Industry Insight.

Machinery and equipment manufacturing.

14 April 2021

Contents.

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Summary.

This report focuses on New Zealand's machinery and equipment manufacturing sector. Firms operating in this sector supply and manufacture a diverse range of transport equipment, electronic and electrical equipment, and mechanical machinery, which are used by other firms in downstream industries and sold directly to consumers.

Globally, the machinery and equipment manufacturing sector is huge. For example, worldwide sales of manufactured mechanical machinery, just one major market segment, amounted to $2.7trn in 2019, while sales of electronic equipment were in the region of US$3.8trn. With revenues of about $36bn, the sector is also a big deal in New Zealand, although this does include an estimated $23bn of machinery and equipment imports. Home grown revenues were worth about $13bn, of which $5bn was generated from exports.

The machinery and equipment sector has many moving parts. That's not surprising considering that the sector touches every part of the New Zealand economy. Most of the 6,000 firms that make up this sector are small operators, although this differs markedly by market segment. The largest firms in the sector are involved in development and design of appliances, as well as the manufacture of medical and surgical equipment.

By contrast, a large chunk of the machinery and equipment imported into New Zealand is manufactured by large multinational firms that have operations and distribution networks across the globe. These firms primarily compete amongst themselves for local custom in selected market segments and product sets. Although there are exceptions, they do not as a rule compete head on with local manufacturers.

Table 1: Summary of competitive forces

Force	Direction
Power of suppliers	Medium and rising
Power of buyers	Medium and falling
Substitutes	Low and stable
Barriers to entry	Medium to high and stable
Industry rivalry	Medium and rising

Source: Westpac

Demand for machinery and equipment is determined by many factors.

Some are slow burning and shape demand over time. That includes the increasingly stringent nature of regulations and the impact of technology on equipment service lifetimes. It also includes the ongoing challenges faced by downstream customers to improve operational efficiencies at the same time as they are having to come to grips with growing social and environmental pressures. At a structural level, changing sectoral contributions to the New Zealand economy and population demographics loom large.

Other demand drivers are more cyclical in nature and tend to have short-run effects. They include economic growth, fluctuating activity in downstream industries, and seasonal issues. Causality also runs the other way, with spending on machinery and equipment not only a function of the economic cycle, but also a key driving force behind it.

More recently it has been Covid-19 that has loomed large, with many of the sector's customers having to pull back on their investment in machinery and equipment as the New Zealand economy went into recession in mid-2020. Since then the domestic economy has largely recovered, and indeed has performed better than most expected. Downstream customers have responded in kind, and this has been reflected in a pickup in demand for most types of machinery and equipment. In some cases, spending has surged, reflecting pent up demand due to the earlier postponement of investment. This in turn has helped to boost prices.

To respond to demand, manufacturers and suppliers of machinery and equipment need several things.

Firstly, they need access to the factors of production. That means having access to the right quantity and quality of raw material inputs, labour, and capital (in the form of facilities and supporting infrastructure).

For materials like steel, aluminium, plastics, and fibreglass that is not typically a problem, with requirements being adequately addressed through a combination of bulk imports and local supply. That said, supply chains are vulnerable to disruptions, such as those caused by Covid-19. Also, many of these material inputs are globally traded commodities so local manufacturers are exposed to commodity price movements and the vagaries of the exchange rate.

Getting the right quantity and quality of skills, however, is a big challenge for the sector. Indeed, ongoing skills shortages are a defining feature of the sector, particularly for tradespeople. This has the effect of pushing up median salaries, which in turn pushes up unit costs of production. The very low numbers of workers entering New Zealand because of Covid-19 is likely to have exacerbated matters.

Secondly, they need efficient supply chains. Traditional supply chain models incorporate a linear set of discrete, sequential and event driven processes that link sourcing of materials to production, distribution, and storage. However, with new digital technologies coming to the fore, firms are shifting to intelligent, more flexible networks that integrate suppliers, manufacturers, and customers to deliver an end-to-end view of the supply chain. Benefits of a digitised supply chain include visibility to all participants along the value chain, an improved responsiveness to changing customer needs, and

the flexibility to incorporate circular economy principles that focus on the reuse and recycling of existing equipment.

Thirdly, they need to innovate if they want to stay ahead of their competitors. Product innovation is achieved either through mergers and acquisition activity, both at home and abroad, or through research and development activity. On both accounts the machinery and manufacturing sector stands out. Machinery and equipment firms are the largest investors in research and development activity in New Zealand's manufacturing sector.

Competition is intense, although this differs by market segment. As mentioned, local firms don't really compete against large international firms that import machinery and equipment into New Zealand. With a few notable exceptions, New Zealand-domiciled firms neither have the financial muscle or economies of scale to compete effectively with these very large firms.

Instead, machinery and equipment manufacturers in New Zealand tend to compete in niches where size doesn't really matter. They compete based on the high quality and reliability of their products, the innovation and creativity of their designs and the excellence of their servicing offering. That may explain why some of New Zealand's larger machinery and equipment manufacturers have already moved manufacturing offshore, while still retaining their design capabilities at home. It may also explain why they spend so much on research and development.

Outlook.

By the end of 2020, the economic benefits of New Zealand's elimination strategy for Covid-19 had become increasingly evident. Indeed, the economy continues to perform well, despite being impaired by a loss of international tourism due to the closure of our borders.

Following the roller coaster ride of 2020, we expect subdued economic growth for 2021. That said, the level of domestic economic activity should still be solid over the year, underpinned in large part by construction and agriculture. From 2022, we expect economic growth to pick up as the borders open and service sector activity strengthens. If that proves to be the case, then the near-term outlook for New Zealand's machinery and equipment manufacturing sector is likely to be positive.

In large part that's because business investment should start to improve over 2021, gathering pace in 2022. Investment had previously contracted in 2020. That, together with continued growth in government capital expenditure, should support domestic demand for electrical and transport equipment, as well as for specialised mechanical machinery used in the construction and agricultural sectors. Most of this is likely to be met by imports, although local manufacturers should still benefit.

That said, some market segments may see a sharp fall in sales. With Covid-19 raging and offshore holidays off the table, New Zealanders have been spending large on consumer electronics and household appliances. This lift in spending could reverse when international borders start to open and travelling abroad becomes a viable option again. Most affected are likely to be importers/distributors, although local manufacturers are unlikely to be unscathed.

However, the export market should provide local machinery and equipment manufacturers with growth opportunities. In large part that is because of the rollout of Covid-19 vaccines as well as ongoing massive monetary and fiscal support in major economies, both of which are likely to boost global economic activity over the course of 2021 and 2022. On the flip side, the reducing threat posed by Covid-19 is likely to slow exports of respiratory and other medical equipment, which were a big success story in 2020.

Longer term, the outlook for the machinery and equipment manufacturing sector is positive, especially for those that can adapt to future challenges.

From 2023 onwards, and with Covid-19 largely relegated to history and the economy on a much firmer footing, we expect that demand for machinery and equipment will return to its normal cyclical pattern. With that in mind, the needs of a growing population will be a key factor underpinning the long-term demand for machinery and equipment.

Downstream firms will continue to spend large on machinery and equipment that not only helps them remain competitive, but also addresses growing concerns from customers about the environmental and social impacts of their operations.

Technology is key in this regard. Downstream firms will increasingly demand machinery and equipment that not only embodies the latest advances in digital technology, but is easily integrated into fully automated value chains, allowing for end-to-end monitoring, and tracking of work in progress. Under pressure from customers, these firms will also be looking for machinery and equipment that aligns to the principles of the circular economy, with an increasing focus on reengineering, recycling, and reuse activities.

Machinery and equipment manufacturers will have to meet this challenge head on or risk being left behind. However, this is likely to be easier said than done and many firms will be found wanting.

As a result, successful machinery and equipment manufacturers will need to make substantive investment in new capabilities. That can be achieved either through direct procurement of new technologies, the ramping up of in-house research and development activity, and/or through mergers and acquisition activity. The local machinery and equipment manufacturing sector is no stranger to these options given that it is already the largest investor in research and development activity in the manufacturing sector, and many firms within it have already acquired interests in offshore manufacturers.

However, these requirements are going to go up several notches, and for the many smaller firms that have limited resources, that could prove to be a bridge too far. Some of these firms will be able to make a go of it outside of the digital world and continue to manufacture highly customised products, much the same as they always have done. However, that can only last for a time. As the benefits of digitisation become increasingly apparent to their customers, we think competitive pressures will force these operators to either close shop or become targets for mergers and acquisition activity. On that basis, the number of firms operating in this sector will fall, but those that remain will be larger than those today.

