Design-intensive Product Space as the Indicator for Innovation and Structural Transformation: The Middle-income Trap Perspective

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Abstract  
This paper aims to understand the impact of industrial design as the indicator in capturing relevant aspects of the innovation process and structural transformation in the middle-income trap context.
Specifically, the comparative study of countries sustained their economic growth and countries stuck in the middle-income trap during the past decades has been conducted. The research is based on the industrial design registration data, trademark registration data, international trade data on design-intensive goods and services as well as counterfeiting data etc. The research results indicate that those countries who successfully escaped middle-income trap demonstrated strong performance in terms of industrial design registration, design-intensive goods and services exports as well as low-level of counterfeiting whereas those who stuck in the middle-income trap underperformed. The design-intensive product space and the ‘Design-intensive Industries Facilitation and Development Framework’ thus have been proposed which provide result-oriental capacity building economic development frameworks focusing on internationally traded goods and services that produced from those industries with an above-average use of registered design and registered trademark per 1,000 employees.

Keywords: Industrial Design Rights, Design-intensive Product Space, The Middle-income Trap, Technological Catch-up
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Introduction
During the last four decades, the economies of the world demonstrated various performance in terms of sustainable economic growth. Asian countries have demonstrated a striking rise in economic performance, growing from around 15 percent of the world GDP in 1980 to almost 40 percent in 2008. In contrast, GDP in Latin American countries’ have remained at less than 10 percent of the world GDP, without distinctive growth (Nayyar, 2013; Maddison, 2007; Lee, 2013; Lin, 2012). The GDP per capital (in 2005 constant PPP dollar) in some East Asian countries and regions such as South Korea and Chinese Taipei has soared from less than $2,500 in the 1960s to more than $25,000 in 2010, nearly a 10-fold growth. They have achieved convergence with high-income economies rapidly. However, GDP per capital (in 2005 constant PPP dollar) in other Latin America countries such as Brazil and Argentina etc. has shown marginal growth from around $5,000 in the 1960s. They stuck at the level of less than $13,000 since the 1970s (Maddison, 2007; Lee, 2013; Nayyar, 2013) without stepping into the high-income level. Furthermore, over the last decade, 28 new countries have reached the middle-income status (USD 1,005 - USD 12,075 Gross National Income or GNI per capita using the Atlas method as defined by the World Bank), while only 12 countries have graduated into high-income country status (more than USD 12,076 GNI per capita).

These suggest that, at middle levels of income, economic growth and structural upgrading become more arduous (OECD, 2012). This phenomenon was identified by the World Bank (2007) as the ‘middle-income trap’, which those countries’ economies “… have grown less rapidly than either rich or poor countries.” It is particularly noteworthy given that several Latin American countries (such as Brazil and Argentina) were middle-income long before many countries and regions in Asia (such as South Korea) (OECD, 2012).

Unlike the catching up strategy in low-income countries which focusing on
trade specialization, the comparative advantages of resource endowments and labor-intensive/mature/resource industries which mainly relies on the source of competitiveness from low costs (wages or natural resources) and low risk from adopting existing equipment (Hidalgo et al., 2007; Lin, 2012; Nayyar, 2013; Lee, 2013; 2015), few empirical studies have focused on how middle-income countries can sustain economic performance beyond this level (Lee, 2013; 2015; Odagiri, 2010; Im and Rosenblatt, 2015; Gill and Kharas, 2015; Agenor and Hinh, 2013a; 2013b; Agenor and Otaviano, 2012; Nayyar, 2013). This is believed as the underlying rationale for the phenomenon of the “middle-income trap” (Gill and Kharas, 2015). More than 70% of the world’s population now live in the middle-income economies and surprisingly, economists have yet to provide a reliable theory of growth to help policy makers navigating the transition from middle- to high-income status. Hybrids of the Solow-Swan (Solow, 1956) and Lucas-Romer (Romer, 1989) models are helpful, but they are poor substitutes for a well-constructed growth framework (Gill and Kharas, 2015).

The most frequent explanation point for the phenomenon of the “middle-income trap” is the low-level of productivity in those countries stuck (Lin, 2012; Lee, 2013; World Bank, OECD, 2012). A fundamental idea for this is that compared with those low-income countries, the reaped productivity gains based on workers shift from the agriculture sector to the manufacturing sector using imported technologies has exhausted, also the incomes (and wages) in the middle-income countries have increased high enough to progress away from those low-skilled and labor-intensive industries; however, compared with advanced high-income economies which are characterized by a roughly similar level of productivity across sectors, sophisticated national innovation system, and a diversified and sophisticated export profile, those middle-income countries faces substantial labor productivity differentials among industries, underperformed national innovation system, and an export base concentrated in goods with little value added (OECD, 2012; Kuznets, 1955) due to institutional, knowledge and technologies hurdles (OECD, 2012). In other words, sustainable economic growth in the middle-income countries largely depends on their successful structural transformation (Lin, 2012). Those countries with selected industrial sectors of higher productivity, higher wage level, localization of knowledge & technology creation and an export base concentrated in goods with higher-value or premium-value added may sustain their economic growth (Lin, 2012). The large difference in productivity, wage levels, technology level and value-added across industries is a subtle point to notice in the context of the middle-income trap. The theoretical grounds of these sector gaps go back to the work of Kuznets (1955), who sees them as a catalyst for structural transformation, as they foster the reallocation of production factors towards the most productive sectors. During this process, manufacturing starts to play a bigger role in the economy
particularly in the tradable sector (OECD, 2012). In fact, almost without exception, the countries that effectively escaped the middle-income trap during the post-war era underwent a deep transformation of their economic structure, away from primary activity and into manufacturing (OECD, 2012). In this case, formulating the best combination of the economies’ structure which focusing on those industries with higher productivity, higher wage level, higher technology level and value added are the key for generating sustained economic development in the context of the middle-income trap.

**The Technological Catch-up and the Middle-income Trap**

The iconic study from Korean Economist Keun Lee (2013) aimed to clarify the puzzle of the middle-income trap from the neo-Schumpeterian perspective (Gerschenkron, 1962; Abramowitz, 1986; Nelson and Winter, 1982). The study was based on analysis of the US patent dataset and comparison among East Asian against (e.g. South Korea and Chinese Taipei etc.) and Latin American (e.g. Brazil and Argentina etc.). Lee’s analysis shows that both learning and promotion of technological capabilities by private firms has the greatest impact on sustained growth beyond the middle-income stages (2013). He demonstrated that middle-income countries should specialize in short-cycle technologies, which through acquiring design capability (Move beyond OEM/Assembly), targeting/entering the mature medium short-cycle industries or low-end segment of short cycle industries and leapfrogging into new/emerging technologies in the short-cycle industries (Lee, 2013, 2015).

The underlying rationale is that those industries based on a short-cycle time are relying less on the old knowledge that is dominated by the advanced countries and having a reduced need for latecomers to master old and existing knowledge (Lee, 2013). In other words, the advantage of short-cycle technology industries is relying on the adoption of new technologies, products, and processes which are likely to trigger the frequent emergence of newer technologies and products/processes. In this case, what matters in the short-cycle industries is not the length of the cycle time itself, but the surfacing of more opportunities, with the continuous emergence of new technologies and a reduced reliance on the existing dominant technologies and knowledge (Lee, 2013). It is where new opportunities tend to emerge more frequently and are also where more profitable business is available with lower entry barriers (Lee, 2013).

Those countries at the middle-income stage thus should promote localization of knowledge diffusion & creation as well as enable further development based on indigenous capabilities (Lee, 2013; 2015). Specifically, countries going through upper middle-income toward high-income transition should focus on technology specialization which technological capability are mainly from learning/R&D effort. Short-cycle/emerging technologies are the targeted industries for the middle-income countries which aim to promote the
localization of knowledge creation and diffusion. The source of competitiveness from this strategy in the middle-income countries thus is from product differentiation/ fast mover advantages as well as less need to rely on existing technologies. The risk of this strategy is the difficulties for acquiring the design capability as well as correctly targeting technologies/ standards (Lee, 2013).

