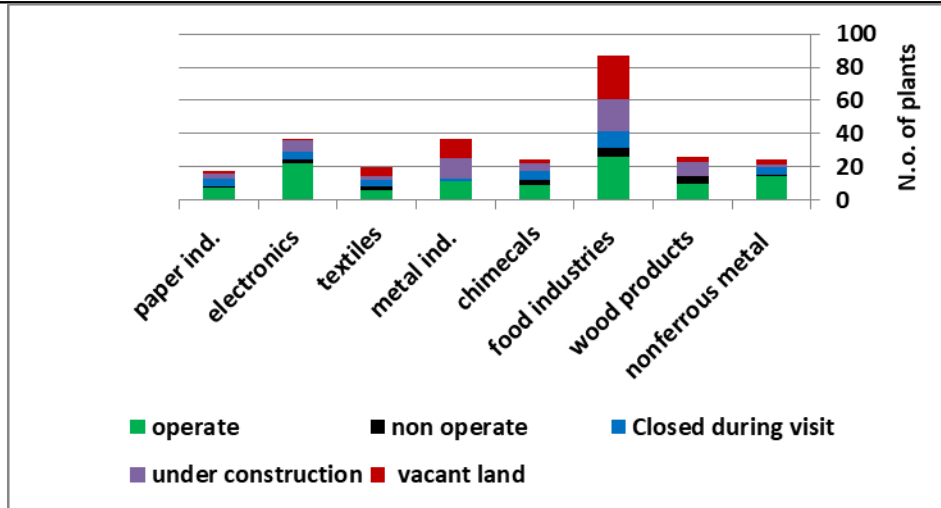


Fig.8. Exploitation levels in the industrial zone of Kom Abu Radi in 2021

Source: Author's Data is based on Industrial Development Authority, 2021

The Abu Radi industrial zone is adjacent to the western desert road, which planned to become an economic development corridor. The industrial area is also 40 km away From the regional ring road and the middle ring road (pilot study, 23 March 2022).

Kom Abu Radi Industrial Zone is an industrially diversified area that includes food industries, metallurgical industries, metal industries, engineering industries, chemical industries, textile industries, paper industries and wood industries. The environmental aspects are taken into consideration the spatial distribution of the various industries within the industrial zone, where the food industries are located to the north of the industrial zone, while the chemical and metal industries are to the south of the industrial area See fig.9.

In Beni Suf Governorate, there are three plants produce electronics and household electrical appliances, Samsung, Al Araby, and HOHO. Samsung electronics Egypt output capacity was 6,000,000 T.V. LED, 7,200,000 LED Panel Display, and 1,110,000 monitors. HOHO output capacity for electrical appliances was 6,000,000 TV LCD, 250,000 TV LED, and 1,000,000 TV CRT. In addition, output capacity was 90,000 fans, 85,000 Suction, 260,000 Electric ovens, 200,000 electric kettles, and 250,000 LED Bulb. Al Araby output capacity was 350,000 full - Automatic washing machines, 320,000 semi-Automatic washing machines, and 3,000,000 Najfa fan or without (Industrial Development Authority, 2022).

Samsung Electronics Egypt is an Egyptian joint stock company located in Abu Radi Industrial Area on an area of 366,196 m² accommodating 1510 workers at a cost of 605 million pounds, with an industrial density of 242 square meters per worker, an investment cost of 400.662 pounds for each job opportunity. The project was allocated on July 18, 2012. It aims to manufacturing and assembling a 22-inch to 64-75 inch color LCD TV, a 22- to 64-inch PDP color TV, and 18- to 27-inch LCD screens (Investment Office, Beni Suf Governorate, 2019).see table.3.