For those that can make the necessary investment in research and development as well as offshore acquisitions, the future looks a lot brighter. Firms in New Zealand's machinery and manufacturing sector have always been innovative and are able to compete effectively on this basis. Their focus, much like today, will be on niches where they have well developed competencies and there is limited competition from imports. Exports too will be a focus but only in selected areas, such as agricultural equipment, which will leverage off advances in agri-tech.

Introducing the industry.

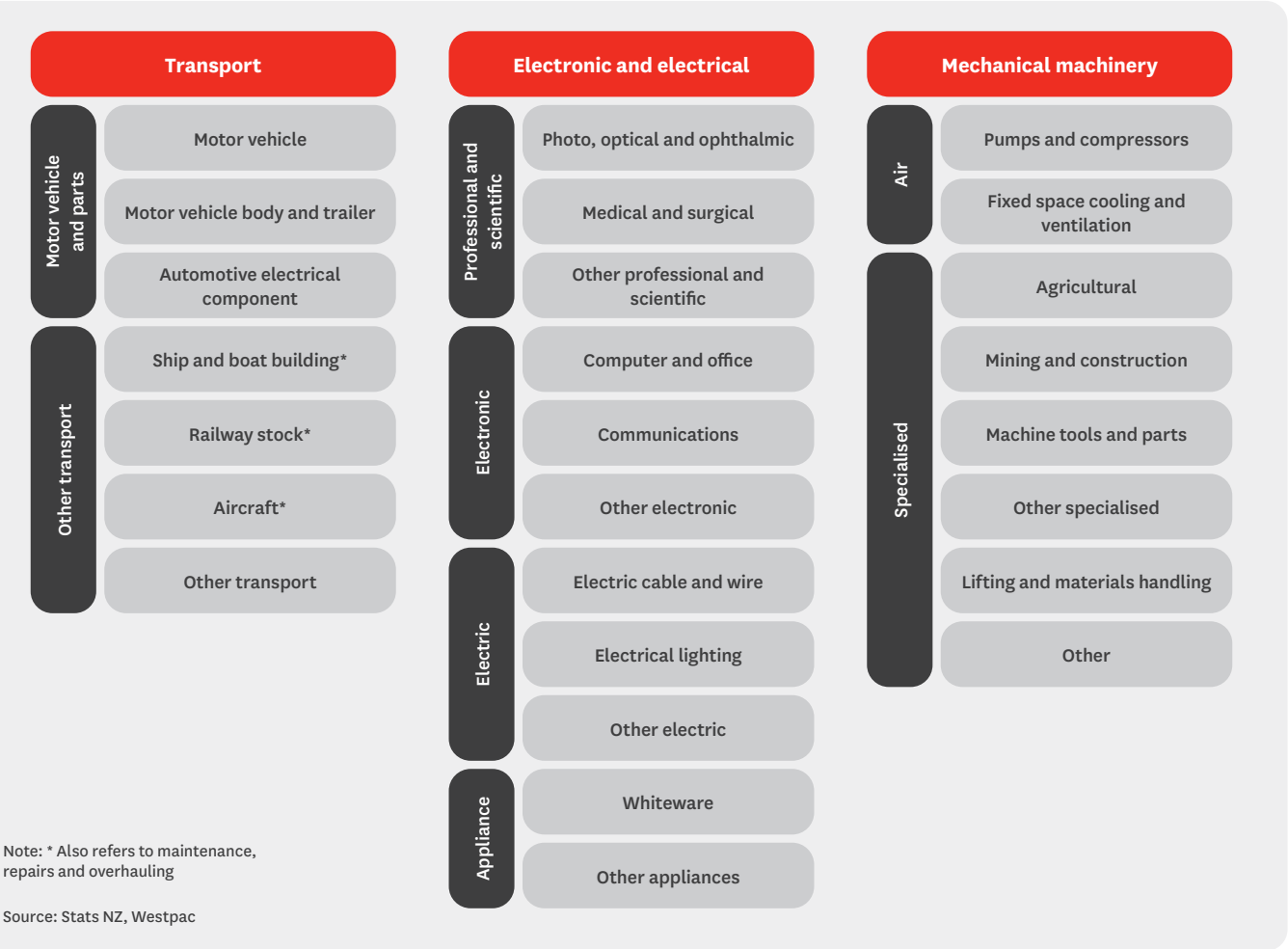
Scope of this report.

This report focuses on the manufacture of a diverse range of machinery and equipment in New Zealand at various stages of beneficiation. It distinguishes between three market segments of machinery and equipment which touch every part of the New Zealand economy, namely transport equipment, electronic and electrical equipment, and mechanical machinery.

Refer to Appendix A for more detail on the scope of manufacturing activities covered by this report.

Machinery and equipment manufacturers service every sector of the economy, from consumer goods to high tech, and the equipment that rolls off their production lines is as varied and unique as their customers.

Figure 1: Scope of manufacturing activities covered by this report



Note: * Also refers to maintenance, repairs and overhauling

Source: Stats NZ, Westpac

Recent performance of the sector.

Turnover of the sector.

New Zealand's machinery and equipment manufacturing sector is large, generating revenues of just over $13bn in 2019. That's equivalent to about 2% of all income generated by industry in New Zealand.

Table 2: Turnover by market segment

Machinery and equipment	Estimated turnover ($bn) - 2019
Mechanical machinery	**4.8**
Specialised	4.3
Pump, compressor, heating, and ventilation	0.5
Transport equipment	**4.3**
Other transport	3.2
Motor vehicle and motor vehicle parts	1.1
Electronic and electrical equipment	**4.3**
Professional and scientific	1.8
Electronic	1.2
Electrical	0.9
Domestic appliances	0.4
Total	**13.3**

Source: Stats NZ, Westpac

Mechanical machinery manufacturing is the largest individual market segment, generating turnover of about $4.8bn in 2019. Meanwhile, transport equipment, and electronic and electrical equipment manufacturing each added a further $4.3bn.

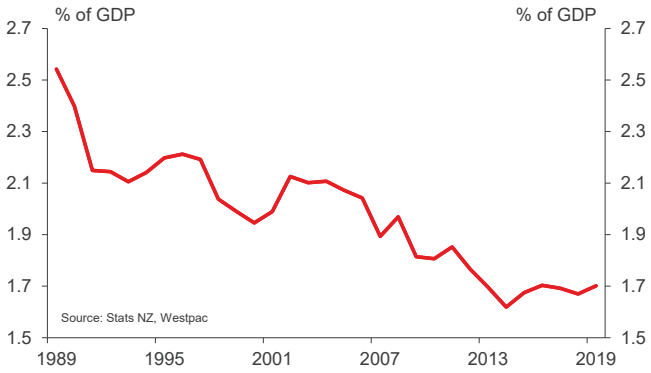
Refer to Appendix B for a detailed breakdown of turnover by market segment.

Contributions to value add.

In terms of value add, the machinery and equipment manufacturing sector contributed about 1.7% to New Zealand's GDP in 2019. That equates to just under 9% of the value add generated by all of New Zealand's goods producing sectors. The sector is ranked as the fifth largest goods producer in New Zealand.

However, the sector's contribution to GDP has been trending lower for some time, with the decline being reflected across all market segments. In part, that reflects slow burning structural changes already underway in the economy, with services making up an increasingly larger proportion of the economy. It also reflects the feasibility of producing machinery and equipment in a geographically distant country that has a small domestic market. Indeed, machinery and equipment manufacturing is the only sub-sector within manufacturing where there is more outward than foreign investment into New Zealand.

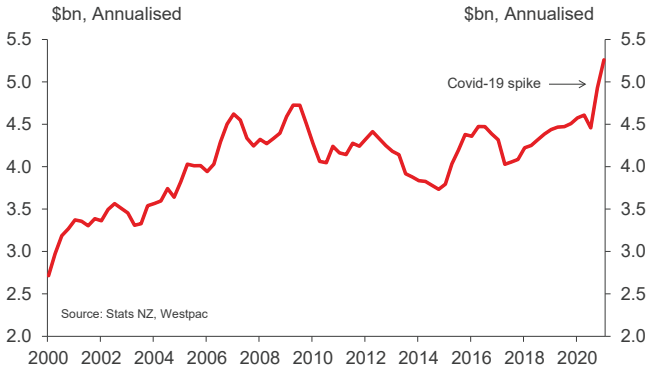
Figure 2: Contribution to GDP



Exports.

Exports of machinery and equipment manufactured in New Zealand stood at just under $5.3bn in 2020, contributing about 38% to total industry revenue. The value of exports rose by 15% in the same year, sharply up from $4.6bn in 2019. Exports have increased in recent years, after having previously trended lower.

