

System Initiative on Shaping the Future of International  
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# Global Value Chain Policy Series Services

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The Global Value Chain Policy Series was launched in 2018 by the World Economic Forum's System Initiative on Shaping the Future of International Trade and Investment. It consists of brief policy papers on various aspects of global value chains (GVCs). The aim of the series is to stimulate cross-policy discussion and thinking about GVCs and collect ideas from researchers and practitioners on how to help GVCs contribute towards development, sustainability and inclusiveness. These ideas can then be examined in more depth in the context of particular value chains, regions or public-private initiatives. The World Economic Forum is working to bring the relevant actors together to facilitate this multistakeholder, cross-policy undertaking, aimed at catalysing partnerships for impact.

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# The internationalization of services

Bar a few early commentators on trends in intra-industry trade and then the global value chain (GVC) phenomenon, the trade policy community was remarkably slow to notice that, for at least the past three decades, business-to-business (B2B) trade in intermediates has accounted for more than half of global merchandise trade. This phenomenon, based on the corporate search for efficient, specialized production locations for each task in the industry value chain and underpinned by outward foreign direct investment (FDI) and contract offshoring, is a manifestation of the process generally known as globalization.

The trade policy community took even longer to notice the same trend under way in services trade. Typically, services, including information and communications technology, were acknowledged for the enabling role they play in cross-border manufacturing value chains. These value chains simply could not function without efficient international transport, financial transactions or B2B communications providing the necessary “glue” at each link between the geographic locations in the chain. New services technologies and some opening in international services markets were recognized as having reduced the cost of trading in goods, facilitating the GVC phenomenon.

It took longer for the global trade policy community to recognize that services play much more than this “support” role in goods value chains.

At the end of 2012, the joint Organisation for Economic Co-operation and Development (OECD) – World Trade Organization (WTO) Made in the World statistical series, based on Trade in Value Added (TiVA) data, shed timely new light on the full role of services in GVCs. The share of services in global exports doubled when measured in this manner, from an average 23% in balance-of-payments terms in 2008 to 45% in TiVA terms.<sup>1</sup> Services industry inputs could now be seen to provide an “unexpectedly” high percentage of value added in all merchandise exports, with the percentage of value added increasing markedly the more highly transformed the manufactured item.

The fact that this result was received as unexpected, when services industries everywhere now account for more than 50% of GDP (when construction services and the “utilities” such as energy and water are included), was testament to a general lack of understanding and focus on services in the literature, including the widespread assumption that services were low value-added activities.

In addition to all their other inputs along the goods value chain, services became recognized as providing very high value-added, both upstream at the beginning of the goods GVC (ideation and innovation) and downstream at the end of the GVC (logistics, network orchestration and after-sales services). Indeed, many “goods” firms had already, in effect, transformed into “services” firms: IBM, for example, sold the Thinkpad in 2005 and shifted out of hardware into software and services.

These new insights on the role of services brought home the realization, from a policy perspective, that domestic efficiency in the services industries clearly mattered for competitiveness, and for export, in every other industry sector and in all economies, developed and developing. The drivers of competitiveness in services were suddenly understood to matter for the whole economy and to deserve more dedicated policy attention. The result of much business case study and other global evidence, the key driving factors are summarized in Box 2. All of these are essentially endogenous; i.e., they can be influenced by government policy and regulatory settings.

## Box 1: Services in manufacturing GVCs

A recent case study in Thailand of a local subsidiary of a global leader in bespoke automated welding equipment and customized in situ welding services (a tier-2 supplier into other manufacturing processes) revealed 38 services along that company’s slice of the value chain, 25 of which were outsourced.

One example of outsourcing is international freight handling. Importing components from Malaysia, for example, requires coordination of multiple transport stages with customs procedures and related delays. Efficiency is achieved by using logistics providers who can simply guarantee delivery.

Core competence services, on the other hand, tend to be retained in-house – for example, scientific and engineering research and development and testing and legal support for intellectual property protection.

Source: Haines, William, “Industrial Welding Services in Thailand”, in *Services in Global Value Chains: Manufacturing-related Services*, edited by Low, Patrick and Gloria O. Pasadilla, APEC Policy Support Unit, 66-79, 2015.