In sum, for a developing country to surpass the middle-income stage, technological specialization in short-cycle technologies can be implemented to identify a new upgraded niche in a higher-vale segment or industry (Lee, 2013). Keun Lee has conceptualized this process as ‘technology detour’ which could help those middle-income countries to escape the middle-income trap and sustain their economic growth (Lee, 2013; 2015).

However, the issue is that Keun Lee’s emphasis on short cycle technologies was mainly based on the traditional indicators of innovation such as patents and R&D in the middle-income countries (2013). R&D and patent indicators as the means of obtaining quantitative information are believed could only partially capture certain aspects of the innovation process (OECD, 2009; Mendonca et al., 2004; Odagiri, 2010). It remains contested even today. Significant reasons for this are:

- The analysis of those data could not reflect the commercial aspect of innovation (OECD, 2005; 2015; Mendonca et al., 2004; OECD, 2009);
- The emphasis on inputs rather than outputs and impacts (Godin, 2003);

Though in Keun Lee’s study the importance of ‘acquiring design capability (Move beyond OEM/Assembly)’ and ‘Move into Own-Brand-Manufacturing or OBM’ (Luo et al., 2014; Lee, 2013; 2015; Aghion and Howitt, 2013a; Millot, 2009) as the significant step for technological catch up in middle-income countries to sustain their economic growth (Lee, 2013; 2015; Luo et al., 2014) has been identified, this proposal has not been investigated further to demonstrate its veracity.

Pierre-Richard Agénor and Otaviano Canuto (2012) from the World Bank have determined that countries with “advanced” rather than “basic” infrastructures have better product diversification as a result of promoting design activities. They concluded that middle-income trap is characterized by low productivity growth and a misallocation of talent and correspondingly a comparatively low share of high-ability workers in design disciplines. Thus, they propose that middle-income countries need to build more advanced infrastructure (e.g. IT) to enable sectors such as design to develop. It thus enables the capacity of the modern sector to absorb a relevant share of workers from the traditional sector, which considered as the key aspects of successful structural transformation (Agénor and Hinh, 2013a; OECD, 2012).

In the global value chain (GVC) context, the issue of design and innovation has often been discussed in terms of (economic) upgrading and the efforts of companies and (developing and emerging) countries to increase the value
they create and capture in GVC activities (Gereffi, 1999). Four types of GVC upgrading have traditionally been identified (Kaplinsky and Morris, 2002; Kawakami, 2012): The process upgrading; the product upgrading; the functional upgrading and the chain upgrading (OECD, 2013). Among which, the design has considered as a form of knowledge capital (OECD, 2012; 2013; Corrado et al., 2005) and as part of the functional upgrading and product upgrading strategy (Kaplinsky and Morris, 2002; Dedrick and Kraemer, 1999; Baldwin, 2012). While the significance role of design for upgrading in GVCs has been identified, it has received relatively little attention in policy-making (OECD, 2013).

In conclusion, within the middle-income trap and global value chains literature, the significance of acquiring design capabilities for technological catch-up and climbing up the global value chains have been identified for sustaining economic growth, however, there is no further empirical evidence to demonstrate its veracity.

**Industrial Design and Trademark as Indicators of Innovation and Economic Performance in Developing Countries**

**Innovation Indicators and Measurement in Developing Countries**

The development of measurement and indicators is a social process, with social and economic consequences. Specifically, a ‘statistic indicator’ is a statistical or combination of statistics that provides information on the state of a system or its change over time (Gault, 2014). The implicit assumption is that the behavior will be beneficial to the economies and societies for which the indicators have been developed. Under this rationale, the past decades have witnessed the considerable progress in the definition, measurement, and interpretation of data on the activity of innovation due to its identified significance (Schumpeter, 1942; Romer, 1989; 1990; Lee, 2013; Aghion and Howitt, 2008). This progress reflects on the revisions of the Oslo Manual since 1992 and its implementation through Community Innovation Survey since 1991 (Gault, 2014; Fagerberg et al., 2005).

The newest version of the Oslo Manual (2005) defines innovation from a systematic perspective (Lundvall et al., 2009) as:

> “An innovation is the implementation of a new or significantly improved product (good or service), or process, a new marketing method, or a new organizational method in business practices, workplace organization or external relations.”

Based on the newest version of OECD Oslo Manual, it also added an annex to interpret the measurement of innovation for use in developing countries (OECD, 2005). This was accepted and the preparation of Annex of OECD/Eurostat (2005) was coordinated by the United Nations Educational, Scientific and Cultural Organization (UNESCO) Institute for Statistics (UIS).
In 2013, the UNESCO UIS launched its first global innovation data collection which including low- and middle-income countries. It was targeted at country-level data covering innovation in manufacturing which was considered as the first time that a dataset with innovation indicators was produced and made publicly available worldwide for countries at different stages of development (UNESCO, 2015). The report deliberately aimed to foster comparability for report data only in manufacturing which enables comparability due to the significant role of manufacturing in the developing countries. Firms that engaged in innovation activities (as a percentage of innovation-active manufacturing firms), the information source from the innovation-active manufacturing firms, the cooperation with partners from the innovation active manufacturing firms and the hampering factors are identified as the indicator for the innovation capabilities in developing countries by the report (UNESCO, 2015).

The report indeed reviles certain implications:
- Compared with firms in high-income countries which were the most frequently implemented by process innovation, the share of innovators in low- and middle-income countries are lead by product innovation (9 out of 27 countries). For instance, Brazil demonstrates around 20 percent share of product innovation, 30 percent of Brazil’s innovators are focusing on process innovation; the Brazil has the innovation-active and innovative firms at around 37.5% and 35% respectively (UNESCO, 2015);
- Cost factors – in particular, the lack of funds within the enterprise or enterprise group – were the main obstacle faced by innovation-active firms regarding the hampering factors for innovation activities. This was observed in high- as well as low- and middle- income countries (UNESCO, 2015).

Industrial Design as the Indicator of Innovation

According to WIPO, industrial design defined as:

“An industrial design may consist of three-dimensional features, such as the shape of an article, or two-dimensional features, such as patterns, lines or color […] In principle, the owner of a registered design has the right to prevent third parties from making, selling or importing articles bearing or embodying a design which is a copy, or substantially a copy, of the protected design, when such acts are undertaken for commercial purposes (2017).”

Generally, industrial design protection covers the visual appearance of a product, part of a product or its ornamentation. Therefore, a design covers the appearance of a product, however, it cannot protect its functions, which fall
under the regime of patent protection (EUIPO-EPO, 2016). Specifically, the main characteristics of design rights include:

- **Subject matter** - The appearance of an article or product or parts of it;
- **Requirements for protection** - Novelty of individual character;
- **Acquisition of right** - For registered designs, examination by the IP office. For unregistered designs, automatically acquired by the act of disclosure;
- **Conferred rights** - Exclusive right to use the design and to prevent any third party from using it without the right holder’s consent;
- **For registered designs, the maximum term is 25 years** - In the case of registered community designs, up to 25 years (in successive 5-year terms).

The requirements that must be satisfied to register a design include that it must be new and have an individual character (EUIPO-EPO, 2016). It is new if no identical design has been made available to the public at the filing date; it has an individual character if the overall impression it produces on an informed user signifies that it differs from any previous designs (EUIPO-EPO, 2016). The economic case for design registration thus builds primarily on the idea of promoting innovation (EUIPO-EPO, 2016). Production of new designs is a creative activity, requiring significant investments of time, skills and labor. If no exclusive rights were available, any party could replicate a creative design and directly compete with the original creator. Therefore, providing a legal mechanism to protect new designs should ultimately enhance investments in design production and innovation work (EUIPO – EPO, 2016).