Figure 3: Machinery and equipment exports



The sharp pick up in exports in 2020 can largely be explained by a $500m increase in sales of optical, medical, and measuring equipment. Most of this reflects heightened global demand for respiratory and associated equipment in the second half of the year, as healthcare providers found themselves having to battle the rapid spread of Covid-19. Overseas buyers include wholesalers, hospitals, medical facilities and practitioners from the United States, Australia, France, and Germany.

The other big gains were in exports of aircraft and aircraft parts, which rose by over $600m during the second half of 2020. However, most of this was generated from the re-export of aircraft previously imported into New Zealand, rather than the export of locally manufactured planes. Most exports of aircraft and aircraft parts went to Australia, United States and China.

Table 3: Value of exports - machinery and equipment manufacturing sector

Category	2020 ($bn)	2019 ($bn)	Change (%)
Mechanical machinery	1.7	1.9	-11.1
Optical, medical and measuring equipment	1.5	1.0	52.3
Electrical machinery and equipment	1.0	1.1	-3.6
Aircraft and parts	0.7	0.2	188.9
Vehicles, parts and accessories	0.3	0.3	-7.2
Ships, boats and floating structures	0.1	0.1	-6.5
Railway stock and signalling equipment	0.0	0.0	-13.2
Total	**5.4**	**4.6**	**17.4**

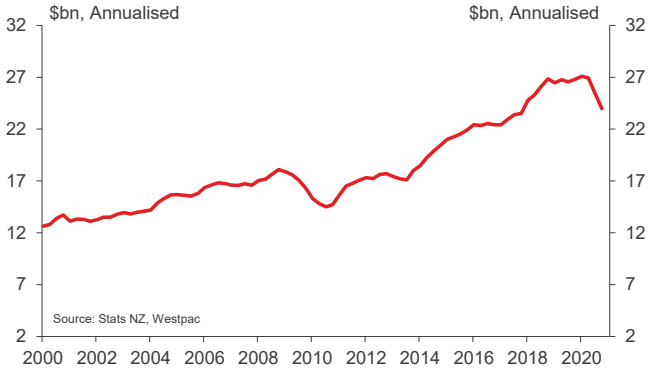
Source: Stats NZ, Westpac

However, not all export categories posted gains in 2020. Indeed, exports of mechanical machinery and equipment fell by about $200m as economic activity in key markets contracted sharply following Covid-19.

Imports.

Machinery and equipment imports into New Zealand are massive, easily dwarfing exports and domestic sales of locally manufactured products. Collectively machinery and equipment is New Zealand's largest import category. Imports were worth about $23bn in 2020, down from $27bn in 2019, with the drop reflecting the impact of Covid-19 on economic activity in key markets and distortions caused to global supply chains.

Figure 4: Machinery and equipment imports



Most of the machinery and equipment imported into New Zealand is distributed by offshore manufacturers that either have a direct presence in New Zealand or have supply agreements in place with local distributors. Many of these manufacturers are multinationals that have a global footprint. They are typically German, US, Chinese, Japanese or South Korean in origin, and compete on their ability to deliver high quality machinery and equipment at a competitive price and a whole of lifetime service offering. Local firms generally do not compete head on with these firms, preferring instead to confine their activities to niche or complementary areas. However, where they do compete, local firms typically look to leverage off their situational expertise and their ability to respond quickly to changing customer requirements.

Table 4: Value of imports - machinery and equipment manufacturing sector

Category	2020 ($bn)	2019 ($bn)	Change (%)
Mechanical machinery	8.2	9.3	-12.1
Vehicles, parts and accessories	6.4	8.6	-4.9
Electrical machinery and equipment	5.3	5.4	-1.6
Optical, medical and measuring equipment	2.0	2.0	0.7
Ships, boats and floating structures	0.6	0.4	59.8
Aircraft and parts	0.5	1.3	-62.8
Railway stock and signalling equipment	0.2	0.1	35.7
Total	**23.2**	**27.1**	**-14.4**

Source: Stats NZ, Westpac

Imports have risen as a share of domestic demand, as local firms have struggled to compete against larger foreign manufacturers.

The second largest import category is transport equipment, which was worth just over $7bn in 2020. Most of this consisted of new and used fully built passenger, public transport, and freight vehicles as well as parts. By contrast, imports of vehicle bodies and chassis, which are more likely to compete with local manufacturers, amounted to a miserly $10m. Meanwhile, imports of trailers and semi-trailers, which compete with local manufacturers at the price conscious end of the market, were worth about $250m.

New Zealand also imports ships, boats, and floating structures worth about $500m a year, as well as aircraft and aircraft parts, which contributed $660m to imports in 2020. Because of the high value nature of these products, import values can vary significantly from year to year.

Imports of electronic and electrical equipment, mostly computers, communication equipment, television receivers, recording and sound equipment, lighting, electric motors, furnaces and generators are substantial, amounting to just over $5.3bn in 2020. That does not include a further $600m worth of imported domestic appliances, mostly dishwashers, freezers, and fridges.

It also doesn't include imports of optical, medical, and measuring equipment worth about $2bn, about half of which relates to medical and surgical equipment. While New Zealand has its own manufacturing capability, the country is still heavily reliant on imports of medical equipment, with approximately 80% of equipment used locally being imported.

Shape of the sector.

Number of firms and employees.

Almost 6,000 firms operate in the machinery and equipment manufacturing sector. About 57% of these firms manufacture mechanical machinery. Transport equipment and electronic and electrical equipment manufacturers make up the remaining 26% and 17%, respectively.

Figure 5: Number of firms by market segment

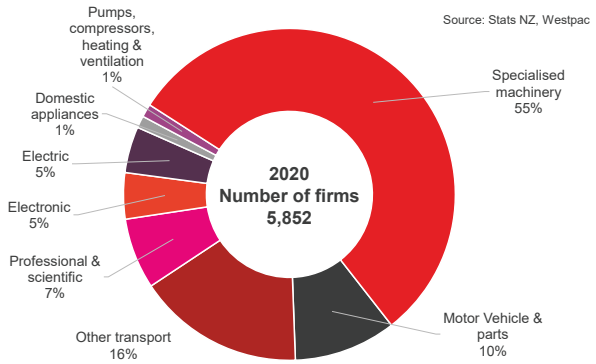
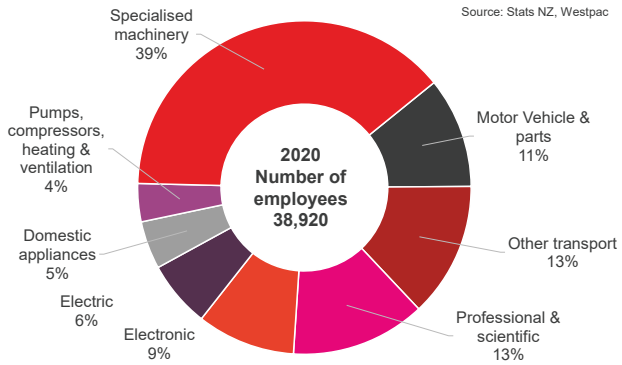


Figure 6: Number of employees by market segment



The machinery and equipment manufacturing sector employs almost 39,000 people, 43% of whom work for machinery equipment manufacturers. Electronic and electrical manufacturers employ a further 24% of people working in the sector, with the remaining 23% involved in the manufacture of transport equipment.

Degree of fragmentation.

The machinery and equipment manufacturing sector is fragmented. Most firms are small operators confined to specific niches. On average they employ just 6 people each, although that can differ depending on the market segment. Firms that manufacture electronic and electrical products, for example, employ about 13 people each, which is more than double the size of those that manufacture transport equipment and mechanical machinery.

For the most part, larger firms do not have dominant market share. However, that again can differ by market segment and product type. For example, the top 4 firms that supply heating, cooling, and ventilation equipment, categorised as electrical equipment, have a collective market share of over 50%. Similarly, New Zealand's largest manufacturer of medical and surgical equipment has a market share of well over 50%.

By contrast, large firms that manufacture agricultural equipment in New Zealand typically have a market share of less than 10%. The same goes for firms that manufacture and repair aircraft in New Zealand.

Most small firms operate within specialist areas and focus on specific niches.

Refer to Appendix C for more detail on the shape and degree of fragmentation within the sector by market segment.

Value chain model.

Machinery and equipment manufacturers are heavily dependent on having access to material inputs at various stages of beneficiation, as well as technical skills that are often in short supply.

Figures 7, 8 and *9* below summarise the cost of inputs and value of outputs produced by machinery and equipment manufacturers by market segment. They are expressed in basic price terms and as such exclude taxes payable, any subsidies received and transportation costs. Values are based on prices for the year ended March 2013, adjusted by the producer price index up to 2019.