## Box 2: Enabling factors for services competitiveness

- Human capital (talent, education, skills, ideas)
- Investment in intangible assets (corporate intellectual property, including business methods) and supportive environment for collaborative innovation
- Enabling digital infrastructure (access to fast reliable mobile broadband)
- Quality institutions (independence, simplicity, flexibility) and efficient domestic regulation (low compliance costs, allowing flexibility to adapt to change)
- Connectedness with international markets (trade and investment reform, openness to cross-border data flows, availability of visas, international standards, mutual recognition and other forms of cooperation on domestic regulation for seamless cross-border interoperability)
- Organized services business advocacy and public-private stakeholder consultation
- Deliberate national policy focus (statistical measurement, interagency coordination, competitiveness roadmaps)

Source: Drake-Brockman, Jane and Sherry Stephenson, "Implications for 21<sup>st</sup>-Century Trade and Development of the Emergence of Services Value Chains", *International Centre for Trade and Sustainable Development (ICTSD)*, 2012.

Inter-governmental organizations have made recent efforts to better assist governments with self-assessment of competitiveness in services against these kinds of key criteria. The World Bank "Valuing Competitiveness in Services" toolkit has set the essential benchmarks.<sup>2</sup> Inter-governmental rule-making efforts, including in the WTO, have focused recently, but still without result, on the need for principles for domestic regulation in services.

To continue the storyline, what still tended to go unnoticed for a very long time was the fact that the services industries themselves were globalizing – fragmenting into cross-border value chains. The process admittedly started later and was slow to get off the ground.

One reason behind the relatively slow early pace of services internationalization was the extent of public ownership across the sector (telecommunications, banking, transport, infrastructure construction, postal, energy, water and waste management and distribution, education and health, etc.) and the appropriate sequencing of structural reforms such that, for competition policy reasons, the process of privatization often needed to precede internationalization.

## Box 3: Domestic regulation is a big services trade irritant

It is worth illustrating the importance of harmonization or mutual recognition in domestic regulations for services export competitiveness. In the Thai case study discussed earlier (Box 1), trade policy problems identified by the firm relate especially to regulation of temporary labour movement. Foreign services providers must obtain a work permit and a non-immigrant visa, requiring submission of 11 supporting documents. The application is processed slowly and ultimately awarded on a discretionary basis. The number of foreign workers a firm may hire is linked to its registered paid-up capital, tax payments and number of local workers employed. A 10:1 ratio between foreign and local workers is needed. Even when the formal requirements are met, the visas may not be granted as welding is considered a protected sector.

This makes it impossible to bring in trained technicians from other group members to meet sudden demand. The firm cannot outsource such work to local technicians not trained in the use of its equipment. Few other local firms have the specialized skills required, so the increase in demand tends to go unmet rather than local welders being employed to meet it. In a recent government policy consultation, the firm involved highlighted this issue as its primary obstacle to local expansion.

Regional expansion is made doubly difficult because neighbouring economies do not recognize Thai government-issued licences or safety inspections. The domestic licensing process is onerous (including professional exams, occupational health and safety training and equipment audit) and a significant opportunity cost to the firm. The firm cannot afford to send its welders and equipment to repeat the licensing and occupational health and safety processes in other jurisdictions, severely limiting its opportunity to export. Internationally consistent industrial standards plus mutual recognition of licences and safety training based on these standards are regarded by the firm as the policy reform that would most facilitate international trade.

Source: Haines, William, "Industrial Welding Services in Thailand", in *Services in Global Value Chains: Manufacturing-related Services*, edited by Low, Patrick and Gloria O. Pasadilla, *APEC Policy Support Unit*, 66-79, 2015.

Another reason relates to the importance in many services of face-to-face services provision and consumption. Traditionally, services providers were constrained by their inability to capture, store and possess the value of the intangible. There were few opportunities to unbundle the tasks and create step-by-step “pathways” to market. For a long time, the face-to-face nature and simultaneity of production and consumption of many services hindered any significant cross-border activity.

It was not until the turn of the century that widespread application of ICT technology meant that knowledge-intensive services could increasingly be “packaged” in digital form, ownership could be established, production could be scaled up, units could be stored and exchanged separately from production via the internet. “Knowledge-intensive business services”, increasingly vital inputs to competitiveness in all industry sectors, no longer needed to be performed in-house and could be unbundled into their higher and lower value-added segments.

So began the search for lower-cost, more efficient intermediate services production offshore. To some extent, the process of globalization in services mirrored the process in manufacturing. It certainly involved much FDI – to enable protected technology to flow safely offshore; for example, in the knowledge process outsourcing (KPO) sector and parts of the business process outsourcing (BPO) sector – but it also involved much contract offshoring to services small and medium-sized enterprises (SMEs) and start-ups in developing countries, especially in information technology outsourcing (ITO).