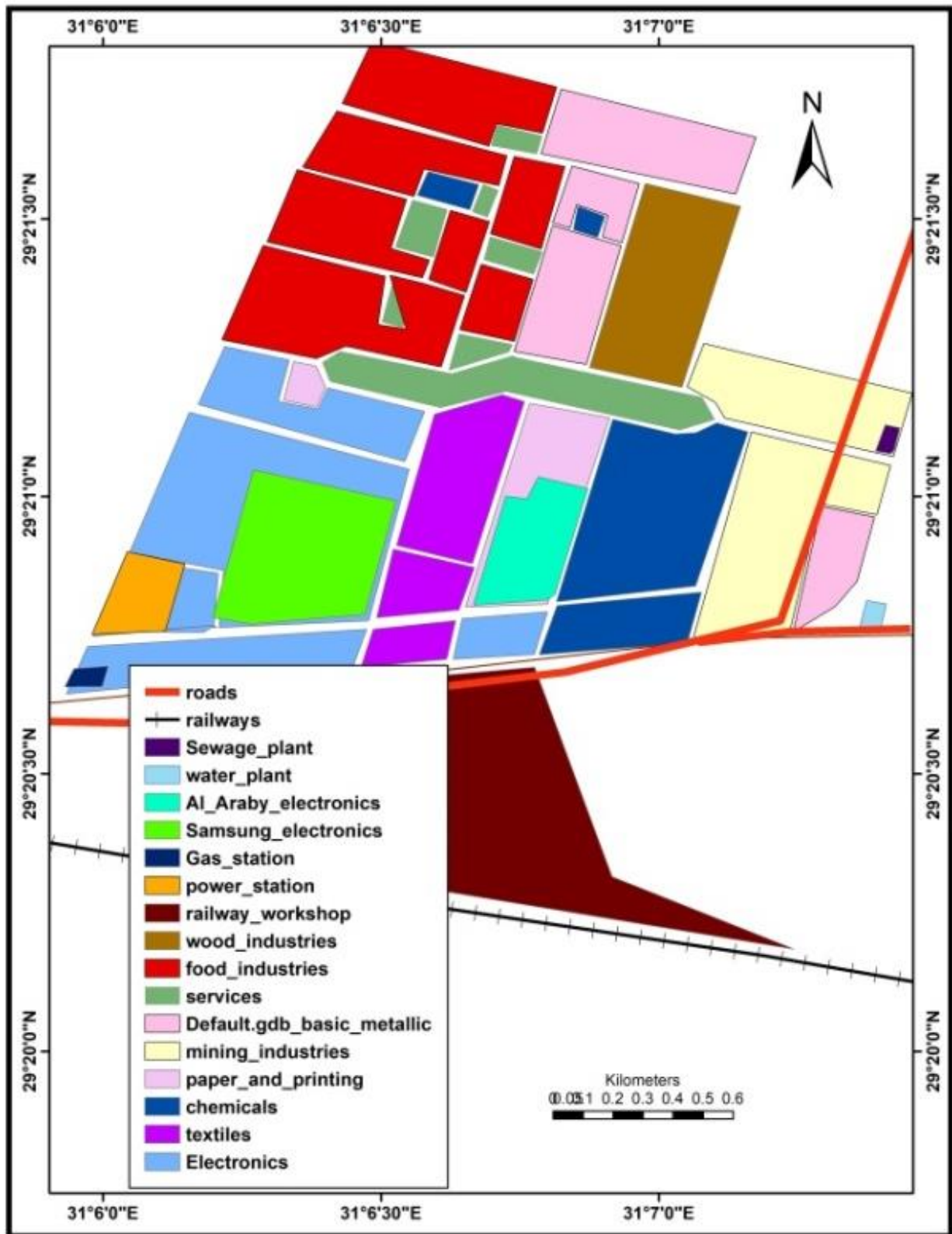


Fig.9. layout of the Kom Abu Radi industrial area, 2022

Source: Author's Data is based on Investment Office, Beni Suf Governorate, 2019. Field Study using GPS, 29 June, 2022

Samsung Electronics Egypt consists of 11 sections see fig.10&11. Samsung electronics production is 5 million units, it increases from March to December, and through sporting

events and decreases during January, February and March due to maintenance and rehabilitation of production lines. The tablet production line was piloted at the beginning of 2022. It planned to establish plant of smart phone in 2024 (field study 29 June, 2022).

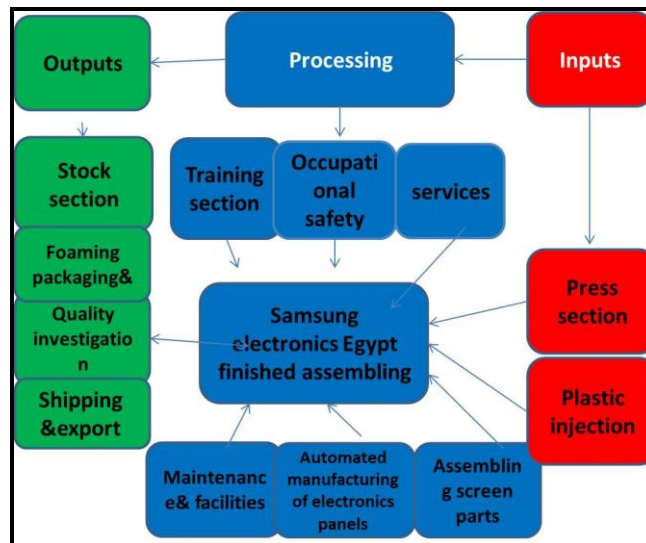


Fig.10. Organization of Samsung electronics Egypt, 2020

Source: Author's Data is based on Samsung electronics Egypt, 2020.

Raw material of Samsung electronics Egypt consists of Metal parts for TV sets by capacity by 15000 ton, Plastic parts for LED TV-screen by 500 ton, Cards - electronic circuits for electrical devices by 2450 number in thousand, Form molds of industrial cork for packaging by 2000 ton (Industrial Development Authority, 2020).

2- Infrastructure

The Abu Radi industrial area is served by a potable water plant with a total capacity of 30 thousand m3 per day photo.8. The first phase has been operated with a capacity of 10 thousand m3 per day. Kom Abo Radi sewage plant has a design capacity of 20 thousand m3 per day. It is of the type asphalt filters, operating at a rate of 50%, with an actual capacity of 10 thousand m3 per day, serving the industrial area and Al-Wasti district. Photo.7.

To solve the problem of industrial drainage for the Kom Abu Radi industrial area, which was being drained in the Al-Lubini drainage, a plot of land with an area of 52,000 square meters was allocated to establish an industrial wastewater treatment plant. In addition to the construction of a new ejection line with a diameter of 600 mm for the current sewage treatment plant (Beni Suef Governate, 2022).

The industrial area is served by two medium-pressure power lines from Al-Wasti transformer station with a length of 11 km and two lifting transformers with a voltage of 11/22 kV, providing an electric capacity of 8 mVA. Kom Abu Radi transformer station, which is located within the industrial area, has a capacity of 25 * 3 mVA. Photo.3. Gas pressure reduction Station, the main feeder line, and the internal network of factories that need gas to operate have been established (Beni Suef Governorate, 2018).photo.4.