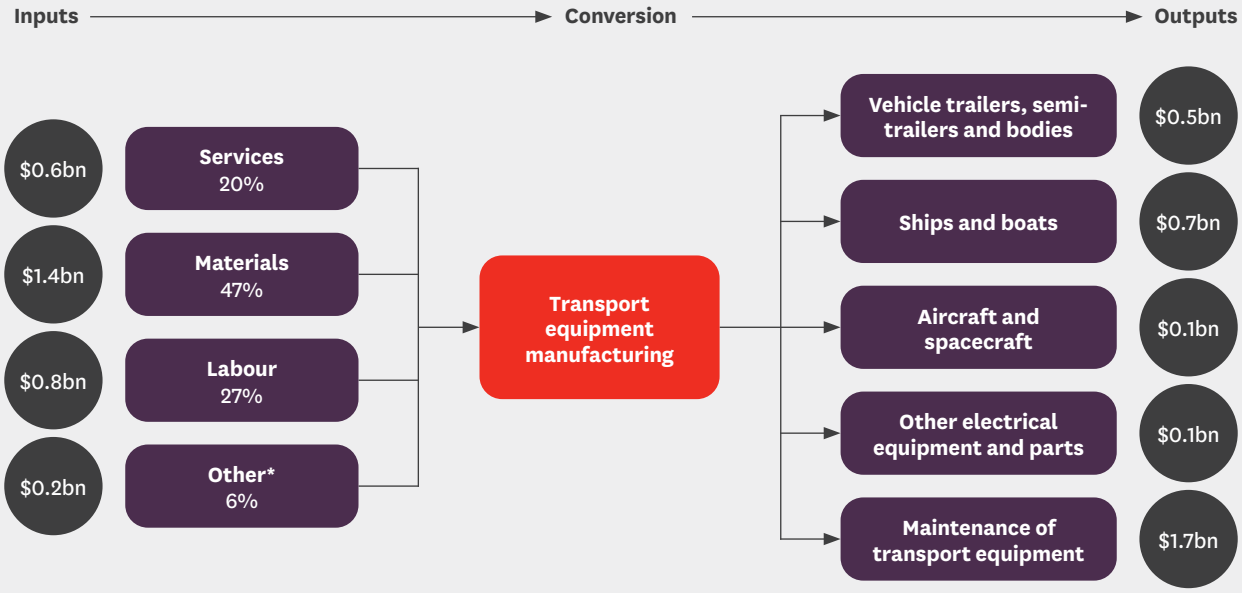
Transport equipment.

Transport equipment manufacturers spend heavily on materials, with the biggest cost items being the $0.8bn spent on engines and just over $0.2bn spent on aircraft. Transport equipment manufacturers also spent about $0.2bn on steel and fabricated metal products and about $0.1bn each on trailers and vehicle bodies as well as electrical equipment.

By contrast, transport equipment manufacturers spent only $0.6bn on services. Most of this is on outsourced maintenance services, which add $0.4bn to costs and services incidental to manufacturing.

Labour costs are, however, significant. That reflects not only the large number of people that work in the sector, but also the high level of technical skills required to operate in many parts of this market segment. Aircraft engineers and technicians, for example, can command high salaries due to the highly technical nature of their work and ongoing skills shortages. Similarly for the manufacture and assembly of truck cabs and trailers, which typically require skilled labour.

Figure 7: Simplified value chain map of the transport equipment manufacturing market segment



* 'Other' refers to the depreciation of fixed assets.

Source: Stats NZ, Westpac

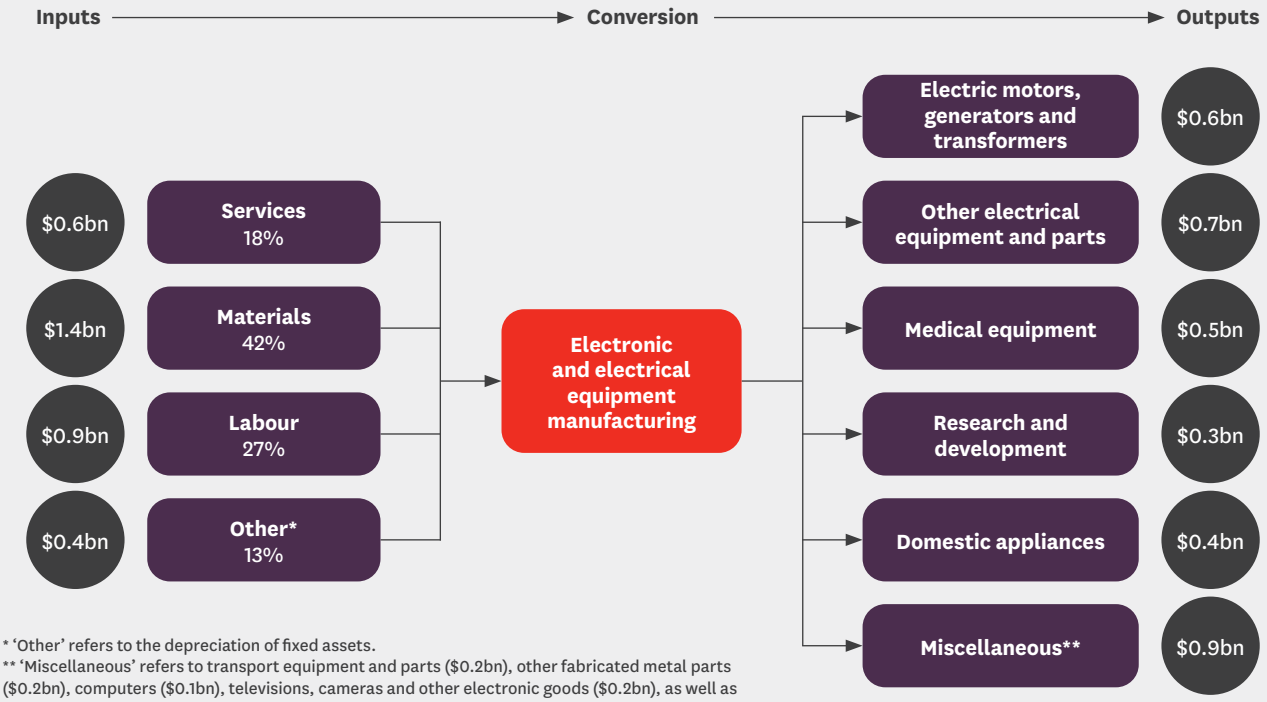
Electronic and electrical equipment.

Electrical and electronic equipment manufacturers in New Zealand spend heavily on materials, with the biggest cost items being the $0.6bn spent on other electrical equipment and primary plastics. Manufacturers also spent about $0.2bn on metal products, a further $0.2bn on electric motors, generators, and transformers, and $0.1bn each on chemicals, semi-manufactured and other plastic products, domestic appliances, televisions, cameras and other electronic goods.

Like their counterparts in the transport equipment manufacturing market segment, firms that manufacture electronic and electrical equipment spend considerably less on services. Firms in this market segment spent just over $0.3bn on advertising and marketing, management consultancy, and commercial property services.

Labour costs though are significant. That reflects the large number of technical workers working for firms that design and manufacture medical and surgical equipment. Because such equipment needs to be manufactured to a high standard and meet strict quality requirements, firms operating in this market segment need skilled staff with operational expertise. That is also true for the relatively large number of people employed by firms that manufacture navigational and other measuring equipment in New Zealand.

Figure 8: Simplified value chain map of the electronic an electrical equipment manufacturing market segment



* 'Other' refers to the depreciation of fixed assets.
** 'Miscellaneous' refers to transport equipment and parts ($0.2bn), other fabricated metal parts ($0.2bn), computers ($0.1bn), televisions, cameras and other electronic goods ($0.2bn), as well as photographic and scientific equipment ($0.2bn).