There is now a constant quest in the services sector to segment out any business function where the services expertise can be digitalized and traded cross-border via the internet. The innovative business process transformation very much involves engaging SMEs, as well as creating globally integrated services firms. The outcome is that services outsourcing trebled from 2005 to 2010 and ICT-enabled business services intermediates have become one of the fastest-growing components of world trade today.<sup>3</sup> So began the services outsourcing and offshoring story of the “services revolution”, with all its implications for latecomers to development, explored a little further below.

This also generated increased efforts to map services business value chains (e.g., by Gereffi and others at Duke University and more recently the Swedish National Board of Trade,<sup>4</sup> the International Trade Centre, the Fung Global Institute, the APEC Policy Support Unit and the Economic Research Institute for ASEAN and East Asia). Not being as linear as goods value chains, but having real-time cluster characteristics within time zones and network features, such as feedback loops, especially in the front office and at the user interface, services value chains have not proved easy to map.

Much of this fledgling mapping work still fails to identify the cross-border aspects of the value chains – which is essential for locating the policy and regulatory disconnects that need to be addressed if full services value chain connectivity is to be achieved. Mapping via business case studies is also still grappling with how to determine the value added at any point in the services chain, important for understanding or predicting the ongoing fragmentation process.

## Digitalization: “Data” as an intermediate input

The process has not stopped there. Another 10 years on, in 2018, with the transformation to digitalization now well under way, another conceptual shift is required to understand the evolving role of services in GVCs. What started as “servicification” (increasing intensity of services inputs as value added not only in manufacturing but in all sectors of the economy) has now intensified in what is commonly called the Fourth Industrial Revolution, with the advent of new technologies like cloud computing, mobile internet, internet of things (IoT), automation, autonomous vehicles, additive manufacturing (3DP), artificial intelligence (AI) and so on.

This is a continuation of the process of greater services intensity and digital enablement becoming evident across many economies. What is new is the increased velocity, scope and impact of technological change, including on trade. What has long been evident in the services sector is clearly now a whole economy issue. Everyone – whichever sector they are employed in – is aware of the changes taking place with the transformation to digitalization, the business opportunities opening up for services SMEs and micro, small and medium-sized enterprises (MSMEs), the regulatory reform challenges arising in the services sectors and questions on the “future of work” as the structural shifts intensify. The AI revolution in the next 10 years is expected to be even wider in scope, faster and stronger than previous industrial revolutions and replacing perhaps as much as 50% of current work.<sup>5</sup>

All firms are now using digitalized “knowledge-intensive business services” intermediate inputs. Increasingly, these services inputs, for both goods and services firms, are themselves fragmenting to the core, essential, valuable ingredient of “data” inputs. Once processed, whether by human or AI, data is becoming the critical business input in all sectors, as well as spawning new value chains of downstream big data analytics services. A digital unit of data is simply packaged knowledge that can be stored and traded. In reality, it is a service – services expertise or knowledge captured in digital form – and a key factor of production, along with talent, in all digitally enabled businesses.

Looking ahead to the next step in the story, one thing seems certain. Protectionist intervention aside, the application of new technologies is likely to continue to enable the cross-border services fragmentation process to intensify. The impacts of new technologies like IoT, AI, blockchain or 3DP on services business models is that services value chains, originally conceived as much shorter than most goods value chains, are likely to lengthen.

It is important to recognize that the contrary is likely to be the case for “goods”. The shrinking of 2D manufacturing, explored a little further below, is likely to shorten considerably the length of traditional “goods-related” aspects of value chains, as well as diminish their cross-border components.

For services, the continuing cross-border fragmentation differs fundamentally from goods in that it is effectively both digital and online, meaning that the policy and regulatory issues involved are very different from the traditional trade policy agenda. And because so many aspects of services business, including innovation and data storage and retrieval, take place most cost-effectively via non-static servers in the cloud, these cross-border services value chains have a fundamentally global nature. The strong regional dimension to goods GVCs is apparent for services functions that need to operate together in real-time virtual networks but much less apparent for 24/7 services business functionality.

The likely outcome is that trade in merchandise goods will continue a long-term decline as a percentage of global trade.<sup>6</sup> Over the next two decades, many “goods” will effectively transform towards services (computer-aided design or CAD files) and take physical form only at or near the final point of consumption or use. 3DP or additive manufacturing lies at the heart of this transition, widely expected to replace more than 50% of manufacturing processes as it becomes less expensive.