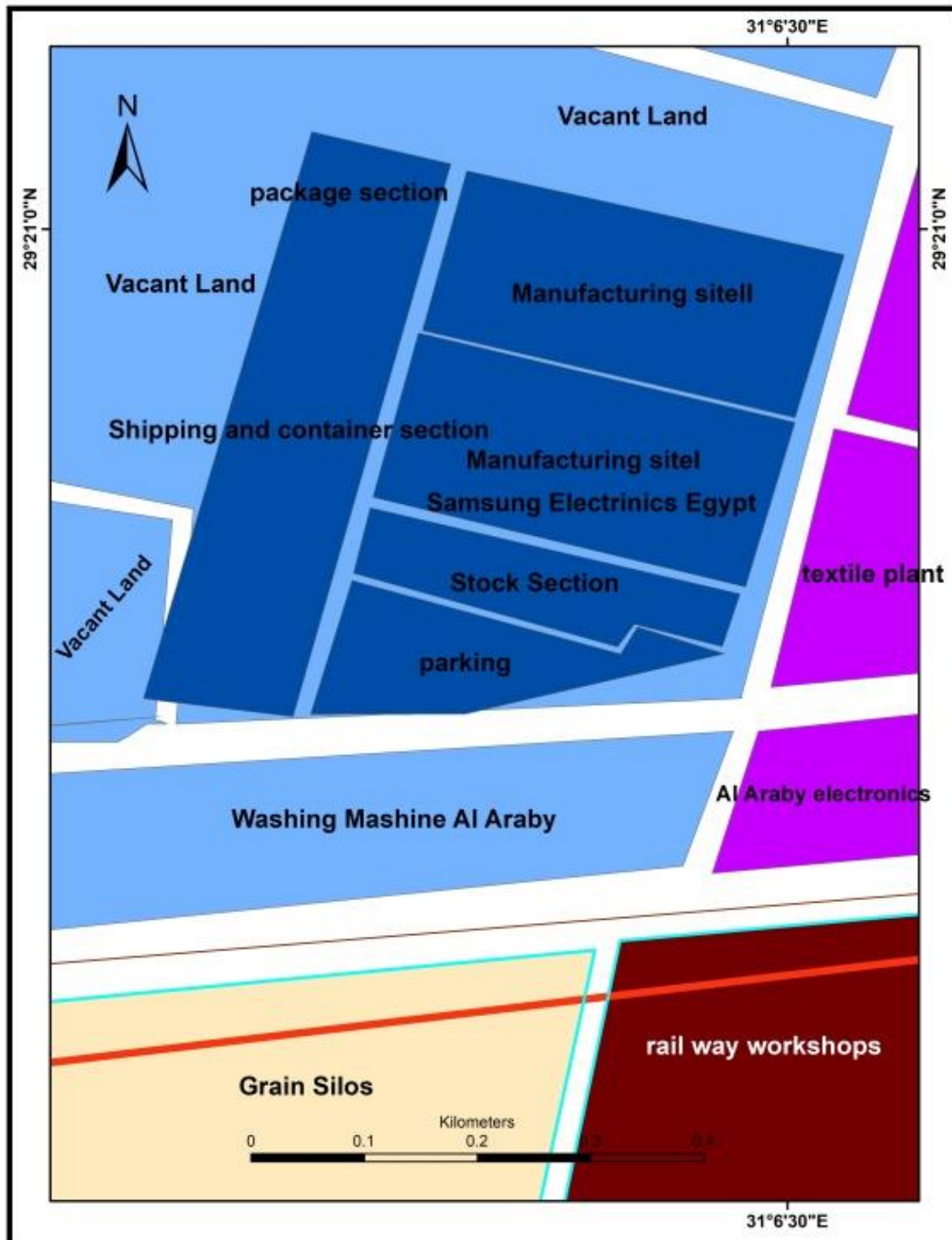


Fig.11. Samsung Electronics Egypt layout 2022, Kom Abu Radi industrial area

Source: Author's Data is based on field study 29 June, and 8 Sept. 2022

3- Wages & technical support

Labor Cost reduction is often a main reason for clients to outsource to developing or emerging countries. The average annual salary of the software developer position in Egypt is \$7,500 (EUR 6,900) - in comparison, in Poland, the amount of such remuneration is estimated at around \$ 24,000 (EUR 22,000) per year, the savings reach up to about 60%. In Addition,

the Egyptian pound has constantly depreciated over the past five years, significantly decreasing the cost of operations in the country in comparison to many other states (Tjia, 2020, 16).

Avasant estimates Egypt to be one of the cheapest destinations for call center and technical support provision in EMEA at \$14, 800-\$16, 100 annually, around 30% cheaper than Morocco (Business Monitor International, 2018, 23).

4- Technological infrastructure (economies of time)

According to MCIT data, outsourcing industry exports from Egypt amounted to \$ 2.4 billion in 2019. The IT/ITES industry absorbed an estimated 292,000 workers in 2017 (international finance corporation, 2020:90). The sector value added of the three main ICT industries—manufacturing, telecommunications, and information technology (IT)—reached LE 137 billion (\$7.8 billion) in 2019. This is equivalent to about 2.9 percent of GDP. Egypt is strategically located where multiple regional and international fiber-optic submarine cables crisscross.

In December 2019, some 342 operators around the world had invested in 5G networks, and 56 had launched such networks in 32 countries. Egypt's tower infrastructure is considerably under par. The World Bank estimates the need for 16,900 additional towers and 20,000 small cells if Egypt is to match the global average for subscribers per tower. That expansion would require an investment of about \$2.7 billion, along with \$680 million in additional capital expenditure to connect half of the existing towers to fiber (International Finance Corporation, 2020:92-94).

Thus, several steps have been undertaken to improve the telecom infrastructure with planned to upgrade copper cabling to fibre optic. Egypt offers the IT and BPO parks such as Smart Village and Maadi tech Park. Silicon Waha is developing "WE Parks" across various tier 2 cities like Borg El Arab, New Assiut, knowledge city in 10th of Ramadan, Sadat City, Beni Suef and Aswan (Tjia.p.2020:17-18).

Moreover, in 2018, Egypt's Communications and Information Technology Ministry announced plans that target \$ 20bn of IT exports by 2025, up from \$1.8bn of exports in 2016. It targets multiple industry activities including web-enabled export-oriented services, offshored IT services by multinationals, and developing Egypt as a data center hub (Business Monitor International, 2018, 24).

5- Encourage foreign investments

Egypt issued the new Investment Law No. 72 of 2017 provides many incentives and guarantees such as: Sales tax on equipment and machinery necessary for production has been lowered from 10% to 5%. Custom duties on imported equipment and machinery used in production have been trimmed to 2% instead of 5%. Refund of half the value of the land allocated for industrial projects if production begins within two years from the land delivery date (Ministry of Investment and International Cooperation, 2017:30)

The government issued a decision 184, 2013 to change the customs tariff to allow assembly industries to request permission to treat their aggregated products under the supervision of the Customs Authority to encourage foreign investments to locate in Egypt, in line with the following provisions:

- Completely disassembled parts imported for industry to be assembled under the supervision of the Customs Authority and subject to the item of the final product are customs treated at the incoming tax category imposed on the entire product after a 10% reduction.
- If the percentage of local content ranges between 30-40%, imported foreign parts will be subject to the same category of import tax as the finished product after it has been reduced by 110 percent from local content percent.

- The import tax rate on the finished product is decreased by 115 percent if the percentage of local content is greater than 40 to 60 percent.
- If the percentage of local content exceeds 60%, the import tax on the final product is reduced to 120 percent of the percentage of local content, with a maximum of 90 percent of the tax category on the final product (Presidential Decree No. 184 of 2013: 5).

6-Competitive Landscape

Egypt is a gateway to Africa and the Middle East for International companies, its IT Companies include IBM Egypt, Orange Business Services, Samsung Electronics Egypt,(Abu Radi industrial area) Raya Holdings, Giza Systems, Intercom Enterprises, ECC Solutions, International Electrical Products, Katron (Benha Electronics), El Araby Group in Benha, Qesna, Egabi Solutions, and ITWorx. In addition, other electronics companies such as kiriazi electric, general electric in Obour city, fresh electric, Alaska, LG electronics in Tenth of Ramadan industrial area, universal, unionaire, electro-star, international electronics in Sixth of October See tables 4, 5 (Chamber of engineering industries, 2022).

Samsung Electronics Egypt is responsible for local sales and marketing; it is one of the South Korean giant's two production facilities in the Middle East and Africa. Samsung developed its plant in Beni Suef with an investment of EGP1.7bn (\$280mn) in 2012, before investing a further \$35mn in August 2014 as part of the second phase of its expansion plan. In 2016, it is citing economies of scale and tax incentives as the reason for not investing in manufacturing in Nigeria, and, instead, serving West African markets from Egypt. Samsung also exports monitors to Europe. See table 5.