Most recently, The World Intellectual Property Organization (WIPO) has demonstrated the global performance in terms of the industrial design application and registration etc. (2016):

- An estimated 872,800 applications were filed worldwide in 2015, with annual growth of 2.3%; An estimated 729,800 industrial designs were registered worldwide in 2015, up 21.3% on 2014;
- In 2015, 3.4 million industrial design registrations were in force worldwide, representing annual growth of 2.8%. China (1.24 million – 36% of the world total), Republic of Korea (318,027) ranking the top two offices;
- The upper-middle-income countries witnessed the sharpest growth between 2005 (35.8% of the world total) to 2015 (58.1% of the world total), the average growth rate is about 11.2%; on the contrary, the high-income countries have witnessed the decrease in terms of the share of the world total designs in applications (from 57.8% in 2005
Design applications filled in Chinese office accounted half of the global total, 596,059 for 2015, up 0.8% from 2014. It was followed by the European Union Intellectual Property Office (EUIPO: 98,162) and the Korean Intellectual Property Office (KIPO: 72,458);

The Republic of Korea had the highest resident design count per 100 billion US dollars (USD) of gross domestic product (GDP) as well as the highest resident design count per million populations in 2015;

The Locarno classification includes 32 classes of industrial design. In 2015, the classes that accounted for the largest shares of the world total were furnishings (9.4%), articles of clothing (8.3%) and packages and containers (7%).

In 2016, the WIPO has also newly published the Hague Yearly Review – International Registration of Industrial Designs which has not been published previously. It is believed in respond to the increasing significance of industrial design in the economic development and international trade:

- International industrial design applications under WIPO’s Hague System grew by 40.6% in 2015, the fastest rate since 2008; Designs contained in those applications grew by 13.8%;
- In 2015, 3,581 international registrations with an increase of 32.5% compared with 2014. These registrations contained 14,484 designs, which is a 7.3% increase compared with 2014, marks the fourth consecutive year of growth in the number of designs;
- Samsung Electronics in South Korea became the largest applicant in 2015, with 1,132 designs;
- Substantial increase in designations international applications. In 2015, the total number of designations in international applications grew by 30.2%, whereas the number of designs in designations increased by 13.3%. Specifically, the total number of designs contained in applications in all designations increased from 65,479 in 2014 to 74,200 in 2015.
- Design relating to recording and communication equipment (Class 14) accounting for the largest share (10.8%) of total registration in 2015. This was followed by the designs relating to clocks and watches (Class 10), and means of transport (Class 12), with share of 9.0% and 7.4%, respectively;
- Renewals of international registration grew strongly. International registration holders renewed 3,194 registrations in 2015, accounting for an 18.2% increase on 2014 figures. Similarly, the number of designs contained in renewals increased by 22.2%; the 3,194
registrations renewed contained 13,371 designs.

- Six consecutive years of growth in the total number of registration in force. It increased by 3.3% in 2015. The 28,760 active registrations contained 122,183 designs.

As a form of intellectual assets (WIPO, 2017), design has been widely used by firms as a means of adding value to the product; creating a competitive niche; differentiating products from competitors; enabling entry into new markets and strengthening product marketing (European Commission, 2015). It has been increasingly considered as the driver of innovation (Verganti and Dell’Era, 2009) as well as the indicator for the commercialization aspect of innovation (OECD, 2015).

A study conducted by the EUIPO (2015) based on the dataset from 130,000 European firms with financial information and IPR data – the most comprehensive dataset for the understanding of intellectual property at the firm level – has strongly shown that companies own industrial design rights and trademarks have improved performance than those that do not:

- **Revenue premium:** The revenue per employee per year in firms owning industrial design rights (296,316 Euro) and trademarks (292,011 Euro) are 31.4% and 29.5% higher compared with those non-owners of IPR companies (225,540 Euro), this “revenue premium” is largest for design owners and followed by trademark owners;

- **Wage premium:** The wages per employee at the industrial design owning companies (46,747 Euro) and trademark owning companies (45,139 Euro) – “the wage premium” – are 23.0% and 18.8% higher than those non-owners of IPR companies (37,996 Euro);

- **Performance premium:** SMEs 1 that owns IPRs (Patents, Trademarks, and Industrial Designs) have almost 32 percent higher revenue per employee than SMEs that do not own IPRs at all; for trademark only (33% higher), trademark and design (48% higher) and patents, trademark and designs (34% higher) demonstrated the highest “performance premium” than the non-owners in terms of revenue per employee. This “performance premium” are larger in the case of SMEs than in the case of all companies.

- **Trademark only and combined Trademark-and-Design:** In general, firms that have trademark-only and combined trademark-and-design have 30% and 39% higher revenue per employee respectively compared with those companies that do not own IPRs at all;

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1 An SME is defined in Article 2 of the annex to the Commission Recommendation of 6 May 2003 concerning the definition of micro, small and medium-sized enterprises (2003/361/EC) as a company with fewer than 250 employees and turnover not exceeding EUR 50 million and/or an annual balance sheet total not exceeding EUR 43 million.
• **Manufacturing focus:** Design and trademark owner companies are mainly from manufacturing sector (C) as well as wholesale and retail trade (G) according to NACE codes;

• **The widespread usage of design:** The average stock (counts) of design overall in Europe is the largest (18.0 for EUR design and 16.0 for NAT design) compared with other intellectual property;

The fact is that extensive study in the business literature (Black and Baker, 1987; Walsh et al., 1992; Roy and Potter, 1993; Dickson et al., 1995; Gemser and Leenders, 2001; Hetenstein et al., 2001; Design France, 2002; Hetenstein et al., 2005; Chiva and Alegre, 2009; Design Council, 2005; 2009) has demonstrated the significance of industrial design and trademark for the firm performance, however, the understanding of design and trademark for economic development has not been well covered (Moultrie and Livesey, 2009; 2014; European Commission, 2014; 2015; 2016; OECD, 2015a; 2015b; 2016; UKIPO, 2012).

The measurement of industrial design as the indicator for the process of innovation, industrial change, and economic development is a rather recent phenomenon (Moultrie and Livesey, 2009; 2014; OECD, 2015b; 2016; European Commission, 2014; 2016). The existing literature has provided various perspectives for the measurement of design in order to provide evidence-based studies:

• Measures of design as an industry-based on ISIC Revision 4\(^2\) and NACE Revision 2 codes;

• Measures of design as workforce skills and tasks (Galindo-Rueda et al., 2010; Squicciarini and Le Mouel, 2012; OECD, 2013);

• Measures of design as intellectual property (IP) rights (EUIPO and EPO, 2013; Schickl, 2013; WIPO, 2012);

• Measures based on direct enquiries on design efforts – i.e. ONS – NESTA survey\(^3\); the EU Innobarometer; The Italian ISTAT-ISFOL pilot study etc. (Moultrie and Livesey, 2014; Corrado, Hulten and Sichel, 2005; Awano et al., 2010; Field and Franklin, 2012);

• Measures of design as an element of innovation and innovation activities (OECD, 2005; Haskel et al., 2005; Tether, 2005);

Among which, the first ever OECD design survey questionnaire has been proposed by OECD Directorate for science, technology and innovation committee on industry, innovation, and entrepreneurship (2014). The issue of design-related activities; industrial design registration; Use of intellectual

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\(^2\) ISIC stands for International Standard Industrial Classification

\(^3\) The United Kingdom Office for National Statistics survey of investment in intangible assets, with financial supports from NESTA.
property rights (IPRs); Government design policy; design related training and economic outcomes has been addressed in the survey (OECD, 2014).

The reason for such a diverse inquiry is that the simple counts of industrial design are affected by various sources of bias, such as difficulties in data consolidation (e.g. one design can be protected simultaneously by a combination of shape, line and color etc.); industries difference (the international industrial design registration system follows the characteristics of the product and not of the industrial sector); and the weaknesses in international comparability etc. (Moultrie and Livesey, 2009; 2014; European Commission, 2014; OECD, 2015b).