Additive manufacturing of any physical good will involve lengthening of the chain of knowledge-intensive services inputs at the pre-“printing” stage, including design and engineering to produce the blueprint and design file. It will also require a complex chain of R&D services processes to identify and produce appropriate advanced additive materials as inputs to the “printing” stage. The intermediate goods inputs involved in producing a simple consumer item might reduce to (1) the basic physical and chemical ingredients for the “printer ink”; (2) the capital goods required to process them; (3) the plastics, powder- and liquid-based additives created; (4) the 3D printer (another capital good) and all its components and associated devices; and (5) the final resulting physical object. If printed at the point of consumption, packaging materials and transport equipment might be eliminated. All this disruption will deliver huge opportunities along the value chain to ensure a sustainable environmental impact from modern “manufacturing”.

The transformation of goods to services and the consequent increasing blurring of the distinction between goods and services raise multiple questions as to whether new international governance is needed with respect both to rule-making and regulation. It also draws attention to the need for the trade policy community to think more horizontally across goods and services.

The new agenda comes to a head in domestic regulation and international rule-making for e-commerce. For the moment, the trade policy community appears doggedly focused on cross-border business-to-consumer (B2C) e-commerce for final goods. This is the mere tip of the iceberg. The larger prospective agenda relates to cross-border electronic exchange of services and data inputs. These transactions are fundamentally B2B transactions in GVCs.

Governments, meanwhile, are not keeping up with the digital reality that business currently faces and restrictiveness in trade in services remains pervasive. What all businesses will want, as the transformation to digitalization intensifies, is a regulatory environment that allows them the flexibility to adjust to change and facilitates access to talent, access to data and access to fast, affordable broadband. These are now the central three determinants of services competitiveness.

## Micro, small and medium-sized enterprises

The services sector is noteworthy for its strong SME intensity. Unlike the goods sectors, where it traditionally takes substantial scale to service international markets, increasingly it is the SMEs in the services sector that are joining GVCs. Global evidence suggests that knowledge-intensive services SMEs are more inclined to engage in international B2B activities than their manufacturing counterparts. As early as 2000, it was already estimated that globally there were nearly four times as many services SMEs engaged in international alliances as manufacturing SMEs.<sup>7</sup>

The Philippines provides a good example. In 2016, 99.57% of all Philippine businesses were MSME (and over 80% of them were in services); 60% of exporters were MSMEs, accounting for 25% of Philippine export revenue, chiefly as services suppliers into GVCs.<sup>8</sup>

This kind of success has not been replicated everywhere. In Finland, in the mid-2000s, for example, the percentage of services firms that exported was about 6% for firms with one to nine employees, 18% for firms with 10-19 employees, 30% for firms with 50-249 employees, and almost 60% for firms with 250 and more employees. Similar patterns are found in France, Ireland and Slovenia.<sup>9</sup> In Australia, which is less well-integrated in GVCs, it is also the larger services firms that tend to engage more in export business, resulting in a general export underperformance in services.<sup>10</sup>

One observation that all this data confirms, including for the Philippines, is that despite the opportunities international markets offer to small, nimble services firms, MSMEs still face big challenges accessing them.<sup>11</sup> Business perception surveys over the past decade of research consistently identify lack of access to traditional sources of trade finance as ranking at or near the top of services export constraints for MSMEs.<sup>12</sup> MSMEs struggle, even in the OECD member countries, to obtain bank finance and rely instead on internal resources or other options such as angel investment, incubator programmes, venture capital, crowdsourcing and factoring. Services exporters' relative lack of engagement in the banking system was identified by the World Bank as a strong contributor to the relative crisis-resilience of services trade during the global financial downturn.<sup>13</sup> Problems accessing trade finance might have tended to diminish somewhat for services MSMEs engaging in online trade, but often only to be replaced instead by problems in accessing payments systems.

The transformation to digitalization is nevertheless making it easier and reducing the importance of scale at the production stage. In the digital economy, the additional cost of adding a new customer can be tiny and even start-up services firms can enter international markets – being born global. Examples abound of digital enablement delivering huge commercial opportunities for SMEs as the world wide web lowers the barriers to market entry. Music, films, computer software, computer games and the like are often produced for the global market by young SMEs.<sup>14</sup>

A number of studies have highlighted how the use of internet platforms for e-commerce, as well as social media platforms, help SMEs reach the international market. These studies are generally not specific to services SMEs and are largely focused on B2C transactions for merchandise goods rather than electronic B2B services transactions in GVCs. Some of the results are nevertheless instructive. One study indicated that 82% of all companies that started trading via e-commerce thanks to the internet are micro and small. A study by eBay showed that exports by SMEs accessing e-commerce platforms exceed those in the traditional economy fivefold and that these companies tend to have higher wages and reach a higher average number of diversified export destinations.<sup>15</sup> McKinsey Global Institute has shown that services SMEs utilizing the internet for business functions grow at more than twice the rate of those that do not.<sup>16</sup>

Many business commentators consider it inevitable that digitally enabled services SMEs will engage increasingly in GVC activity and B2B trade will become dominant. To survive in the international market, services SMEs will focus, like the larger firms, on core competence and market niche and outsource non-core tasks to other services SMEs.