Table.4. Characteristics of main Radio, television and communications plants in Egypt, 2022

Industrial zone	N. of establishment	Output value pounds000	Investment costs pounds000	N. of employees	Area M ₂	Value added pounds000
Cairo helwan	1	374115	161583	941	60000	174115
Maadi	1	48000	47207	736	105000	18000
New Cairo	2	355300	75000	645	60300	109510
Tenth of Ramadan	28	6300251	1292683	1897	112596	2174338
Obour City	11	5711081	1446878	461	88060	435842
Benha City	1	3091111	616000	6000	23000	1770244
Benha district	3	330706	70371	1911	65224	147418
Qesna	2	3870000	637433	1000	22251	497257
Zone I in Ismailia	1	880140	114768	320	4877	540903
Ismailia district	1	44986	14735	1099	6466	17270
Abu Rawash	3	220636	80132	613	16840	69950
Sixth of October	27	2901093	924148	2482	143928	909759
Kom Abu Radi	1	18584240	3500000	1510	360000	5584992

Source: author's collection is based on Industrial Development Authority, 2022

Production of TV sets, monitors and PCs started at Beni Suef in 2013, with output of 500,000 units, rose to 2.8mn in 2014, 2.9mn in 2015 and then reaches to 5 million units in 2022. In 2022, Samsung exported 3.5 million devices from Beni Suef for 36 markets in the Middle East and North Africa, worth more than \$790mn. Samsung exports to Saudi Arabia, UAE, Kuwait, Morocco, Algeria, Côte d'Ivoire, Mali, and Uganda. Local market absorbs 20% of production, while international market takes over 80% (Field study, 8 Sept.2022). Meanwhile, in September 2018 , Samsung was chosen by the Ministry of Education to supply 1mn tablets for the 2018/2019 school year after publishing seven other companies in a tender worth EGP2.4bn over the academic year. The price per tablet will not override EGP1400 (\$80) (Samsung Electronics Egypt, 2020).

Table.5. Characteristics of main household electrical appliances plants in Egypt, 2022

Industrial zone	N. of establishment	Output value pounds000	Investment costs pounds000	N. of employees	Area M₂	Value added pounds000
fifteenth May	3	81185	26500	143	11346	26856
New Cairo	4	230000	148562	87	6296	132790
Tenth of Ramadan	33	5228548	2051241	4306	365599	2605803
Obour City	13	583885	159442	657	32680	17829
Benha district	1	330706	70371	1911	65224	147418
Shubra El Kheima	1	265500	70000	140	42000	82200
Great al Mahalla	2	157775	72870	670	4600	55702
Mubarak Industrial	3	512195	97672	550	10047	298686
Abu Rawash	3	74000	17900	185	6577	49000
Sixth of October	18	982493	322974	1176	69554	246875
Total						

Source: author's collection is based on Industrial Development Authority, 2022

In terms of the Egyptian devices market, Samsung is the prevailing player in the tablet, smartphone, and TV set markets. Meanwhile, in the TV set market, Samsung was also the commander with a 35% share in 2016, and a 60% share of the 55-inch or more screen size market (Business Monitor International, 2018; 26-27). The growth rate of exports of TV receivers reached 58% and the average relative importance is 1.8, while the relative advantage index reached 4.6 during the period 2011-2020, which are good indicators due to Samsung's entry into the Egyptian market in 2013. See fig.12.

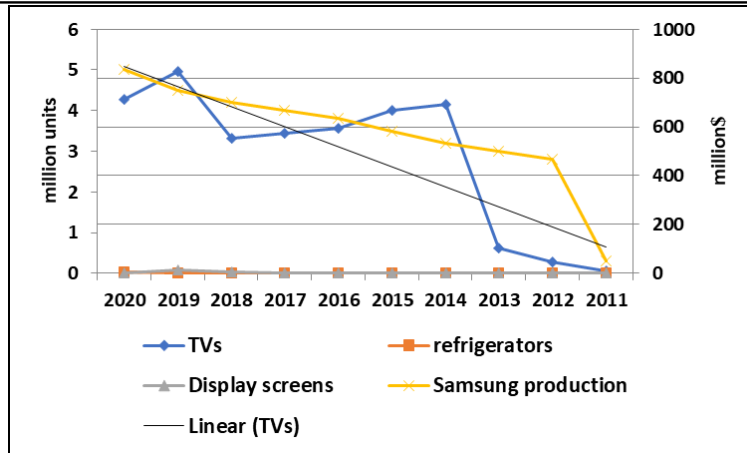


Fig.12. Relationship between Exports of electronic industries and Samsung electronics Egypt output 2011-2020

Source: Author's Data is based on Makar, 2021:11, 19, 39.and www.trademap.org/2020, Samsung electronics Egypt Company, 2020,

5- Samsung retail network

Samsung has also invested in a local retail network that reached 175 stores in August 2021, including agents, of which 50 stores in Cairo, 46 stores in Giza, Ismailia has 18 stores, Mansoura has 12 stores and 8 stores in Assiute. Samsung has established the largest mobile spare parts warehouse in the country, enabling it to supply a higher level of after-sales service than most of its competitors. See figs., 13, and 14.