The Design Scoreboard: Initial indicators of national design capabilities (Moultrie and Livesey, 2009) conceptualized the national design system framework, which enables the initial international comparison of national design capabilities based on the following indicators:

- Design subjects - Architecture, product/industrial design, clothing/fashion design, digital/multimedia design and graphical/communication design;
- Inputs - Numbers of students graduating from design subjects;
- Outputs - Number of trademarks registered per annum through WIPO; Number of designs registered per annum through WIPO;
- Outcomes - Number of design firms in the design services sector; turnover of the design services sector;
- Enabling conditions - Total national investment in design promotion and support as funded through a national support agency.

However, the inconsistency of design classification, as well as conceptual clarification from each country results in a limited value in terms of the data comparability (Moultrie and Livesey, 2009). Only until 2014, the European Union has issued the “Euro design: measuring design value” guideline as the initial version for the future Barcelona Manual on collecting and interpreting design activities statistics. In 2015, Organization for Economic Cooperation and Development (OECD) clarified design as the indicator of innovation, which proposed the conceptual clarity of design in terms of measurement and data collection during the process of science and technological innovation (OECD, 2015b):

- Design as user-centred creative development - design led innovation;
- Link innovation to the market;
- Design as capability.

Based on the 615 NACE classes of industries, the EUIPO-EPO study (2016) provides the most comprehensive economic analysis for the understanding of the economic value and measurement of design at the industry level by
looking at the design-intensive industries and trademark-intensive industries within the EU level. A **fundamental** assumption for the study is that the degree to which an industry is design-intensive or brand-intensive is an intrinsic characteristic of that industry, regardless of where it is located or which country the industry is based (EUIPO-EPO, 2016). The two prominent indicators for the measurement of the design-intensive industries and the trademark-intensive industries are **employment - total employment and wage level in this case** and **output – GDP, industrial design and trademark registration per 1000 employee, export in this case**.

If we look at high-level indicators of economic performance, the impact of a strong design sector can be clearly seen in developed economies by looking at ‘**design-intensive**’ industries (i.e. those industries that have above average use of registered designs per employee) and ‘**trademark-intensive**’ industries or ‘**brand-intensive**’ industries (i.e. those industries that have above average use of trademarks per employee) (EUIPO-EPO, 2016; Luo et al., 2012). The high indicators also have demonstrated certain intrinsic characteristics for the understanding of the design-intensive industries and trademark-intensive industries:

The following data is for the EU:

- Out of 615 NACE classes in EU, 470 industries use designs, and 165 of them are identified as design-intensive, i.e. have an average number of designs per 1,000 employees that exceeds the overall average of 1.61. They have identified mostly in the manufacturing (secondary) sector of the economy. The design-intensive industries and brand-intensive industries are considered as the **modern sectors**, which simultaneously satisfies two important conditions: productivity is higher than in the traditional sector, and it is sufficiently labor-intensive so as to transmit these productivity gains to a sizeable share of the wage sector (EUIPO-EPO, 2016).

- From 2011 to 2013, Design-intensive industries have around 25.6 million direct employment accounts for 12% of the total employment in the EU; trademark-intensive industries have around 45.7 million direct employments which account for 21% of the total direct employment in the EU. Besides the direct employment, design-intensive industries and trademark-intensive industries generate employment in other industries, which supply them with goods and services as inputs;

- From 2011 to 2013, if those additional jobs are considered, then 65.4 million jobs, or more than 30% of all jobs in the EU are from trademark-intensive industries; 38.6 million jobs or around 18% of all employment in the EU are from design-intensive industries (EUIPO-EPO, 2016). The number of total employment in trademark-intensive
industries is slightly higher compared with that of design-intensive industries;

- From 2011 to 2013, the total European Union GDP\(^4\) is approximately euro 13.4 trillion. More than 1,788,811 million Euro was created from design-intensive industries, which accounts for 13.4\% of the total EU GDP. More than 4,812,310 million Euro was created from trademark-intensive industries, which accounts for 35.9\% of the total EU GDP.
- From 2011 to 2013, the total exports of design-intensive industries are around 945,084 million euro whilst the total exports of trademark-intensive industries are around 1,275,472 million euro;
- The indicator for the employment and output implies that the value-added per employee is higher in design-intensive industries and trademark-intensive industries than in the rest of the economy. The average personnel cost (Euro per week) is 732 in design-intensive sectors, 783 in trademark-intensive industries. This “wage premium” is 38\% in design-intensive industries and 48\% in trademark-intensive industries compared to non-IP-intensive industries.

This data provides compelling evidence that design-related workers and brand-related workers have a higher wage level than the average industry level (EUIPO-EPO, 2016; OECD, 2015b). Design-intensive industries and trademark-intensive industries (or brand-intensive industries) can also contribute to higher productivity growth as well as higher value-added growth for national economic competitiveness (OECD, 2009; 2015b).

In conclusion, existing evidence has demonstrated those industries and firms with extensive design registrations and trademark registration show wage premium, productivity premium, revenue premium as well as performance premium for SMEs (EUIPO-EPO, 2015; 2016; OECD, 2015b). These characteristics have somehow been considered as the intrinsic characteristic of the design-intensive industries and brand-intensive industries (EUIPO-EPO, 2015; 2016; OECD, 2015). Understanding design as the indicator for the process of innovation and structural transformation should be based on

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\(^4\) Gross domestic product (GDP) is the total value of the goods and services produced in a given territory during a given time period. The value added equals the industry’s sale minus its purchases of goods and services from other industries. When these quantities are added up across the entire economy, the inter-industry purchases cancel each other out and what is left is the overall value added, or GDP, for the economy.

\(^5\) According to the EUIPO-EPO report, the definition of wages:

Personal costs are made up of wages, salaries and employers’ social security contributions, both compulsory and voluntary. Average personnel costs (or unit labor costs) equal personnel costs divide by the number of employees (persons who are paid and have an employment contract). This is the definition of “wages” used in this study.
Effective, comparable and consistent measurement as well as data collection. Measurement is the prerequisite in order to provide evidence; evidence is helpful in informing policy; sensible policies result in economic growth (Moultrie, 2013; Aghion and Howitt, 2008). A well constructed economic development framework based on evidence and data from consistent conceptual clarity of design indicators for innovation process, which could enable international comparability as well as help policy makers from developing countries to identify and facilitate the development of design-intensive industries and brand-intensive industries, in an age of globalization, is an urgent need (Raulik – Murphy, 2010; Heskett, 2016; Hobday, 2012; Lee, 2013; 2015; Moultrie and Livesey, 2009; OECD, 2014; 2015b; European Commission, 2014).

Trademark as the indicator of innovation

The existing literature on trademark\(^6\) data analysis as a form of indicator for innovation and industrial change has been well covered by scholars as a complementary approach for measuring innovation. The main arguments from existing literature are trademark might be the output indicator of the innovation process (Mendonca et al., 2004). In other words, trademark data could be analyzed to indicate the commercialisation process of innovation, industrial dynamics and international economics (Mendonca et al., 2004; OECD, 2009). Specifically, the trademark could indicate the two key aspects of innovation which are not well covered by traditional R&D and patent data: innovation in the service sectors and marketing innovation (Allegrezza and Rauchs, 1999; Schmoch, 2003; Mendonca et al., 2004; Malmberg, 2005; OECD, 2005; 2009). According to the World Intellectual Property Organization (WIPO):

“A trademark is a sign capable of distinguishing the goods or services of one enterprise from those of other enterprises (2017).”

Also, the article 15 of the Agreement on Trade-Related Aspects of Intellectual Property Rights (TRIPS) defines trademarks (TM) as:

“Any sign, or any combination of signs, capable of distinguishing the goods or services of one undertaking from those of other undertakings, shall be capable of constituting a trademark (WTO, 1994).”