## Development dimensions

In East Asia, small entrepôts such as Singapore and Hong Kong had experienced early growth and development through specialization in services industries, but this experience was not duplicated elsewhere, and the services involved were essentially incidental to trade in goods. Maritime services, logistics, merchanting and financial services all played a very big part in these economies' export development models.

The “services revolution”, which later became apparent in South Asia<sup>17</sup> but quickly proliferated across other parts of the developing world, offered a different path to development, with an explosion of business services, seemingly independent of manufacturing.<sup>18</sup>

For the first time, services were providing an alternative engine for development, enabling some latecomers to leapfrog directly from agrarian economies to services outsourcing activities. The Philippines was an early East Asian example. But the phenomenon quickly spread throughout the Caribbean to Africa and to Central and Eastern Europe. Evidence started to emerge that developing countries were shifting towards services sooner, at a lower per capita GDP than had been the case in the traditional development trajectory. Importantly, services export contribution to GDP growth in the low-income developing countries was seen to be as high as or higher than was the case for high-income countries.<sup>19</sup>

By 2013, a quarter of the least-developed countries (LDCs) – Cambodia, Djibouti, Gambia, Laos, Liberia, Nepal, Samoa, Tanzania, Vanuatu – were net services exporters. Over the period 2007-2011, average LDC services export growth had been nearly double the world growth rate and for as many as 18 countries, or half the LDCs, the share of services in total exports was at or well above the global average by 2013. There is a high degree of diversification in LDC services exports, though tourism is dominant. Bangladesh is by far the strongest LDC performer in other business services exports.<sup>20</sup> In 2013, UNCTAD's *World Investment Report* showed that despite an 18% drop in global FDI in 2012, services FDI was the least affected and FDI inflows to services industries in LDCs hit a record high, an increase led by developing-country investors.<sup>21</sup>

Outsourcing of business services to lower-cost locations in developing countries had some distinctly different features from the outsourcing experienced in manufacturing. The GVC “pipelines” being opened up were not so dependent on physical transport or physical transport infrastructure. However, airports and airline connections were important for temporary people movement and face-to-face communication, and undersea telecommunications cables were certainly relevant to internet connectivity.

More critical factors in attracting foreign clients related to “knowledge economy infrastructure”; that is, the quality of tertiary education and training, including language capabilities and IT skills. A services culture and a cultural affinity with the lead firm might also be relevant. Time zone tended to matter.

The business environment, the transparency of domestic regulatory regimes and the rule of law also mattered a great deal. This was partly because it is harder to quarantine services export activities in separate “free trade zones” to achieve domestic regulatory efficiencies. Further, while domestic market size is generally not the initial driving force, some extension of activity into the domestic market is always desirable to an investor in services export activity.

Some other traditional geographic features mattered much less. Mixed results from gravity modelling aside, the old tyrannies of smallness, remoteness and distance from destination market were much less relevant to services trade. Services that can be exported online help connect countries that are otherwise left out of GVCs due to distance from hubs like Japan or China in Asia, the United States in North America and Germany in Europe.

Translating development in services sectors into inclusive and sustainable growth outcomes requires deliberate all-of-services government focus and strategy. China provides the stand-out example of a deliberate strategy designed to leapfrog in development by targeting the services sector. The last two Five-Year National Development Plans explicitly recognized the importance of services industries, setting targets inter alia for services employment growth in the Pearl River Delta. Services were an explicit focus of China’s economic stimulus package during the global financial crisis. The Shanghai-Pudong Free Trade Zone for Services is a world first. The Beijing-China International Fair for Trade in Services was the first international dedicated all-of-services export promotion fair. Of the many outcomes, perhaps the single biggest demonstration of success is that the last country for which the services sector accounted for less than 50% of GDP has now crossed that line.

With massive structural transformation to the digital economy under way, new economic and social questions are arising. The services sector itself is impacted by disruptive technological change, including the application of AI, which is automating a vast array of services tasks previously performed by people. The future of work has become a key conversation topic for many professional services providers. Are the benefits that developing countries have enjoyed from services outsourcing, especially with respect to female employment growth, therefore at risk?