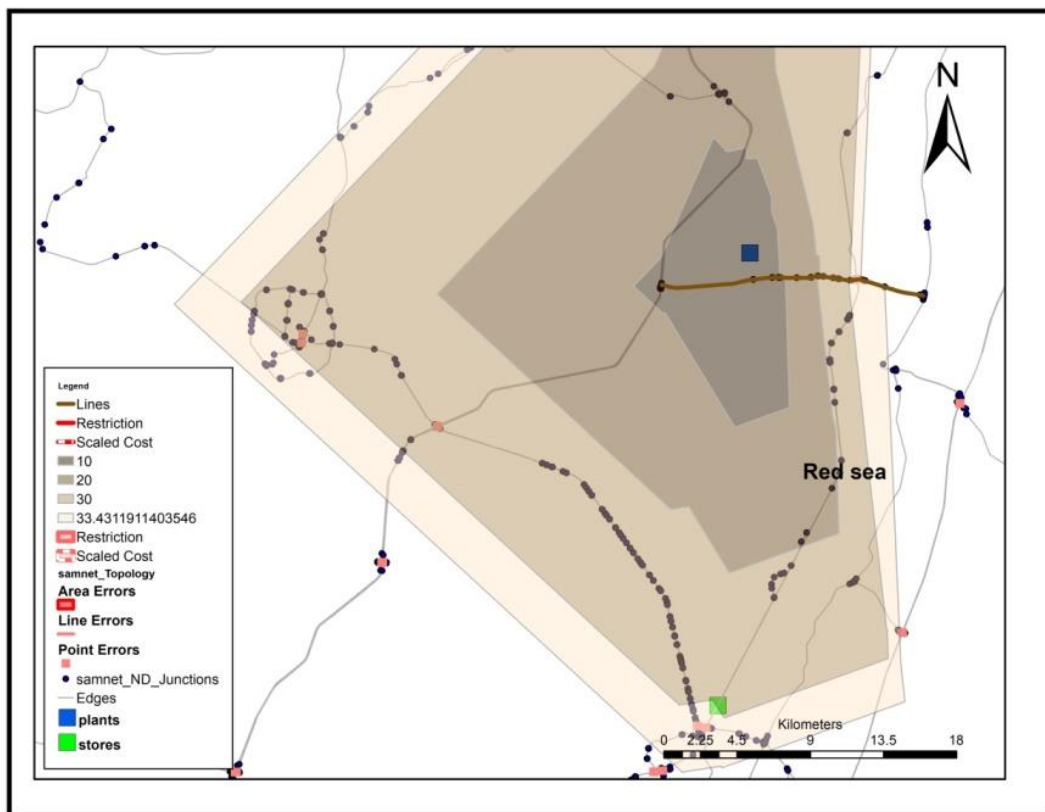


Fig.13. new service area of Samsung electronics Egypt plant, 2022

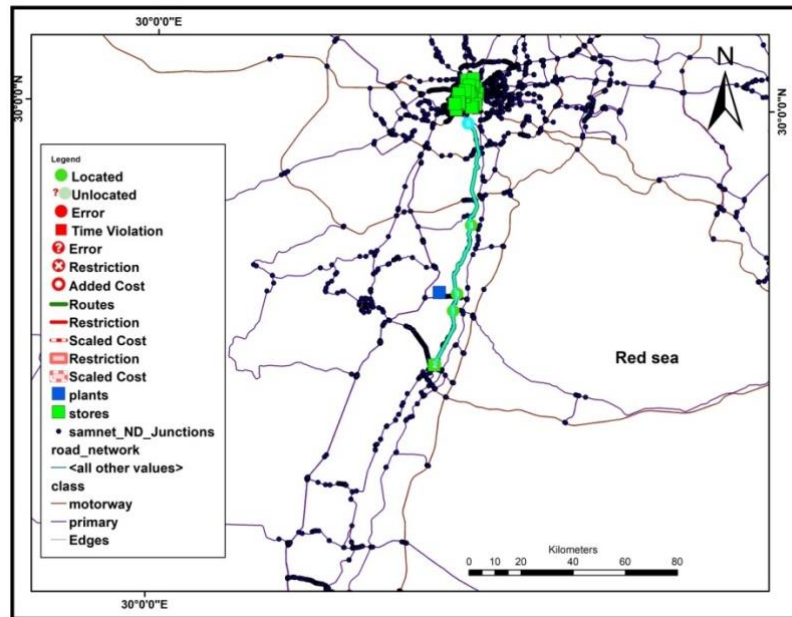


Fig.14. the best route between Samsung electronics Egypt plant and its stores, 2022 using network analyst

The best route between Samsung electronics Egypt and its stores is agricultural Assiut– Cairo road, From Samsung electronics Egypt to Giza stores distance is 90 km 75 minutes, while from Samsung plant to Beni Suef stores 36km 30 minutes. New service area analysis concluded that through 10, 20, 30, 33 minutes from Samsung electronics Egypt plant, there is only one store serving a large area from Giza, Beni Suef and Fayoum governorates. See fig 13 &14.

6- Labor union and civil society

Issues of labor have long been central to understanding the location of economic activities and locational model was based on the geography of labor costs. The variance in labor costs is related to the existence of trade unions and membership (Herod, 2003:342).

The working age in Samsung electronics Egypt ranges between 22 -30 years and The duration contracts of work for employees and technician ranges between 3-6 months, while the duration contracts of engineers ranges between one to three years. If renewal contracts are made, the salary will be on the basis of the first year without any an increase. Samsung works two shifts daily 12 hours per shift; it works four days a week and two days off (field study, 29 June, 2022).

On the other hand, the role of civil society, the consumer has the right to obtain fair compensation for the damages incurred to him or his money as a result of purchasing the products, using them, or receiving the service. The Consumer Protection Agency coordinates with the Competition Protection Agency, prevents monopolistic practices, and supports the activities of NGOs specialized in consumer protection, technically and legally. The civil associations concerned with consumer protection are specialized in conducting a survey and comparing the prices and quality of products, verifying the validity of the data, and assisting consumers who have suffered harm (Consumer Protection Law, 2018).

IV- Global production network strategies for supporting Samsung Electronics Company

There are four specific strategies for supporting, organizing, and configuring Samsung electronics GPN:

1- Intra-firm coordination strategy

In South Korea, for example, Tesco works with its strategic partner, Samsung, to penetrate into an otherwise difficult retail market characterized by highly competitive conditions, distinctive and demanding consumer preferences, and a strong local supply base. Overall, this example helps us understand why and how intra-firm coordination can be adopted as a key strategy to organize global production networks in the retail industry.

2- Inter-firm control strategy

In 2011, Samsung signed an agreement with a Switzerland supply chain company CEVAx. Under the contract, CEVA will organize pickup of return devices, such as phones, flat screens, printers and refrigerators from Samsung's service partners across Switzerland and bring them to a central laboratory. CEVA employees will carry out quality control activities on behalf of Samsung to find if the items have an inherent defect or can be reformed. This kind of operation can be found in every market (Canadian Embassy in the Republic of Korea, 2012:19).

3- Inter-firm partnership strategy

Samsung has signed cross-licensing agreements with Google (signed in January 2014), Nokia (October 2018), Western Digital (December 2016), Qualcomm (January 2018), and Huawei (February 2019), and Sharp (July 2019) through which the Company has saved an extensive patent protection in mainstay businesses as well as in the fields of new business. The Company has also been concentrating on protecting **design patents** to secure its original design applied to smartphones and TVs. Therefore, in 2020, the Company acquired 517 US patents, in part for the aforementioned purposes (Samsung Business Report, 2020:52-64).