The filling of new trademarks by economic actors reflects the new offerings which designed to differentiate certain products from those provided by other firms (Mendonca et al, 2004; OECD, 2009). Trademark thus has also been argued in association with exporting activities which help business competing

\(^6\) Trademarks are alternatively called “brands”, this term being more commonly used in the marketing literature. The trademark refers more specifically to the legal object, whereas the terms “brand” and “branding” are more related to the commercial use and the customer’s perception of the mark.
in the global markets (Baroncelli et al., 2005; OECD, 2009). Those industries have the above average trademark registration rate thus provides enormous opportunities for international trade, especially exports activities for certain country or region in the global markets (Mendonca et al, 2004; Baroncelli et al., 2005; OECD, 2009).

The design-intensive products and the brand-intensive products – internationally traded goods and services that produced with intensive employment in industrial design registration and trademark registration – has placed the increasing importance in the 21st-century hyper-globalized knowledge economy with the increasing complexity of products and services. It may offer considerable opportunities for developing countries to climb up the global value chains and to escape the middle-income trap (OECD, 2009; 2015b; Gill and Kharas, 2015). This is especially true based on the evidence that 90-95% of companies in most developing countries are small or medium sized (Heskett, 2016). The success story of Dyson from a small company to a globalized enterprise based on the manipulation of design creativity linked to technological competence and entrepreneurial capability is a good example (Heskett, 2016). The design thus can be a powerful tool not only for resisting the penetration of global companies in existing product markets but enhancing its nation’s international trade performance and competitiveness (OECD, 2015b; 2016). In fact, the WIPO industrial design registration among upper middle-income countries have soared during the past decades which has assigned considerable importance than in the past (WIPO, 2017). Specifically, many design-intensive categories represent just a small fraction of developing countries’ economy which indicates a vast potential for growth (UNCTAD, 2016). Whether in high-tech goods, basic manufactures or services, the export opportunities offered in the innovative global economy are significant and is a trend that is expected to continue (UNCTAD, 2016).

By looking specifically at ‘design-intensive industries’ and ‘trademark-intensive industries’ as well as their impact on economic performance, this paper seeks to better understand design as the indicator of innovation and structural change to nations stuck in the middle-income trap.

**Methods**

Taking ideas related to the Growth Identification and Facilitation Framework (GIFF) developed by Lin et al. (2011), which encourage policy makers to sequence structural transformation, taking gradual steps in line with latent comparative advantage. This study argues that successful structural transformation in the middle-income countries are driven by proximity considerations – with expansion into related industries, making use of existing productive skills – while concomitantly accumulating more advanced capabilities (OECD, 2012). The comparing and understanding the process of structural transformation in this research is based on the output-
oriented perspective, which focusing on the export profiles of individual countries. Specifically, this study attempts to innovatively formulate an output-oriented analysis framework based on identified design-intensive industries and trademark-intensive industries export data. It is believed those data could provide a unique and underused information source for making an additional contribution to the understanding of design, its role in innovation and structural transformation in the middle-income trap context (OECD, 2015b). By manipulating these underused datasets, this study believes the design-intensive industries and brand-intensive industries based indicators could show promise for advancing research agendas concerned with (i) the rates and directions of product innovations in different industrial sectors; (ii) international patterns of specialization; (iii) the strengthening links between technological innovation and marketing activities (Moultrie and Livesey, 2009; EUIPO-EPO, 2015; 2016). Thus, this study thus investigates the possibilities and issues of using design-intensive industries and brand-intensive industries international trade data in middle-income countries for introducing emerging or improved manufactured products in the global competitive markets. We analyze (i) statistic data on industrial design registration and trademarks registration in a certain country for the period since 1980 from World Intellectual Property Organization (WIPO); (ii) statistic data on international trade (exports and imports) for design-intensive industries and brand-intensive industries from 2001 to 2015. To understand whether design might be a strong indicator and contributor to innovation, structure transformation, and economic growth, this paper will compare economic performance in two countries: Brazil and the Republic of Korea. These have been chosen as being exemplars of countries that are stuck in the middle-income trap (Brazil in this case) and that have escaped the middle-income trap (South Korea in this case).
The high-level economic indicators between these two nations confirm this categorization:

- Data from WIPO shows that Industrial design registration (per million population) has grown significantly in Korea since the 1990s. In contrast, growth has been very slow in Brazil (Figure 1);
- In Korea, approximately 573 designs are registered per million populations, in comparison with 22 designs per million populations in Brazil;
- Trademarks - When it comes to the WIPO trademark registrations per million people, South Korea (1,436) more than 5 times that of Brazil (281);
- Number of design firms: the number of design firms per million people in South Korea (52) outperform Brazil again, which is almost 18 times that of Brazil (3);
- In terms of employment in the design sector, there are 175 design professionals per million people in South Korea, compared with only 21 design professionals per million people in Brazil;
- In Brazil, there are approximately 69 design graduates per million populations (Moultrie and Livesey, 2009), in comparison with over 750 in Korea (Brasilia 2014).

Figure 1 WIPO industrial design resident design count per million populations (by origin) & resident design count per 100 billion USD GDP (2011 PPP) (by origin) Brazil vs South Korea, 1980 - 2014
The role played by industrial policies – policies specifically promoting the development of design-intensive industries and brand-intensive industries in shaping the process of structural transformation, through a comparative review of these policies in Korea and Brazil etc. has also been considered (OECD, 2012). In other words, under the broad context of different industrial policies, the case of South Korea and Brazil also demonstrates the difference of policies regarding design industries (Raulik – Murphy, 2010) (Figure 2).

![Figure 2 Design policy process in South Korea and Brazil (Raulik – Murphy, 2010)](image)

There are two broad government design policies with the aim of creating imagery symbolizing the government and its power or to gain economic advantage in international trade (Heskett, 2016). South Korea, also other East Asian countries and regions such as Chinese Taipei and Singapore, who successfully witnessed the sustainable economic growth over the past decades and escaped the middle-income trap have put the direct linkage of the design policies to economic aims as well as close cooperation with business in developing design practices (Raulik – Murphy, 2010; Heskett, 2016). They gained the economic advantage in international trade through design policies by the protection of domestic markets which controlling imports, while using design to promote exports (Heskett, 2016). These policies of gaining the economic advantage through design policies have only become more systematic in recent centuries, with the growth of modern government organizations as well as the revolution of the industrial policies (Heskett, 2016; Hobday et al., 2012; Lin, 2013; Cimoli et al., 2009). The Korean Institute of Design Promotions (KIDP) in Korea is directly linked to the Ministry of Knowledge Economy in Korean government and responsible for both elaboration and delivery of the policy. There have been also a series of ‘Five-Year Plans’ published since 1993 with supported budget allocation (Gisele Raulik – Murphy, 2010; Hobday et al., 2012). While in Brazil, and other Latin America countries and regions, the government provides a low

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7 Since its inauguration in 1970, KIDP has aimed at revolutionizing the export structure of Korea by promoting the field of design and has engaged in a variety of activities to assist in the advancement of Korea’s design industry.
budget and a lack of leadership for implementing design policies (Raulik – Murphy, 2010; Hobday et al., 2012).

*The ‘Product Space’*

The analysis in the research relies on a novel strand of the economic development and trade literature, the product space, developed through the contributions by Hausmann and Klinger (2006), Hausmann et al. (2007), and Hidalgo et al. (2007). The notion of the ‘product space’ was first proposed in a Science journal called “The product space conditions the development of nations” (Hidalgo et al., 2007; Hausmann et al., 2006; Hidalgo and Hausmann, 2008). The article analyzed international trade based on the Standard Industry Trade Classification (SITC) data of 775 product classes over 128 countries over 60 years (Hidalgo et al., 2007; Hidalgo and Hausmann, 2008). The product-space thus formulates a two-dimensional visualization of the comparative scale of exports in different product classes and enables a comparison between nations to focus attention on economic performance. In other words, product space considers economic development is essentially the network of relatedness among different product group one country manufactured at given time period (Hidalgo et al., 2007). This is believed to be complementary with the traditional one-dimensional view of gross domestic product (GDP), adjusted by power purchasing parity (Hidalgo and Hausmann, 2008) in which just calculated by the amount of the output of the country (Hidalgo and Hausmann, 2008). As a result, it can be used by policy makers in middle-income countries to understand which sectors might be important for economic growth (Hidalgo et al., 2007; Jankowska et al., 2012; Hausmann et al., 2006; Hidalgo and Hausmann, 2008) (Appendix).