A.T. Kearney estimates that 1 million BPO jobs are indeed at risk over the next five years concentrated in four countries (the US, India, Philippines and Poland). Illustrating this reality, Infosys and Wipro have recently laid off 11,000 and 12,000 employees respectively in India, replacing them with intelligent software.<sup>32</sup>

#### Box 5: The shift to services in the global economy

- The largest sector of global economic activity, accounting for more than 70% of world GDP (including construction and the utilities)<sup>22</sup>
- The dominant driver of global economic growth, making the strongest contribution to delivering GDP growth and poverty reduction<sup>23</sup>
- The largest and the fastest-growing employer; employment in services surpassed employment in agriculture over a decade ago – services account for just over half of total global employment in 2017 and three-quarters in high-income countries<sup>24</sup>
- The fastest growing contributor to female participation in the workforce and relatively higher female wage growth<sup>25</sup>
- The dominant destination for FDI flows, the services share of global FDI stock is more than double that of manufacturing<sup>26</sup>
- Significant contributor to productivity growth – multifactor productivity is increasingly understood as services innovation<sup>27</sup>
- Traditionally underperforming in trade terms (but there is known significant under-measurement in the balance-of-payments), services account for over 50% of global trade in value added,<sup>28</sup> and global services trade is growing relative to goods trade<sup>29</sup>
- Developing countries (excluding China) account for only 25% of world services exports but their contribution is growing very fast<sup>30</sup>
- Nine LDCs are net services exporters; tourism figures prominently as does BPO<sup>31</sup>
- The services industries are internationalizing; there are no commercial services these days that can strictly be considered “non-tradable” (not even hairdressing or cleaning)
- Early measures by UNCTAD and the US Bureau of Economic Analysis point to strong growth potential for B2B trade in digitally enabled services in GVCs

An optimistic response emerges in Richard Baldwin’s recent book, *The Great Convergence*.<sup>33</sup> Baldwin predicts that the next pending wave of globalization will see continued technology-enabled disintermediation and that offshoring to developing countries will hit large numbers of previously “feather-bedded” white-collar services providers in developed economies. Face-to-face will remain important and developing country services providers, including women, will continue to grow their participation, including through telepresence and hologram, in developed country services markets.

Suffice it to say that most services business commentators foresee no process of **net** job loss in services. Quite the contrary.

# Sustainability

Naturally, it is important to recognize the role of “environmental services” in delivering improved industrial sustainability. Many services activities not generally identified as “environmental” also play a vital role in this outcome.

A number of studies have illustrated this point. An APEC study focuses on how the installation and operation of renewable energy equipment in the solar photovoltaic, wind and hydropower sectors is dependent on high value-added services knowledge and skills.<sup>34</sup> Renewable energy technologies can only be deployed in combination with other associated services, such as installation, technical support, training and maintenance of equipment. Many other services are also critical inputs to renewable energy projects: scientific and technical consulting services; services required for electricity distribution; professional services; construction and engineering services; management consultancy and financial control; and equipment maintenance and repair.

One important policy conclusion is that any international effort to facilitate trade in goods that benefit the environment should also make an effort to facilitate trade in environmental services broadly defined because the associated services are “indispensable”.<sup>35</sup>

Recent studies of the role played by services in the re-manufacturing phase of heavy equipment GVCs also deliver insights on how services inputs help achieve sustainability outcomes in complex internationalized capital goods GVCs. Re-manufacturing is considered the highest level of re-use for industrial goods – a more refined, sophisticated and developed process than recycling, refurbishment or rebuilding.<sup>36</sup> This is partly because it involves the return of core physical components, so firms are able to recapture much of the value of their previously manufactured goods at the very beginning of the re-manufacturing value chain, thus reducing the length of the goods aspect of the value chain and hence the resource and material intensity of the re-manufacturing process.

Two recent business case studies, of a large US and a large Japanese manufacturer of heavy mining and construction equipment,<sup>37</sup> show that re-manufacturing-related services add value at every stage of production and many are very high-value, involving a high degree of technical, engineering and design skill, deep understanding of proprietary specifications, extensive training and technological development.

For the US firm, the high-value adding engineering and design phase of re-manufacturing involved the application of advanced 3DP technology to restore components to original specifications and good-as-new quality. The environmental benefits generated are far-reaching, including reduced waste from industrial production, decreased demand for raw materials, and the creation of a “closed-loop reverse logistics process” that recovers end-of-life products. The

re-manufacturing cycle helps the firm meet its sustainability goals by extending the time that resource-intensive goods are in use and reducing the materials and energy used in their production.