Samsung Electronics has also operated a broader range of intellectual capital without much investment by sharing their proprietary technologies with partners. These firms can share their patents without additional investment, resulting in a more stable basis for innovative activities. Samsung has implemented planting innovation through SAIT internally and has utilized external capabilities through M&A and licensing for significant financial gains in the long run. SAIT has achieved several major research projects independently as well. The Value Innovation Program (VIP) Centre, setup in 1998, has represented a key role in developing innovative new products at SE. In 2012, SE established the Centre for Intelligent Computing (CIC) with Seoul National University. SE has also founded the Samsung Talent Program (STP) with 14 Korean universities. This program is intended to nurture and develop R&D employees to fit its needs. Co-innovation has allowed SE to focus both planting and harvesting innovation activities with limited resources (Jang, et al. 2019: 4-10).

4- Extra-firm bargaining strategy

Samsung enters into robust negotiations with relevant domestic non-firm actors such as state authorities, standards organizations, and industry associations. As local firms acquire or develop greater technological and market capabilities, they may bargain with home institutions for preferential access to resources and fiscal incentives given to foreign lead firms.

The combination of value chain modularity and deep capabilities in multiple locations will extend to produce huge opportunities for both suppliers and Samsung Company in electronics GVCs. Samsung has options to assemble and reassemble GVC elements in new ways for new markets and products that did not exist even a few years ago. Dynamic change is nothing new in the electronics industry. However, going forward, new industries and value chain combinations will inevitably comprise more firms – lead firms, contract manufacturers, component suppliers, and even platform leaders – based in newly developed and developing countries (Sturgeon, T.& Kawakami, M.2011:144).

In the future, China - major competitive - aims to transform economy into a hi-tech powerhouse and focuses on ten industries: Artificial intelligence and quantum computing,

automated machine tools and robotics, Aerospace, Maritime equipment, Modern rail transport equipment, Self-driving and new energy vehicles, Power equipment, Agricultural equipment, new materials, Bio- pharma, and advanced medicine (Dollar, Khan, and Pei, 2019, 151).

IHS Markit predicts that 5G- technology related investment from 2020 to 2035 by firms that are part of the 5G value chain within seven countries (China, United States, Japan, Germany, **South Korea**, France, and United Kingdom) will average over \$260 billion annually, and will produce \$3.8 trillion of gross output and support 22.8 million new jobs (Qualcomm Technologies & Omdia, 2020: 3-6).

5- spatial strategy for re-organizing Samsung electronics Egypt

Front shop- back factory model is the best model for dividing electronics hub or platform in Abu Radi industrial area (Meyer, et al, 2012: 127). Establishment of Egyptian -Korean Technological College (2016 -2022) by \$5.8millions in new Beni Suef city to support Samsung electronics Egypt complex (Korea international cooperation agency, 2020: 119). College **includes four programs**: The Mechatronics program, The ICT program, The Auto-ronics program, and The Renewable Energy program. There is also Beni Suef techno-pole or smart village in East of Nile on an area of 54 acres. The first phase has been completed on an area of 18 acres, which includes areas for factories; areas for companies, training laboratories, and an integrated center to citizens serve.