Source: Stats NZ, Westpac

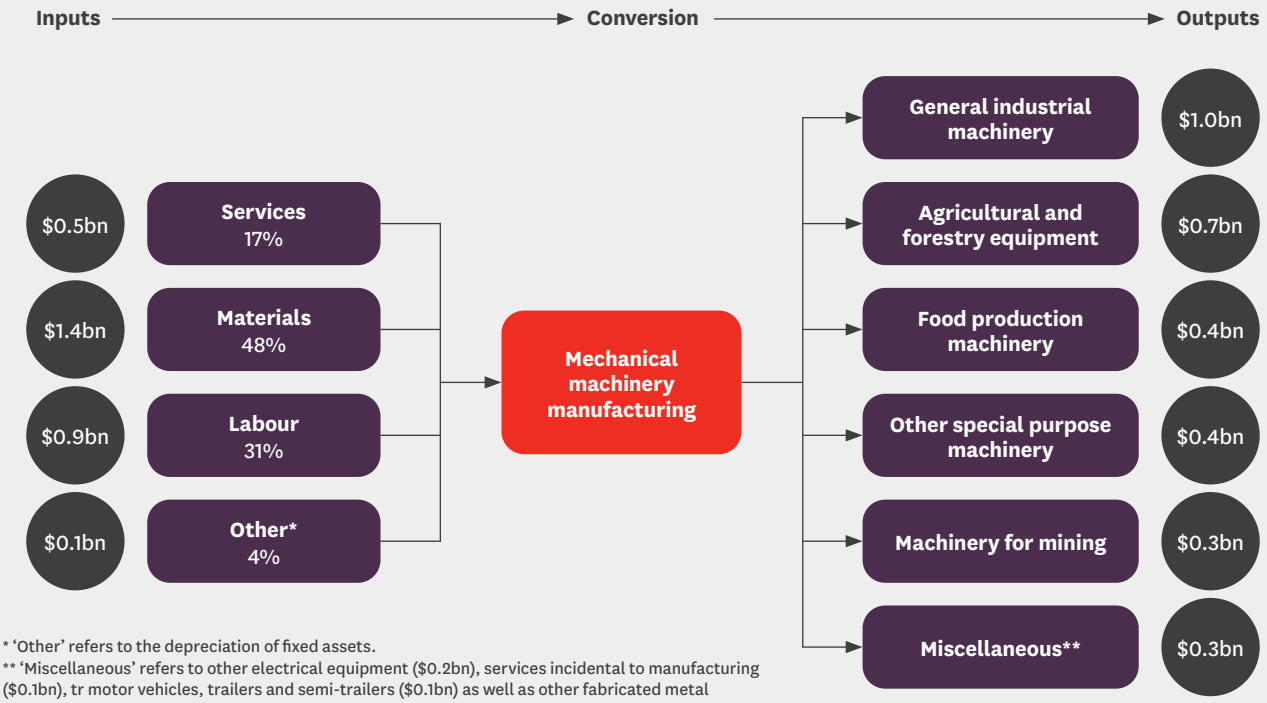
Mechanical machinery.

Mechanical machinery manufacturers spend heavily on materials, with the biggest cost items being the $0.8bn spent on semi- and finished metal products, $0.2bn on general industrial machinery and a further $0.2bn spent on electric motors, generators and transformers. An additional $0.1bn was spent on plastics and plastic packaging.

Like their counterparts in other market segments, firms that manufacture mechanical machinery spend relatively little on services. Firms in this sector spent about $0.1bn each on architectural and engineering services, leased commercial property services, as well as other professional services, such as advertising and marketing and consultancy services.

Labour costs are again a big-ticket item, but this has less to do with technical requirements, although this is still relevant in some sub-market segments, and more to do with the quantum of people employed by firms operating in this sub-market segment. Firms that operate in the mechanical machinery manufacturing market segment collectively employ almost a third of all workers that work in the sector.

Figure 9: Simplified value chain map of the mechanical machinery manufacturing market segment



* 'Other' refers to the depreciation of fixed assets.
** 'Miscellaneous' refers to other electrical equipment ($0.2bn), services incidental to manufacturing ($0.1bn), tr motor vehicles, trailers and semi-trailers ($0.1bn) as well as other fabricated metal products ($0.1bn).

Source: Stats NZ, Westpac

Legislative and regulatory environment.

The degree of regulatory control differs by market segment, with health and safety being the key considerations shaping the design and use of machinery and equipment in different settings. Increasingly, other factors are becoming more prominent with regulations expanding to include environmental impacts covering both product manufacture and use.

All machinery and equipment manufacturers in New Zealand are required to adhere to legislative requirements relevant to the markets that they supply. The Health and Safety at Work Act 2015 (HSWA) is New Zealand's key work health and safety law that supercedes the Machinery Act 1950. Among other things the HSWA requires that firms which design, manufacture, install and inspect plant and equipment ensure that it is fit for purpose and safe to use.

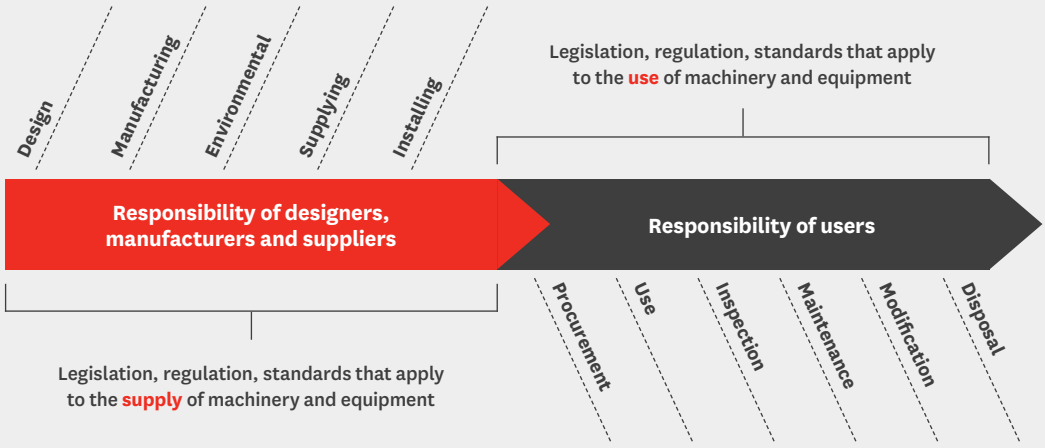
The regulatory framework associated with the Act is made up of a diverse set of standards and/or rules, mostly developed in conjunction with Standards Australia. These standards and rules are generally in line with best international practice and cover design aspects (including performance and safety features), manufacturing processes, mitigation of adverse environmental impacts and quality of materials used. There may also be additional requirements with respect to physical delivery and installation of machinery and equipment. In general, regulatory stringency has increased over time.

Standards and rules also apply to the use of machinery and equipment, especially in commercial or industrial settings. These cover the safety aspects of machinery and equipment use (through factory organisation layouts, relevant training and employment conditions), the management of health risks from hazardous substances emitted by machinery during use, inspection and maintenance protocols, and end of life disposal, with an increasing focus on reengineering, recycling and reuse.

In addition, many machinery and equipment manufacturers (and suppliers) are members of industry associations, which promote their interests through lobbying activities, information sharing, training and/or education. Examples include the Tractor and Machinery Association (TAMA), which has represented New Zealand's tractor and farm-related machinery industry since 1949, and the Medical Technology Association of New Zealand (MTANZ), which is the leading industry body representing medical technology manufacturers, as well as importers/distributors of medical devices in this country. Similarly, NZ Marine promotes the interests of boat builders and provides industry training.

Many of these associations have developed their own codes of conduct for their members. The Climate Control Companies Association of New Zealand, for example, details expectations for member firms that provide heating and ventilation equipment. These requirements are generally based on members acting ethically and responsibly, and ensuring they abide by related laws and regulations.

Figure 10: Legislation and regulation covering the machinery and equipment manufacturing sector



Source: Worksafe New Zealand, Westpac

Transport equipment.

New Zealand boat builders and motor vehicle body manufacturers are subject to relatively moderate levels of regulation. By contrast, firms that manufacture, maintain and/or overhaul aircraft face significantly higher levels of scrutiny.

Firms that manufacture or import transport equipment in New Zealand must ensure that such equipment complies with the transport rules and associated product standards specified by regulating authorities under enabling legislation. For example, firms that produce vehicle bodies and trailer units in New Zealand must comply with rules regulated by the New Zealand Transport Agency (NZTA) under the Land Transport Management Act 1988. Similarly, firms involved in the building of boats are required to comply with maritime rules overseen by Maritime New Zealand under the Maritime Transportation Act 1994. Among others, these rules specify requirements with respect to the design and construction of boats in New Zealand.

It should be noted that most leading boat builders in New Zealand build their boats to independently audited construction and safety standards that are recognised by Maritime New Zealand. Compliance Plate Certification (CPC) provides a guarantee of build quality, certifying that stringent standards have been adhered to in the manufacturing process.

In similar vein, firms that manufacture, repair and overhaul aircraft are required to comply with relevant rules as specified by New Zealand's Civil Aviation Authority, a crown agency, created under the Civil Aviation Act 1990. To be airworthy an aircraft must meet all the requirements specified in Civil aviation rules relating to design, manufacture, maintenance, modification, repair, and safety. This covers the aircraft, components, fuel, and other materials essential to the operation of the aircraft.

Furthermore, firms looking to undertake repair and overhauling work for the Royal New Zealand Air Force must be granted Approved Maintenance Organisation (AMO) status. Similar to CPC for boats, this involves a rigorous audit process.

Standards are important because they help manufacturers deliver products that conform to performance requirements.

Professional and scientific equipment.