The case study draws attention to how re-manufacturing-related services deliver benefits of “dematerialization”,<sup>38</sup> including “increasing material efficiency in operations; designing products with reduced mass, packaging, or life-cycle energy requirements; reducing transport requirements in the supply chain, thus reducing fuel and vehicle utilization; and substitution of electronic services for material-intensive services”.<sup>39</sup> This is a good example of the evolutionary story described above, with the production process evidently shifting towards greater digitally enabled services content.

In the case of the Japanese firm, which likewise produces machines with a 20-30-year service life, 74 services inputs were identified along the value chain, estimated as contributing over 50% of value added. After-sales services value-added was very high – higher than the price of the machines themselves. Back-office services accounted for one-third of services activities, the manufacturing stage for one-fifth, pre-manufacturing and post-sales stages for 14% each, and establishment and post-manufacturing stages for 9% each. Fifty-two services tasks were outsourced, including some related to compliance with health, safety and environmental regulations.

A final point worth making in respect to sustainability trends relates to the built environment, where the application of new technologies is having a disruptive impact on architectural, engineering and construction services value chains, much of which is beneficial from an environmental perspective. By way of example, future-proofing services have been transformed with the use of CAD, enabling estimates of a buildings’ future energy consumption and improving the sustainability of built environment outcomes.

The application of IoT provides another example, allowing all objects on a construction site to be connected in sustainable and affordable ways to collect and exchange data on equipment, people, tools, materials and environmental impact. IoT allows contractors to monitor equipment, issue maintenance alerts, track inventory, perform quality tests on-site, detect defects early, monitor environmental impact, predict accidents and ensure safety and track the whereabouts and well-being of staff in any sort of emergency or construction-site evacuation.

In a next step forward, virtual reality technologies will allow aspects of such tracking to be done remotely, in real time, and potentially offshore in lower-cost jurisdictions for technical and professional services, but still delivering reduced environmental impact.

# Gender equality

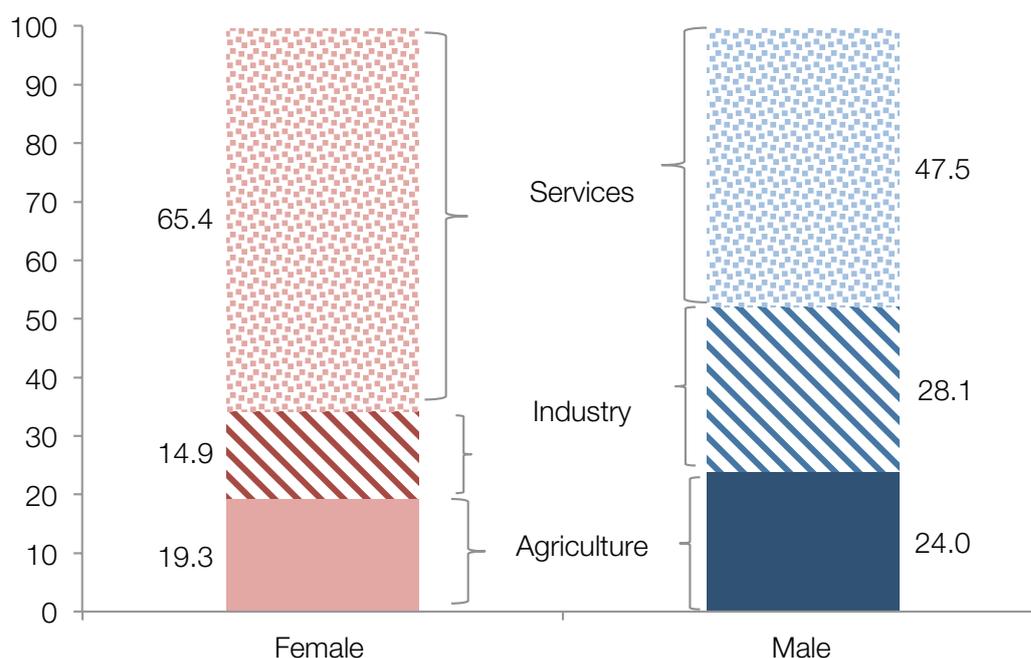
The data speaks for itself.<sup>40</sup> Globally, 40% of the employed workforce in 2009 was female. Of the employed women in the world, 37% work in agriculture (33% for men), 16% in manufacturing (26% for men) and 47% in services (40% for men).

Women account for roughly half of total global employment in services. The female share of employment in services has risen rapidly, from 41% in 2001 to 49.5% in 2013. In tourism, women account for 56% of the global workforce. In ICT, women account for 30%.