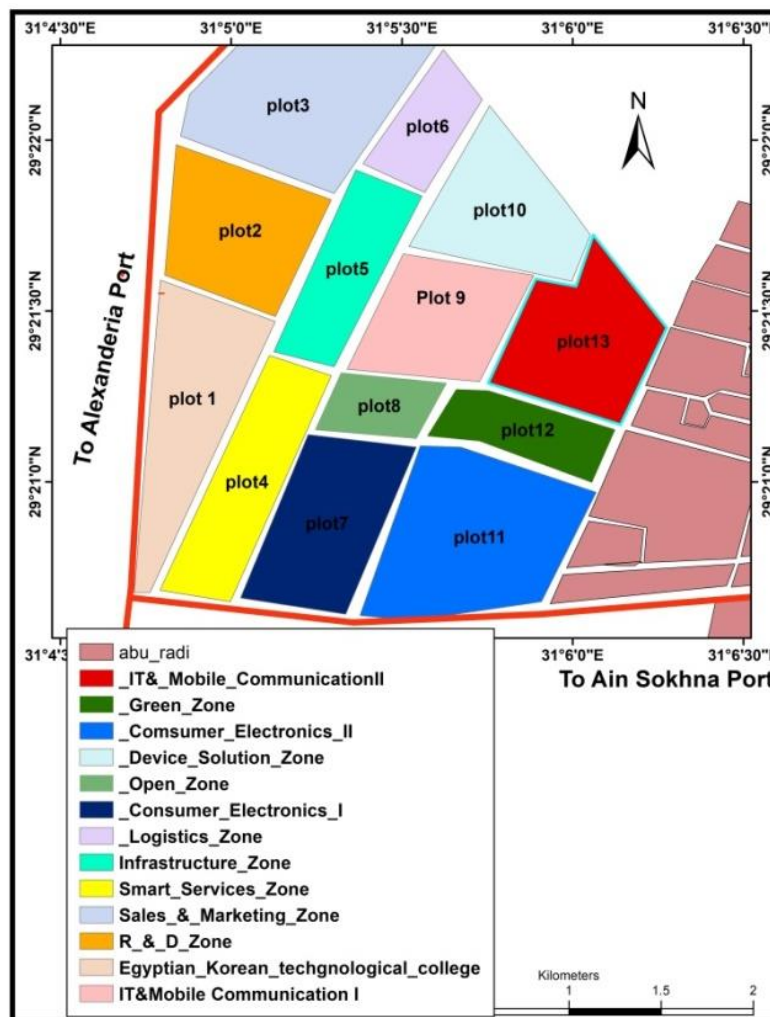


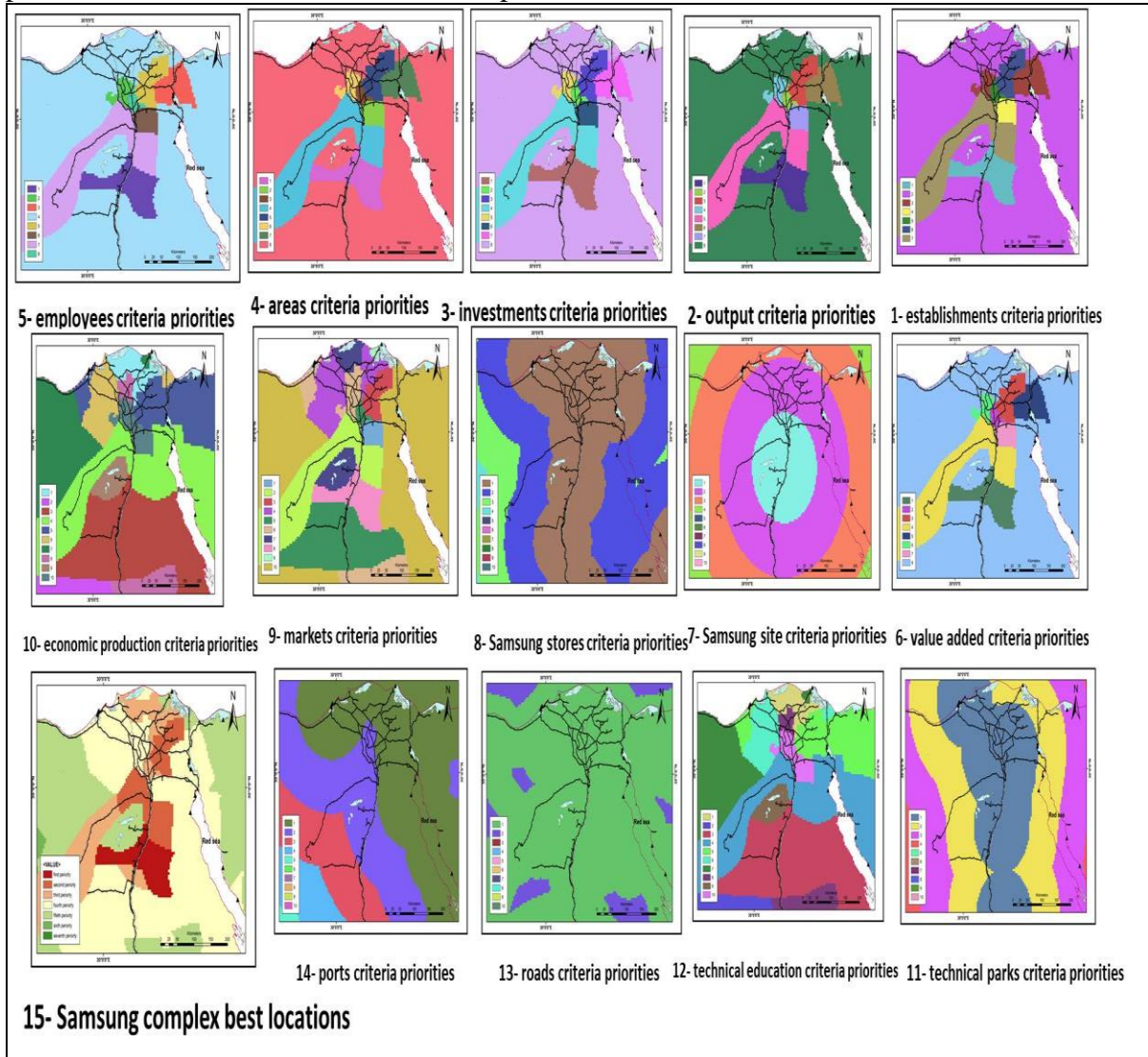
Fig.15. proposed smart Samsung electronics complex (electronics pearl) in Kom Abu Radi industrial area II 2022

Source: Author's Data is based on field study, 29 June, 2022.

Government has been allocated 2,124 acres for tourism investment in the Golden Triangle area between Beni Suef, Fayoum and Giza next to Samsung electronics complex (Beni Suef Governorate, June, 2022).

Therefore, this paper suggests smart Samsung electronics complex beside and extension to Kom Abu Radi industrial area See fig 15.

By using 14 variables including: number of electronics establishment-with weight 6% , value of electronics output- 8%, value of electronics investment 8, area of electronics 8%, employees of electronics 8%, value added of electronics 8%, roads network 5%, Samsung electronics Egypt location 8%, Samsung stores 8%, tech parks 8%, markets 8%, economic production 7%, technical education 7%, ports 5%.



Multi criteria analysis results concluded that the optimum locations for decision makers in term of smart Samsung electronics complex are Beni Suef in the first priority and then Giza and Cairo in the second priority. See fig.16.

Fig.16. Optimum locations of smart Samsung electronics complex, 2022

V- Conclusion

- The geographical analysis of Samsung's global production networks organization showed that the production sites are **Remarkably concentrated** in China, South Korea and other Asian countries, while the sales centers are **spread** in several

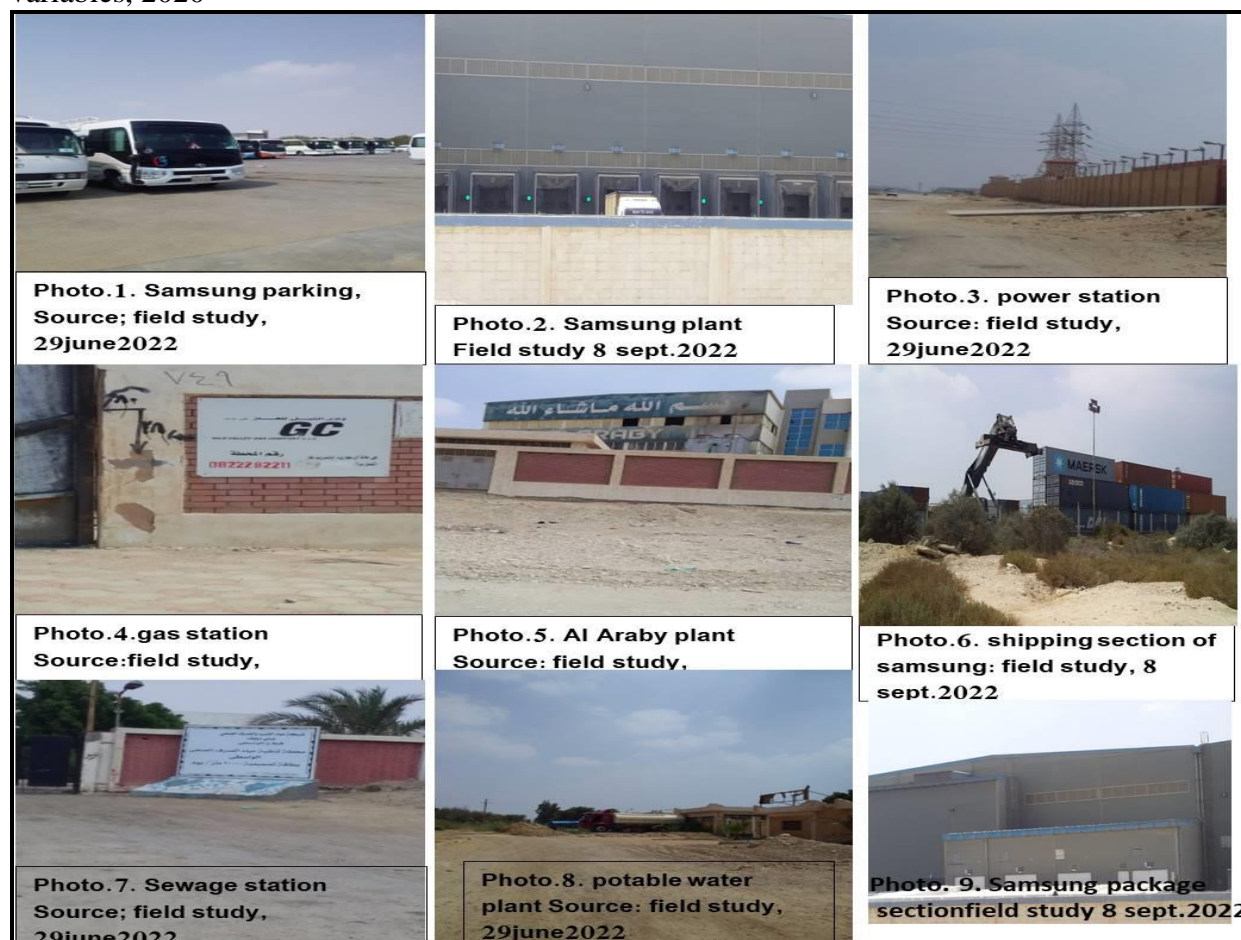
continents, the most important of which are Asia, Europe, Africa and Latin America, respectively.