Essentially, the product space is an analytical framework that allows for categorizing relationship between export industries, as well as evaluating the export profile of a country at given time or over a time period. It marks research has shifted the focus from differences in sector shares (i.e. manufacturing sector to service sector) to differences in product characteristics or industries characteristics (Lall, 2000; Hausmann and Klinger, 2006; Hausmann et al., 2007). Accordingly, the process of structural transformation involves a change in the types of goods that are produced and exported, i.e. shifting production from simple, traditional commodities to complex or sophisticated goods and products (Lall, 2000; Hausmann and Klinger, 2006; Hausmann et al., 2007). In other words, what country produce and export is indicative of its developmental stage, with advanced economies generally producing and exporting high-technologies and high-skill products (OECD, 2013b).

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8 This was done at the four-digit level (e.g. Rev1.0014: Poultry live)
According to Hausmann et al. (2011), based on the product space framework, countries should follow a targeted diversification strategy that favors expansion into more sophisticated activities and aim to increase the number of exported products according to two criteria. First, selecting those which are sophisticated and value-added thus promise the increase in the country’s capabilities. Second, choosing them according to their proximity, i.e the match with existing capabilities.

With this framework, two considerations are critical: the notion of relatedness, or proximity, between industries; and the quality or value embedded in a country’s export (OECD, 2012).

Proximity is defined as the minimum of the pairwise conditional probabilities that a country exports one good with revealed comparative advantages (RCA) given that it exports the other with RCA (Hidalgo et al., 2007). With regards to the concept of export value, the issue is that the product space study does not necessarily provide further detail in how countries could traverse the product space to the higher value-added industries, this study thus suggests a transition strategy which involves the adoption of design-intensive products and industries as well as trademark-intensive products and industries, exemplified by the precedents of several East Asian economies and regions. Specifically, inspired by the original product space analysis framework, this paper innovatively introduces the ‘Design-intensive Product Space’ which adopts Hausmann’s model but applied specifically to exports of design-intensive and brand-intensive goods and services. This seeks to build on the work started by the second version of EUIPO-EPO study in 2016. The EUIPO-EPO study was considered as the most comprehensive, systematic and provided the first analysis to demonstrate the economic impact of design-intensive industries and trademark-intensive industries in terms of output, employment, wages and trade at EU level (2013; 2016). In this study, EUIPO-EPO defined a variety of industries as “design-intensive” and “trademark-intensive”, such as the manufacture of watches and clocks; wholesale of clothing and footwear; manufacture of electric domestic appliances; manufacture of ceramic household and ornamental articles etc. These industries have been considered as modern industries with intrinsic characteristics of wage premium, productivity premium, revenue premium and performance premium for SMEs (OECD, 2015; EUIPO, 2015; 2016).

To determine the industries which might be considered as “design-intensive” and “brand-intensive”, we took data from the EUIPO-EPO studies (2013;2015;2016). In the EUIPO-EPO data set, industries are classified

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9 Revealed comparative advantage is calculated first by Balassa (1977) as the ratio of the export share of product i in country c, to the world’s export share of product i. Hence, a country will be competitive in exporting good i if its RCA with respect to product i is greater than 1, i.e., if the share of good i in a country’s export basket is greater than the share of the same good globally.
according to the NACE codes\textsuperscript{10} structure. This data provides information on employment and design registration activities. Design intensity can be seen by looking at design registration per 1000 employees and total employment, trademark intensity could be seen likewise by looking at trademark registration per 1000 employees and total employment. Having first identified the design-intensive as well as trademark-intensive industries, we then collected data on exports of goods and services for each of these industries. In terms of export data of design-intensive, as well as brand-intensive goods and services, this research built the sample through the datasets sourced from the International Trade Centre (ITC) Trade Map: Trade Statistic for International Business Development Dataset for the years after 2000 (HS codes). In these data, industry sectors are classified using the HS codes\textsuperscript{11} structure, and so is not directly comparable against the NACE codes used for determining the design-intensive sectors and trademark-intensive sectors. We thus looked at the descriptions of goods used in order to match these as accurately as possible.

Figure 3 shows the relationship between total employment in a sector and design registration activity in those sectors. Industries such as ‘watches and clocks’ account for a small proportion of overall employment but have extremely high design intensity. In contrast, ‘clothing and footwear’ is a very large sector in terms of employment but with much lower design activity.

\textsuperscript{10} The statistical classification of economic activities in the European Community (for the French term “nomenclature statistique des activités économiques dans la Communauté européenne”).

\textsuperscript{11} The Harmonized Commodity Description and Coding System, also known as the Harmonized System (HS) of tariff nomenclature is an internationally standardized system of names and numbers to classify traded products.
Figure 4 demonstrate the relationship between employment in a sector and trademark registration activity in that sector. Sectors such as “Leasing of intellectual property and similar products, except copyrighted works” represent a small proportion of overall employment but has extremely high trademark intensity. On the contrary, manufacture of perfumes and toilet is a relatively large sector in terms of total employment, but with much lower trademark activity. One particular point is that with the relative emphasis of design as the indicator of innovation and structural change process in this study, not all trademark-intensive industries has been included in the data collection, some industries such as ‘research on experimental development on biotechnology’ and ‘manufacture of basic pharmaceutical products’ are less relevant to the research topic of this study, which has been excluded from the data collection. Table 1 and 2 in Appendix present the raw data on design-intensive sectors export from Brazil (2001 and 2015), South Korea (2001 and 2015), Latin American (2001 and 2015), Asia (2001 and 2015), Developed Economies (2001 and 2015), Developing Economies (2001 and 2015) and World Economies (2001 and 2015). Table 3 in Appendix presents data on brand-intensive sectors.

*Design-intensive Product Space*

The total export value of design-intensive industries in the world economies
in 2001 represents around 1278.01 billion U.S dollar, which accounts for approximately 20.9% of the total exports value around the world; the percentage stayed relatively stable in 2015 (20.95%) compared with in 2001, though the total exports value increased almost twofold, at around 3402.5 billion U.S. dollar (Figure 5).

Among which, some industries demonstrated stronger performance than others which witnessed the sharpest rise in exports:

- Total export value of electrical machinery and equipment manufacturing soared from 869 billion U.S dollar in 2001 to 2,303 billion U.S dollar in 2015;
- Total export value of articles of apparel and clothing accessories, footwear etc. manufacturing increased from 232 billion U.S dollar in 2001 to 577 billion U.S dollar in 2015;
- Total export value of furniture, bedding and furnishing manufacturing etc. increased from 77 billion U.S dollar in 2001 to 237 billion U.S dollar in 2015.

Developing countries have made significant progress in supplying global markets with these products. Specifically, the total value of design-intensive industries exports from developing countries increased from about 546.7 billion U.S dollar in 2001 (27.58% of the total export from developing countries) to around 2211.6 billion U.S dollar (28.3% of the total export from developing countries) (Figure 6). Among which, China (from 107 billion U.S dollar in 2001 to 966.8 billion U.S dollar in 2015) takes a large percentage of total value exports for design-intensive industries from developing countries.

In addition to design-intensive goods and trademark-intensive goods, design-intensive and trademark-intensive services, particularly in connection with intellectual property licensing, provide a wide range of export opportunities, with total export value of around 31.1 billion U.S dollar in 2014 around the world, though the statistic data is somehow incomplete which could not get a holistic perspective of its economic value.