Only a small number of firms manufacture photographic, optical, and ophthalmic equipment in New Zealand and those that do are mostly involved in finishing work. Most products, which are imported, are required to meet New Zealand and international standards for ophthalmic and optical instruments as well as spectacle frames and lenses. For example, standard AS/NZS 1067:2003 sunglasses and fashion spectacles, outlines minimum sunglasses and fashion glasses requirements in relation to solar radiation protection.

By contrast, New Zealand does manufacture medical, surgical, and scientific equipment, an area that is heavily regulated. Firms in this market segment, which is dominated by Fisher and Paykel Healthcare, must adhere to regulations enforced by New Zealand's Medicines and Medical Devices Safety Authority (Medsafe) and standards developed, managed, and published by Standards New Zealand. Medsafe is tasked with enforcing the Medicines Act 1981 and the Medicines Regulations 1984. This legislation ensures that suppliers of medical devices and equipment comply with standards relating to the safety, quality, and efficacy in manufacturing.

Products classified as other professional and scientific equipment, which focuses mostly on navigational, control, measuring and metering equipment produced both locally and imported from abroad, are subject to standards that have been published by Standards New Zealand and/or those established internationally. That's certainly true for optical fibre cable and traffic signalling equipment that is manufactured in New Zealand.

Other aspects, however, are more tightly regulated, mainly because of safety considerations. For example, the manufacture of gas meters, which is part of the gas measurement system, are subject to the Gas Act 1002, which regulates the supply and use of gas in New Zealand's gas metering. Higher risk products require that they be tested by accredited laboratories.

The manufacture of equipment is more heavily regulated when the safe use of the product produced is considered.

Electronic and electrical equipment.

Firms that manufacture or supply electronic and electrical or radio equipment in New Zealand are subject to moderate levels of regulation. Most common regulations for electronic and electrical products in New Zealand include the Electricity (Safety) Regulations 2010 that require equipment to adhere to specified safety standards, and the Radio Communications Regulations 2001.

Compliance with regulations means complying with standards that cover product specifications, procedures, and guidelines for manufacturing. Relevant standards might include AS/NZS 200, which specifies the general requirements for electrical equipment, including wiring, lighting, and domestic appliances, and AS/NZS 60950, which specifies the requirements for electronic products such as mobile phones and laptops. Products produced in New Zealand but sold in overseas markets are typically subject to international regulations and standards.

Compliance with regulations and standards for electronic and electrical equipment is largely based on the principle of supplier declarations.

Many electrical products must also comply with minimum energy performance standards (MEPS) that specify the minimum level of energy performance that appliances, lighting and electrical equipment (products) and other electrical equipment, such as electrical motors and generators, must meet or exceed before they can be offered for sale or used for commercial purposes.

Mechanical machinery.

As is the case for other market segments, firms that manufacture mechanical machinery must comply with Australian and New Zealand Standards. That includes AS/NZS 4024, which sets out the standards that ensure that the machinery they manufacture can be used safely.

Regulatory requirements primarily relate to employee safety and mechanical machinery manufacturing standards. Agricultural machinery, for example, must be manufactured to the standards set out by Standards New Zealand and the international standards of export markets.

Imported agricultural machinery must also comply with strict biosecurity laws. The Ministry for Primary Industries (MPI) issues Import Health Standards for items that might bring diseases or pests into New Zealand. Importers must clean machinery both internally and externally, and certain kinds of agricultural equipment must also be sterilised, and heat treated. Cleaning must be performed by an operator that has been approved by the MPI.

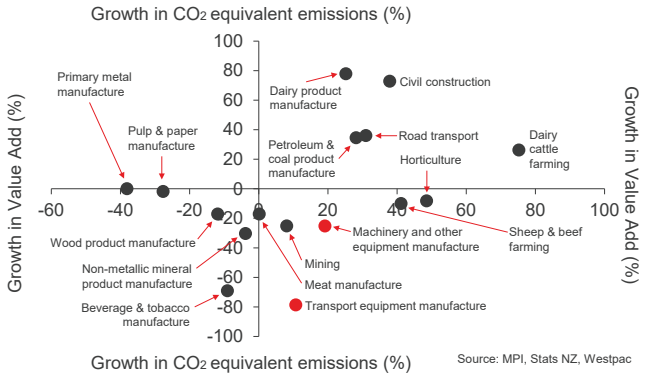
Most New Zealand standards are developed in partnership with Standards Australia.

Climate change.

The machinery and equipment manufacturing sector is a small contributor to overall emissions in New Zealand. However, many products manufactured by this sector are used in heavily emitting downstream activities. Under pressure from regulators and consumers alike, manufacturers are leveraging off new technologies to redesign products so that they have a lower emissions profile.

The machinery and equipment manufacturing sector is a tiny contributor to New Zealand's overall carbon emissions. Sector activity resulted in 58k tonnes of CO_2-equivalent being emitted into the atmosphere in 2018, contributing 0.5% to total emissions produced by New Zealand's manufacturing sector and just 0.1% to all emissions produced in the country. Globally, the machinery and equipment manufacturing sector contributed about 2% to total emissions produced by the global manufacturing sector and about 0.5% to global overall emissions.

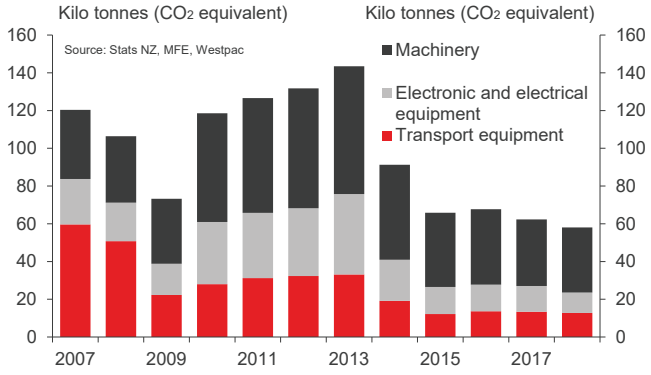
Figure 11: NZ emissions versus value added by selected sector between 2008 and 2018



Emissions produced by New Zealand's machinery and equipment manufacturing sector fell by just over 50% between 2008 and 2018, with most of this decline recorded over the last five years of this timeframe. Moreover, these reductions have been broad based, with the biggest gains being made by manufacturers of electronic and electrical as well as transport equipment. The drop in emissions from the manufacture of electrical goods is likely to reflect the closure of what was New Zealand's largest appliance manufacturing operation in 2014.

The declining and relatively low contribution of the machinery and equipment manufacturing sector to emissions reflects three factors. Firstly, a decline in sector contributions to overall economic activity in New Zealand, which has come despite output gains. Secondly, an increase in the use of renewable electricity. About 60% of this sector's emissions come from electricity use. The share of electricity generated from renewable sources has been trending higher over the past 10 years and currently sits at about 83%, with government looking to raise this to 90% by 2025 and 100% by 2035. Globally, the average is about 28%. Thirdly, the adoption of new emerging technologies, which has helped to reduce the amount of electricity needed to produce a unit of output. New transformative digital technologies are expected to reduce this further over time.

Figure 12: Contributions to CO_2 emissions by market segment



That said, firms operating in the machinery and equipment manufacturing sector are coming under increasing pressure to decarbonise the products they produce, many of which are used in heavily emitting industries. Indeed, growing public sentiment in favour of mitigating the effects of global warming and the growing acceptance of circular economy principles is already pushing machinery and equipment manufacturers onto a more sustainable pathway. That's being backed up by increasingly stringent environmental regulations and further enabled by the emergence of new, economically viable digital technologies that allow manufacturers to redesign their products. While already in train overseas, these trends are starting to emerge in New Zealand.

Manufacturers globally are responding to these pressures by transforming their business models, changing their work organisation methods and realigning their supply chains. However, some have it easier than others. Indeed, moving to a more sustainable pathway is likely to be especially challenging for firms that manufacture agricultural, construction, mining, and transport equipment, which tend to be quite traditional, and often dependent on fossil fuels. That's as true in New Zealand as it is in the rest of the world.

Summary of competitive forces.

Competitive forces in the machinery and equipment sector are finely balanced. Between weakening buyer power and strengthening supply power, rivalry among existing firms is on the rise. But competition is localised with medium to high barriers to entry helping to discourage potential entrants.

Firms operating in the machinery and equipment sector face a complex balancing act. On the one hand they are seeing increased demand for their products as competitive pressures in downstream consuming industries, underpinned by stronger activity levels, begin to pick up, while on the other they find themselves competing hard for skills, raw materials and new digital technologies to deliver product to market.