- Samsung's R&D laboratories are notably concentrated in South Korea, Europe, and the United States, **Global universities-oriented**; whereas design centers are located in China, South Korea, Europe and the United States, **market-oriented**.
- The study concluded that the spatial dynamics responsible for organizing the global production networks for Samsung are mainly represented in research and development, design centers and global marketing strategies.
- Results of Spatial Power coefficient of GPN for Samsung Electronics Company shows that Asia and China regions are ranked first and second in terms of the power of Samsung's production networks.
- The results of the Pearson correlation coefficient analysis indicated that research and development, design centers, suppliers, sales centers, cobalt and tin smelters variables are closely related to production sites.
- The study concluded that Samsung Electronics Egypt was localized in Beni Suef Governorate, south of Cairo, oriented consumer markets.
- Using network analysis, the study found the best way to reach Cairo largest market is agricultural Assiut– Cairo road, while new service area analysis concluded that through 10, 20, 30, 33 minutes from Samsung electronics Egypt plant there is only one store serving a part of Giza, Beni Suef and Fayoum governorates.
- Multi criteria analysis results concluded that the optimum locations for decision makers in term of smart Samsung electronics complex are Beni Suef in the first priority and then Giza and Cairo in the second priority.
- **Recommendations**
- Samsung Electronics should expand into Africa and the Middle East as new markets with a size of more than 1.5 billion people.
- Workers' rights must be preserved, work contracts should be extended for longer periods, and retired workers should receive a monthly pension as social protection or termination.
- The stores marketing Samsung products should be expanded in the regions of Upper Egypt, and other regions where there are fewer stores
- The production of washing machines, home refrigerators and smart TVs of all kinds should be expanded,
- Research and development should be localized in Egypt, and it should become a research and development center, a design center and a gateway to African markets.
- Samsung should be **preserved coordination** with lead firms in global production networks for retail industry to allow them to be responsive to market demand and consumption patterns.
- Samsung must be has a strong **control** over suppliers, and contractors as without external actors, Samsung will not work.
- Samsung should be formed **interdependency** with lead firms providing financial, legal, accountancy, information technology, semiconductor manufacturer, fab and fabless smartphone chip design firms and other producer service firms.
- Samsung must be continued into **negotiation** with domestic nonfarm actors such as state authorities and standards organization in order to, protect their firm specific R&D investments and intangible assets e.g. brand names, patents, and trade markers.
- Samsung must be located their future enterprises in Egypt in Beni Suef, Cairo, Giza respectively, According to multi standards analysis model.

Appendix

		Correlations															
		producti	regiona		Reseac		logistic	supplier									
Pearson Correlation		on	l	sales	h	design	s	s	assets	salesv	labor	gold	cobalts	tungst	tin	tantalu	revenu
	producti	1.000	.223	-.398-	.818	.606	-.471-	.630	.432	.757	.468	.294	.697	.786	.702	.679	.243
	regional	.223	1.000	.651	.709	.633	.657	.181	.377	.362	.130	.851	-.117-	.037	.701	.445	.335
	sales	-.398-	.651	1.000	.009	.058	.730	-.444-	.057	-.102-	-.365-	.591	-.265-	-.230-	.033	.146	.151
	Reseach	.818	.709	.009	1.000	.731	.070	.525	.432	.698	.369	.592	.418	.573	.914	.702	.284
	design	.606	.633	.058	.731	1.000	.183	.657	.884	.792	.503	.684	.041	.175	.602	.531	.769
	logistics	-.471-	.657	.730	.070	.183	1.000	-.414-	.188	.001	-.436-	.326	-.456-	-.394-	-.008-	.102	.340
	supplier	.630	.181	-.444-	.525	.657	-.414-	1.000	.388	.322	.964	.444	-.078-	.027	.648	-.019-	.162
	assets	.432	.377	.057	.432	.884	.188	.388	1.000	.843	.212	.435	.100	.169	.183	.564	.967
	salesv	.757	.362	-.102-	.698	.792	.001	.322	.843	1.000	.086	.301	.576	.652	.385	.878	.782
	labor	.468	.130	-.365-	.369	.503	-.436-	.964	.212	.086	1.000	.463	-.225-	-.135-	.588	-.227-	-.015-
	gold	.294	.851	.591	.592	.684	.326	.444	.435	.301	.463	1.000	-.174-	-.039-	.686	.282	.317
	cobalts	.697	-.117-	-.265-	.418	.041	-.456-	-.078-	.100	.576	-.225-	-.174-	1.000	.984	.190	.763	.049
	tungst	.786	.037	-.230-	.573	.175	-.394-	.027	.169	.652	-.135-	-.039-	.984	1.000	.351	.825	.095
	tin	.702	.701	.033	.914	.602	-.008-	.648	.183	.385	.588	.686	.190	.351	1.000	.390	-.008-
	tantalum	.679	.445	.146	.702	.531	.102	-.019-	.564	.878	-.227-	.282	.763	.825	.390	1.000	.543
	revenue	.243	.335	.151	.284	.769	.340	.162	.967	.782	-.015-	.317	.049	.095	-.008-	.543	1.000

Appendix.1. Pearson correlation results of Samsung electronics global production network variables, 2020



Appendix.2. photos

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