**Design-intensive product space for Brazil and South Korea**

Based on the identified design-intensive product space, the total value of design-intensive industries exports in Brazil was about 6.3 billion U.S dollar in 2001, account for around 10.84% of its total exports; it then increased to about 8.3 billion, which only represents around 4.36% of the total exports in Brazil in 2015 (Figure 7).

The total value of design-intensive industries exports in South Korea was around 43.68 billion U.S dollar in 2001, represents 29.03% of total exports; it then increased to 148.871 billion U.S dollar in 2015, account for 28.25% of the total exports in South Korea in 2015 (Figure 8).

The total value of design-intensive industries exports in Asia was around
546.7 billion U.S dollar in 2001, accounts for 30.4% of the total exports of the continent; it then increased to 2,111.8 billion U.S dollar in 2015, almost increased fourfold, represents 31.69% of the total exports goods of Asia (Figure 7). Unlike Asia, the total value of design-intensive industries exports in Latin American and the Caribbean has witnessed limited increase. It was around 68.9 billion US dollars in 2001, which represents 20.28% of the total exports in Latin America; the total exports of design-intensive industries then increased to roughly 130.4 billion U.S dollar in 2015, constitute only 14.1% of total exports in that area (Figure 10).

When it comes to the individual industries, the first type of industries are those industries that Brazil (From 252 million U.S dollar in 2001 to 409 million U.S dollar in 2015) exports surpass that of South Korea (From 57.6 million U.S dollar in 2001 to 418 million U.S. dollar in 2015) during the time period from 2001 to 2015 - the ceramic products in this case. However, the majority of the design-intensive industries witnessed the higher performance in exports from South Korea, compared with that in Brazil:

• Electric machinery and equipment etc. (From 37 billion U.S dollar in 2001 to 138 billion U.S dollar in 2015 in South Korea; from 3.2 billion U.S dollar in 2001 to 3.6 billion U.S dollar in 2015 in Brazil);
• Cutlery, spoons, and forks etc.(From 595 million U.S dollar in 2001 to 2.1 billion U.S dollar in 2015 in South Korea; from 199 million U.S dollar in 2001 to 449 million U.S dollar in 2015 in Brazil);
• Article of apparel and clothing accessories, footwear etc (From 4.6 billion U.S dollar in 2001 to 24 billion U.S dollar in 2015 in South Korea; from 1.9 billion U.S dollar in 2001 to 1.2 billion U.S dollar in 2015 in Brazil);
• Clocks and watches and parts thereof (From 175 million U.S dollar in 2001 to 85.5 million U.S dollar in 2015 in South Korea; from 3 million U.S dollar in 2001 to 3.1 million U.S dollar in 2015 in Brazil).

The furniture; bedding, mattress supports, cushions etc. industry export witnessed the striking growth in South Korea which surpass that of Brazil since 2009 from less than 500 million US dollars in 2001 to around 2,000 million US dollars in 2015 (Figure 11).
Figure 5 The design-intensive product space in world economies - 2001 to 2015
Figure 6 The design-intensive product space in developing economies - 2001 to 2015
Figure 7 The design and brand-intensive product space in Brazil – 2001 to 2015
Figure 8: The design and brand-intensive product space in South Korea – 2001 to 2015

2001 Total Exports of Design-intensive Goods And Services
USD 43.6 Bn
US dollars at current prices and current exchange rates.

2015 Total Exports of Design-intensive Goods And Services
USD 148.8 Bn
US dollars at current prices and current exchange rates.

South Korea
20.6% of total exports
*Franchise and trademark licensing fees not included.
Figure 9 The design and brand-intensive product space in Asia – 2001 to 2015
Figure 10 The design-intensive product space in Latin American and the Caribbean - 2001 to 2015
Figure 11 The individual design and brand-intensive industries in Brazil and South Korea – 2001 to 2015 (2017)
Discussion
The evidence in this research has demonstrated that there is a large untapped potential for developing countries to advance the development of design-intensive industries and trademark-intensive industries. This paper thus responds to emerging demands and significant gaps among national policymakers and other stakeholders from developing countries, especially the middle-income countries, in awareness of, and cooperation on assessments of industrial design as indicator of innovation process and structure transformation as well as national potential to advance the development of design-intensive industries and brand-intensive industries. Specifically, the targeting of design-intensive industries and brand-intensive industries in certain countries should base on the revealed comparative advantage of that countries to creating enabling conditions, promoting the development of design capabilities, increase the employment wages and facilitate export opportunities while promoting sustainable development. The dynamic design-intensive industries and trademark-intensive industries can make important contributions towards the achievement of national development objectives relating to economic diversification, innovation stimulation, trade facilitation, poverty reduction, consumption promotion, employment generation and an overall improvement of social welfare. It will in parallel with the UN Sustainable Development Framework Development Goals (SDGs) that would shape the UN post-2015.

The Design-intensive product space framework for growth and development
In the development literature, industrial policy is often synonymous with “industrialization policy” (Lall, 1992). It also means a targeted policy for promoting the industrial development (OECD, 2012), which the purely functional sense is close to general competitiveness or productivity policy. Industrial policy in this sense is similar to growth strategy. In nature, industrial policies are horizontal which aims to secure framework conditions favorable to certain industrial competitiveness. In other words, it aims to provide the framework conditions in which entrepreneurs and business can take initiatives, exploit their ideas and build on their opportunities. However, it needs to take into account the specific needs and characteristics of individual industries. Therefore, it needs to be applied differently according to industries. Industrial policies therefore inevitably bring together a horizontal basis and industrial applications (OECD, 2013). According to OECD (2012):

12 The Sustainable Development Goals are a UN Initiative. The Sustainable Development Goals (SDGs), officially known as Transforming our world: the 2030 Agenda for Sustainable Development is a set of seventeen aspirational “Global Goals” with 169 targets between them.
“Any type of intervention or government policy that attempts to improve the business environment or to alter the economic activity toward sectors, technologies or tasks that are expected to offer better prospects for economic growth or societal welfare than would occur in the absence of such intervention.”

Within the middle-income trap context, South Korea is an illustrative example in the East Asian NICs pursued export-led growth by targeting strategic industries which facilitated gradual diversification and upgrading into new products that required similar skills and inputs (OECD, 2012; Lee, 2013;2015; Lin, 2012). South Korea’s capacity to benefit from trade-led growth in high connectivity and value-added sectors relied heavily on implementing the right combination of industrial policies. Korea aligned complementary policies to meet particular industry needs. This policy alignment was critical for providing the necessary skilled labor for moving into higher value-added industries, assuring sufficient capital to develop productive capacities, as well as supporting research and innovation in more knowledge-intensive industries (OECD, 2012). The Korean experience underscores the importance of supporting productive development with the appropriate industrial policies, particularly in order to facilitate the gradual and path-dependent economic transformation necessary for income convergence (OECD, 2012). The comparison for the experience of the East Asian NICs to Latin American economies reveals that successful diversification and upgrading of a country’s productive and export structure requires coherent and complementary policies in the area of education, infrastructure, innovation and access to finance (OECD, 2012).

The policy co-ordination in the four areas of education policies, infrastructure policies, innovation policies and financing policies has been identified plays a strong role in promoting the simultaneous evolution in economic structure and framework conditions. Other factors have also been identified by OECD. Such as the commodity terms of trade are negatively associated with export capabilities with robust evidence. Energy use intensity, government expenditures and capital stock per worker have positively related to export capabilities. Capital flows and arable land has a negative impact on capabilities. Foreign direct investment attraction and tertiary education have a positive and robust impact on export capabilities from 1991 onwards (OECD, 2013; Daude et al., 2014).

To seize the new inclusive design-driven growth opportunities, developing countries, especially the middle-income countries, need an enhanced capacity to identify their production and export strengths for design-intensive products and trademark-intensive products and put into place national industrial policies to create an enabling environment for their production and export. In other words, the creation of an enabling environment through industrial
policies for the selected “design-intensive” industries and “trademark-intensive” industries – education policies, infrastructure policies, innovation policies and policies promoting access to finance could facilitate the production and export of design-intensive goods as well as trademark-intensive goods.