At the same time, there seems to be two largely separate machinery and equipment sectors operating in New Zealand, although there is some cross-over between them. The first consists of a relatively small number of large international firms that import and distribute machinery and equipment into New Zealand. The second consists of many small firms that operate in the same market segment as these large behemoths, but mostly within specific niches. Competition between these two groups is limited but this differs by market segment and product type. An industry source involved in manufacturing electrical components, for example, indicated that they face stiff competition from imported products. Similarly, another industry source that manufactures cultivation equipment used in the agricultural sector highlighted the level of competition posed by cheap imports, particularly from China.

Domestic competition can be intense, especially during an economic downturn, although success in export markets is often a source of much needed relief for many. For the most part, exports focus on niche markets, with products heavily customised and tailored to customer requirements. Again, there are exceptions, notably with respect to medical and surgical equipment exports.

Barriers to entry are medium to high. For some market segments the high capital costs of setting up a manufacturing concern can be a significant hurdle to entry. For others, the focus is less on upfront capital costs, but rather on the intensity of competition that already exists. For some, the fragmented nature of the sector and relatively high costs of switching from one supplier to another may well discourage entry.

Most local firms operating in the machinery and equipment manufacturing sector compete on the quality and reliability of the products they manufacture, the innovation and creativity in their design, and the proven excellence of their service offering. They compete less on price, and more on delivering the required quantity of product within agreed timeframes and standards. Most local firms operating in this space are not large enough or have the scope or scale to mass produce over a fixed cost.

Often the key differentiator is technical skills capability, which are typically in short supply across the sector. This shortcoming constrains growth potential and as such is likely to be a contributor to the level of fragmentation seen in the sector.

To keep their noses in front, many firms invest in research and development activity. Sometimes this involves offshore investment, with the sector notable for being the only one within manufacturing that has a net outward investor profile. Motivations differ, but one key reason to invest offshore is to access new technologies.

Technology is key to the sector, but operators in New Zealand are generally laggards when compared to best practice around the world. However, that's not completely true. In some specific niches New Zealand firms are on par or even ahead. Examples include dairy milking systems in the agricultural equipment manufacturing market segment. An industry source that manufactures transport equipment indicated that their use of mobile technologies in the production process would put them ahead of many offshore firms.

The emergence of new digital technologies is set to fundamentally change the nature of competition in the manufacturing and equipment sector. Indeed, changes are already underway with customers increasingly looking for machinery and equipment that not only helps them remain competitive, but also addresses growing concerns from their own customers about the environmental and social impacts of their operations. That means machinery and equipment that not only embodies the latest advances in digital technology but can be easily integrated into fully automated value chains, allowing for end-to-end monitoring, and tracking of work in progress. It also means that machinery and equipment will have to align to circular economy principles.

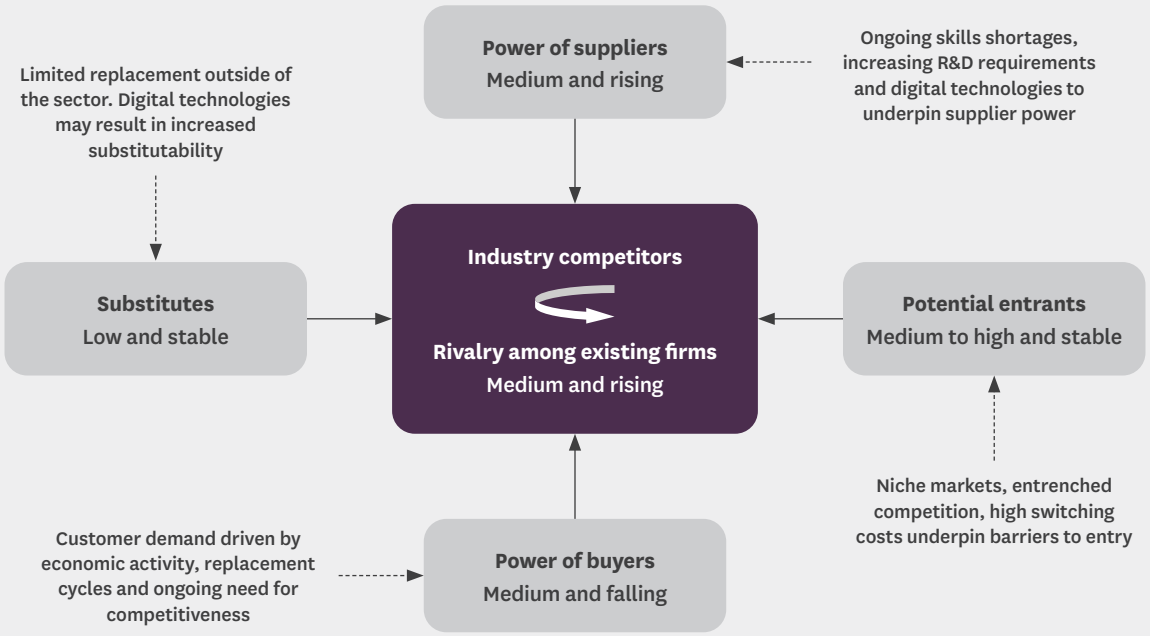
Machinery and equipment manufacturers will have to meet this challenge head on, or risk being left behind. For many smaller firms with limited resources, that is likely to be a bridge too far. Some of these firms will be able to make a go of it outside of the digital world and continue to manufacture highly customised products, much the same as they always have done. However, that can only last for a time, and as the benefits of digitisation become increasingly apparent

to their customers, competitive pressures will force these operators to either close shop or become targets for mergers and acquisition activity. If that happens, the number of firms operating in this sector will fall, but those that remain will be larger than those today.

Figure 13 below summarises the magnitude of the competitive forces shaping the machinery and equipment sector in New Zealand and provides a high-level assessment of where they are headed in the future. Specifically, it assesses where a competitive force currently has a "high", "medium" or "low" impact on firms in the sector and whether this impact will be "rising", "stable" or "falling" in the future.

The figure uses a framework developed by Professor Michael E Porter from Harvard Business School. It includes three forces that relate to "horizontal" competition: the threat of substitutes, which in this case refers to primarily replacement products outside of the machinery and equipment sector; the level of rivalry between firms; and the threat posed by new entrants particularly in the computer system design market segment sector. It also includes two other forces that relate to "vertical" competition: namely the relative negotiating position of those that supply inputs, principally skilled labour, raw material inputs and new digital technologies; as well as the bargaining power of downstream consuming industries as well as individual households.

Figure 13: Porter's 5-forces model for the machinery and equipment sector



Source: Westpac

Demand drivers.

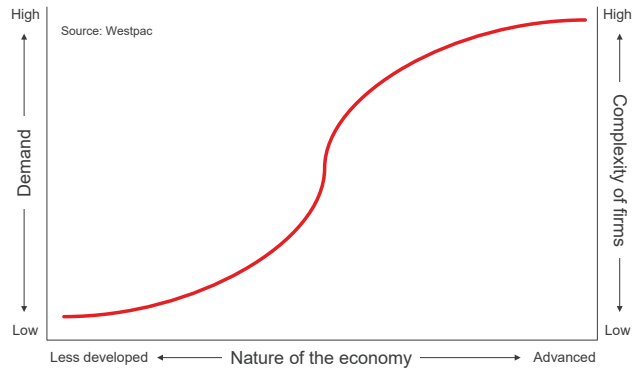
Demand for machinery and equipment is driven by the need to be competitive in an operating environment where social and environmental pressures are increasing. The impact of these factors, however, has been distorted by Covid-19, with demand for most, but not all categories of machinery and equipment now seeing a post lockdown recovery. This in turn is weakening the power of buyers and strengthening the hand of industry participants.

Structural drivers of demand.

Economic structure.

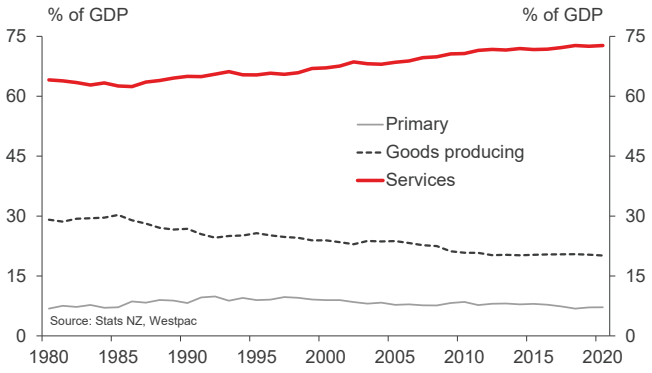
Demand for machinery and equipment reflects the sophistication of the economy, the contributions that individual sectors make to the economy, as well as the scope and breadth of activities undertaken by firms that operate within those sectors.

Figure 14: Macro-drivers of demand



Simply put, firms and households in advanced first world countries like New Zealand spend more on machinery and equipment than those in less developed countries. Not only that, they tend to spend more on machinery and equipment that embodies the latest technology.