In the services industries, women are mainly employees rather than owners of enterprises, and relatively few rise to positions of management. Nevertheless, female ownership and management is much higher in services than in manufacturing. However, only 6% of the chief executive officers of the global top 100 technology companies are women.

Some countries, and some regions, have significant departures from this global average. Figure 1 shows that in the Asia-Pacific region, for 14 APEC economies for which data was available, more than 65% of women work in the services sector. Figure 2 shows that, on average, 37% of SMEs in the APEC region were owned by women, while women are more engaged than men when it comes to MSMEs. APEC data also shows that SMEs and MSMEs that do offline trade are dominated by men-owned companies, whereas for those who do only online trade, the share of women-owned companies doubles.

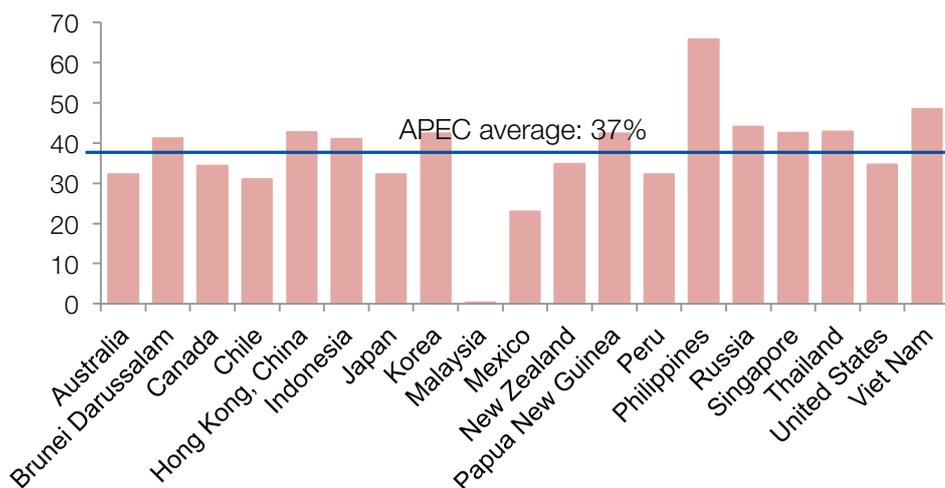
**Figure 1: Services Sector Share of Employment, for Women and Men, in APEC Economies**



Note: Data is from each economy's latest year. The sample includes 14 APEC economies: Australia, Brunei Darussalam, Canada, Chile, Indonesia, Japan, Republic of Korea; Malaysia, Mexico, New Zealand, Philippines, Russia, Thailand and Viet Nam.

Source: World Bank – Gender Statistics and APEC PSU calculations, 2016

**Figure 2: Percentage of Women-owned SMEs in APEC Economies in 2011 (%)**



Note: All enterprises are in the formal sector. "Women-owned" means at least one female owner.

Source: IFC Enterprise Finance Gap Database and APEC PSU calculations 2016

Size (% of SMEs firms)	Owned by males	Owned by females
Very small (5-9 employees)	65.1%	72.9%
Small (10-49 employees)	28.9%	24.2%
Medium (50-250 employees)	6.1%	2.9%

## Policy and regulatory priorities

By way of a quick conclusion, despite all the many services trade restrictions which for decades have seen insufficient reform, digital economy issues must take immediate prominence on the trade agenda if trade in services is to continue to generate the productivity and development gains experienced in recent years.

There is abundant evidence of the need to promote greater regulatory cooperation in respect to services. It cannot be emphasized enough that this applies also to the digital economy. Regulators are not keeping up with the business model transformations under way.

Focus needs to be given to inter-governmental governance on data localization, protection of source code, encryption requirements, consumer protection and data privacy. There is a need to develop regulatory approaches that provide legitimate consumer and security protection and also enable the cross-border flow of data. The current high risk of regulatory fragmentation is detrimental to global services growth.

From a development perspective, priorities must include improvements in digital infrastructure, pro-competitive regulation of telecommunication services, convergence on international standards and education, education, education.

It needs to be better understood that for services exporters, the international market is no longer geographically defined by individual countries. The precise geographic location of a services business client is less relevant than it was for goods because the services business client is doing virtual business further downstream in yet another location and is, in any case, increasingly footloose.

Regulatory disconnects across jurisdictions are, therefore, the biggest irritants in services trade. Mutual recognition of qualifications and licensing requirements, access to cross-border data flows and seamless interoperability across jurisdictions are what will make a difference for services competitiveness, for large and small services providers alike.

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