Following the introduce of design-intensive product space framework, taking inspiration from Justin Yifu Lin’s Growth Identification and Facilitation framework (2012), the design-intensive product space framework for growth and development process has been further proposed in this paper. It has been summarized as follows based on further review and adjustment of industrial policies relates to economic, regulatory, institutional and trade environments characterizing the selected design-intensive industries and brand-intensive industries:

- Identify and select industries for national production and export of design-intensive products and trademark-intensive products;
- Assess the industrial policies for supporting the development of selected design-intensive industries and trademark-intensive industries;
- Prepare and adopt recommendations and action plan for building productive and export capacity in selected design-intensive industries and brand-intensive industries;
- Mobilize financial and technical support to implement the recommendations and action plan, including by mainstreaming the selected design-intensive industries and brand-intensive industries into national development plans and strategies.

Following the process, after identifying a particular design-intensive industries or trademark-intensive industries in a national economy and assessing the impacts of economic and market trends, and of regulatory, institutional and trade reforms on its future performance, national policymakers and other stakeholders – particular small and medium sized business and entrepreneurs – could then further examine a range of important issues within the context of the overall policy framework for the selected industries. Issue examined include:

- National development objectives for the selected design-intensive industries and brand-intensive industries;
- Areas of effectiveness and weakness in the current industrial policy framework for the selected industries from the educational, infrastructural, innovation and financing perspective (OECD, 2012);
- Regulatory and institutional challenges inhibiting industries development;
- Innovative approaches to strengthening backward and forward inter-industrial linkages within the national economy;
The role of business and entrepreneurs, especially small and medium-sized firm, in the industries and how to improve cooperation and build synergies along the supply- and value-chains;

Prospects for trade liberalization to generate increased efficiency, employment and access to foreign markets, particular among SMEs;

Conclusion
In concludes, based on the best dataset and evidence available, this paper has innovatively introduced the “Design-intensive product space framework” for growth and development based on export data of design-intensive industries and brand-intensive industries. It indicates that those countries who successfully escaped the middle-income trap (South Korea in this case) has demonstrated strong performance in terms of design-intensive product exports, with design-intensive products and brand-intensive products exports accounted for around 30% of its total exports during the past decades. On the contrary, those countries stuck at the middle-income trap (Brazil in this case) demonstrated limited performance for design-intensive product exports, account for around 10% of total exports in 2001 to less than 5% in 2015. Thus, nations stuck in the middle-income trap should build national productive and export capacity in identified design-intensive products and trademark-intensive products. The “Design-intensive product space framework” for growth and development process has also been proposed in this paper for assisting national stakeholders assess the policy, regulatory and institutional requirements as well as build the statistic data for supporting the development of selected design-intensive industries and brand-intensive industries and policy making in order to help countries to climb up the global value chains and escape the middle-income trap.

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Raulik – Murphy, G. (2010). The impact of European design policies and their implications on the development of a framework to support future Brazilian design policies. Cranfield University.
## Appendix

### The product space in Brazil

<table>
<thead>
<tr>
<th>Time</th>
<th>Top exports by value in Brazil</th>
<th>Export share</th>
</tr>
</thead>
<tbody>
<tr>
<td>1963</td>
<td>1. Coffee 2. Cotton 3. Wood 4. Agave Textile Fibers 5. Cocoa beans</td>
<td>1. 58% 2. 10.1% 3. 3.9% 4. 3.0% 5. 2.9%</td>
</tr>
<tr>
<td>1973</td>
<td>1. Coffee 2. Oil Cake 3. Soybeans 4. Sugar Cotton 5. Cotton</td>
<td>1. 24.5% 2. 9.3% 3. 8.9% 4. 8.5% 5. 4.5%</td>
</tr>
<tr>
<td>1983</td>
<td>1. Coffee 2. Oil-Cake 3. Iron ore 4. Footwear juices 5. Juice</td>
<td>1. 14.2% 2. 11.9% 3. 4.0% 4. 2.5% 5. 2.2%</td>
</tr>
<tr>
<td>1993</td>
<td>1. Oil-Cake 2. Footwear 3. Iron ore 4. Iron/Steel alloy 5. Coffee</td>
<td>1. 6.7% 2. 5.6% 3. 3.4% 4. 3.2% 5. 3.1%</td>
</tr>
<tr>
<td>2003</td>
<td>1. Soybeans 2. Passenger cars 3. Oil cake 4. Iron ore 5. Petrol oils</td>
<td>1. 6.10% 2. 3.78% 3. 3.7% 4. 3.24% 5. 3.02%</td>
</tr>
<tr>
<td>2009</td>
<td>1. Soy beans 2. Iron ore 3. Petrol oils 4. Sugar 5. Poultry</td>
<td>1. 7.8% 2. 7.2% 3. 6.4% 4. 4.1% 5. 3.4%</td>
</tr>
</tbody>
</table>
The product space in South Korea

<table>
<thead>
<tr>
<th>Time</th>
<th>Top exports by value in South Korea</th>
<th>Export share</th>
</tr>
</thead>
</table>
| 1963  | 1. Raw silk  
2. Base metal ores  
3. Live swine  
4. Materials of animal origin  
5. Cotton gauze | 1. 13.8%  
2. 9.5%  
3. 9.3%  
4. 8.9%  
5. 8.8% |
| 1973  | 1. Clothing accessories  
2. Light manufactured goods  
3. Iron/steel  
4. Woven fabrics of silk  
5. Raw silk | 1. 22.0%  
2. 5.8%  
3. 5.6%  
4. 5.3%  
5. 4.5% |
| 1983  | 1. Ships  
2. Footwear  
3. Tugs  
4. Fabrics  
5. Electronic microcircuits | 1. 5.0%  
2. 4.6%  
3. 4.1%  
4. 3.9%  
5. 3.9% |
| 1993  | 1. Electronic microcircuits  
2. Passenger cars  
3. Fabrics  
4. Ships  
5. Footwear | 1. 8.88%  
2. 4.57%  
3. 3.43%  
4. 2.97%  
5. 2.03% |
| 2003  | 1. Passenger cars  
2. Electronic microcircuits  
3. Electronic (radio, telephone);  
4. Ships  
5. Automatic Data processing machines | 1. 9.41%  
2. 8.23%  
3. 7.47%  
4. 5.56%  
5. 4.46% |
| 2009  | 1. Ships  
2. Electronic microcircuits  
3. Optical instruments and apparatus  
4. Passenger cars  
5. Electronics (radio, telephone) | 1. 11.1%  
2. 7.2%  
3. 6.9%  
4. 6.7%  
5. 5.4% |
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<tr>
<td>27.51</td>
<td>Manufacture of electric domestic appliances</td>
<td>213.150</td>
<td>29.08</td>
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Table 3  Trademark-intensive Industries Matrix (*Rounded to nearest 50; ** Unit: US Dollar thousand)
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<td>77.40</td>
<td>Leasing of intellectual property and similar products, except copyrighted works</td>
<td>16.150</td>
<td>212,22</td>
<td>S8.1</td>
<td>Franchises and trademarks licensing fees.</td>
<td>NA - 29,573,604</td>
<td>NA – 31,152,776(2014)</td>
<td></td>
</tr>
</tbody>
</table>

77.40 | Leasing of intellectual property and similar products, except copyrighted works | 16.150 | 212,22 | S8.1 | Franchises and trademarks licensing fees. | NA | NA – 29,573,604 | NA – 31,152,776(2014) |

77.40 | Leasing of intellectual property and similar products, except copyrighted works | 16.150 | 212,22 | S8.1 | Franchises and trademarks licensing fees. | NA | NA – 29,573,604 | NA – 31,152,776(2014) |