Figure 15: Sectoral contributions to economic activity in New Zealand

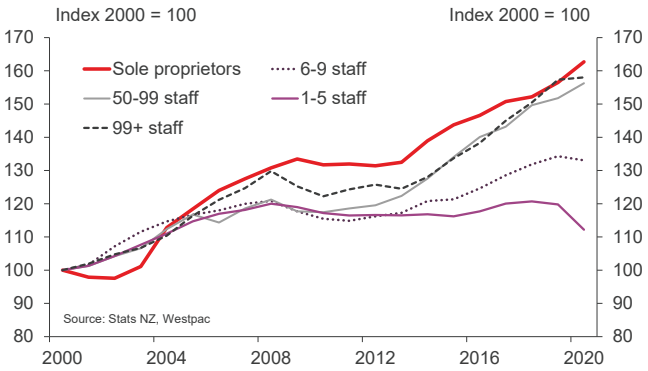


Sectoral contributions to overall economic activity are also a key factor that shapes demand for different types of machinery and equipment. Although some overlap exists, firms in goods producing or downstream manufacturing industries typically require different machinery and equipment than their counterparts in the agricultural, construction, transportation, and services sectors.

As these contributions to economic activity change over time, so too does the composition of demand for machinery and equipment. In simple terms, that means that demand for some types of machinery will tend to grow faster than others.

Demand for machinery and equipment is also influenced by how many firms are operating in various sectors of the economy, how concentrated they are, their inherent complexity, and how they utilise the factors of production. For example, large firms that operate across many areas in the construction sector are multidisciplinary and require access to a broad range of different types of machinery. By contrast, smaller construction firms that operate as sub-contractors tend to specialise in specific areas, so the scope and scale of machinery and equipment needed is a lot narrower.

Figure 16: Growth in firms by selected employee band



The rising contribution of the services sector suggests that demand for electrical, electronic, and specialised equipment should be growing faster than heavy machinery.

Population and household growth.

Population and household growth affect demand for many types of machinery and equipment. For example, a growing population typically has a direct impact on demand for domestic appliances and electronic goods used in the home.

Impacts on demand can also be indirect. For example, a growing population is typically associated with an increase in residential building activity, which in turn drives demand for earthmoving machinery, access equipment, and machine tools. Along the same lines, a growing number of households effectively increases the freight task, which in turn drives more demand for transport equipment, such as truck trailers.

Regulations.

As mentioned earlier, the HSWA requires that firms that design, manufacture and use machinery and equipment must ensure that all practicable steps are taken to ensure that it can be operated safely, at minimal risk of injury or harm. This in turn drives demand for new machinery, with enhanced safety features.

In similar vein, Australian and New Zealand standards help inform procurement decisions that are made by purchasing firms. One industry source that manufactures componentry for electricity distribution indicated that the products they supply must be approved by large distributors before they can be used on the network.

In some cases, regulation can be a more specific driver of demand for machinery and equipment. For example, demand for ship building, or more accurately ship repairs/upgrades, is partly driven by regulations that require ships to be inspected either once or twice every 5 years, with the frequency being determined by the type of ship involved. Similarly, new medical technologies are subject to regulatory scrutiny through clinical trials.

Compliance with increasingly stringent regulations and tighter standards supports demand for new machinery and equipment. However, that often can come at an additional cost to purchasers, especially if such equipment needs to have embodied new technologies for it to comply.

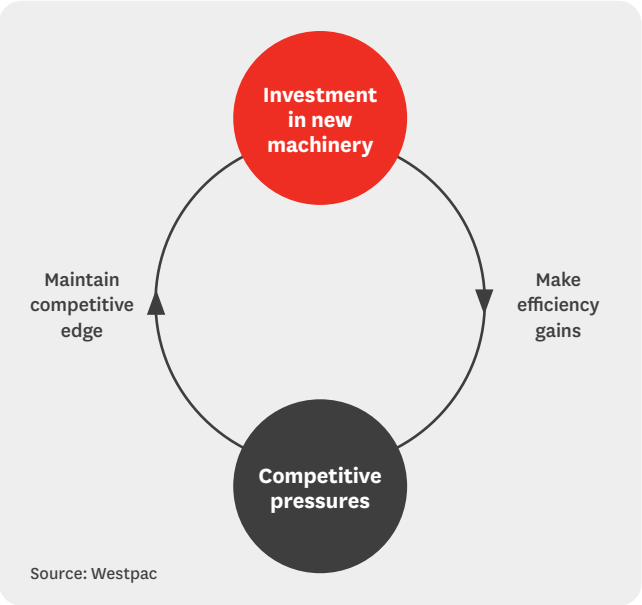
Increasingly stringent regulations and tighter standards support demand for equipment.

Competitiveness.

Downstream firms invest in new machinery and equipment to improve their competitiveness. If they do not, they risk being left behind by more productive peers. With other firms responding in kind, this sets in motion a “race to the top” and an ever-quickening investment cycle.

Investment in new machinery and equipment can deliver several competitive advantages. Firstly, firms that invest in new machinery and equipment are often able to improve operational efficiencies. New machinery and equipment is not only subject to less wear and tear, it typically comes with new additional functionality, often underpinned by the latest advances in digital technology, which in turn generates better safety outcomes, reduced downtimes, greater throughput, lower input costs and better quality outputs.

Figure 17: Impact of the investment cycle on competitiveness



Source: Westpac

Table 5: Benefits of new machinery and equipment

Performance benefits	Growth benefits
Operational efficiencies	Organisation capacity
Product and service quality improvements	New products and services
Increased safety and security	Flexibility to changing business needs
Reduced environmental impacts	Customer satisfaction

Source: Westpac

Secondly, firms that introduce new machinery and equipment are typically more agile and responsive to changes in their operating environment. For example, the latest generation of 3D printers are enabling firms to produce large volumes of a single product, each one of which is customised to a customer's specific requirements.

Similarly, advances in battery technology have been a key factor driving the shift away from fossil fuel into electrically powered vehicles, generating new opportunities for transport equipment manufacturers globally.

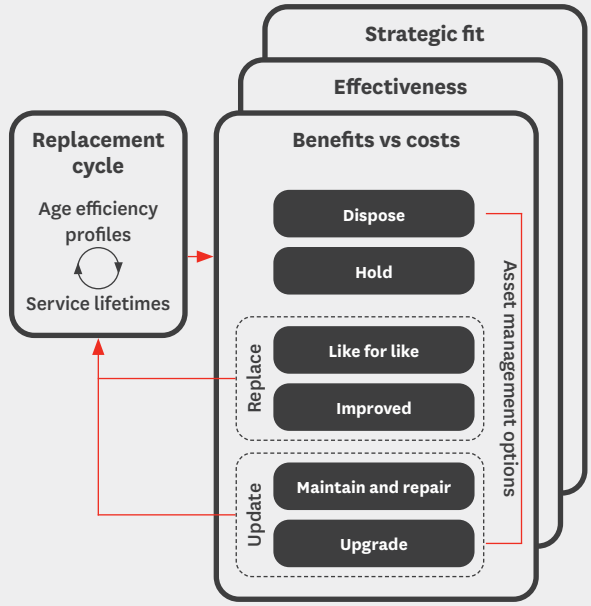
In addition, machinery and equipment that incorporates new digital technology, such as sensors, robotic automation, and the Internet of Things (IoT), make it much easier for downstream firms to respond to the demands of their customers, who increasingly want to know more about the products they consume. Notable examples include food manufacturers, who have invested in equipment that allows their customer to track food from "farm to fork".

New machinery and equipment is a necessary but not sufficient condition for competitiveness.

Asset management and micro-decision-making factors.

Ultimately demand for machinery and equipment reflects the asset management decisions taken by individual firms. In this regard, asset management refers to the process of replacing, operating, maintaining, upgrading, and disposing of machinery and equipment in the most cost-effective and timely manner.

Figure 18: Asset management decision making framework



Source: Westpac

Asset management decisions reflect the service lifetimes and age efficiency profiles of machinery and equipment, which measure actual and expected operational efficiency levels over time. As a rule, the age efficiency of machinery and equipment typically declines over time because of normal wear and tear, often accelerating during times of stronger economic activity when use increases. That's particularly true for heavy machinery used in construction and mining activity.

Demand is driven by the need to eliminate wear and tear as well as comply with health and safety requirements.

At an individual asset level, decisions on whether to replace (and thus purchase new) machinery and equipment as opposed to disposing, holding, upgrading, repairing or maintaining it, are largely based on the relative benefits and costs (or economic efficiency) of each of these competing options, the extent to which its ongoing use aligns with organisational strategy (referred to as strategic fit), and how effectively it is able to contribute to broader outcomes, such as traceability along the value chain, environmental sustainability and social equality.

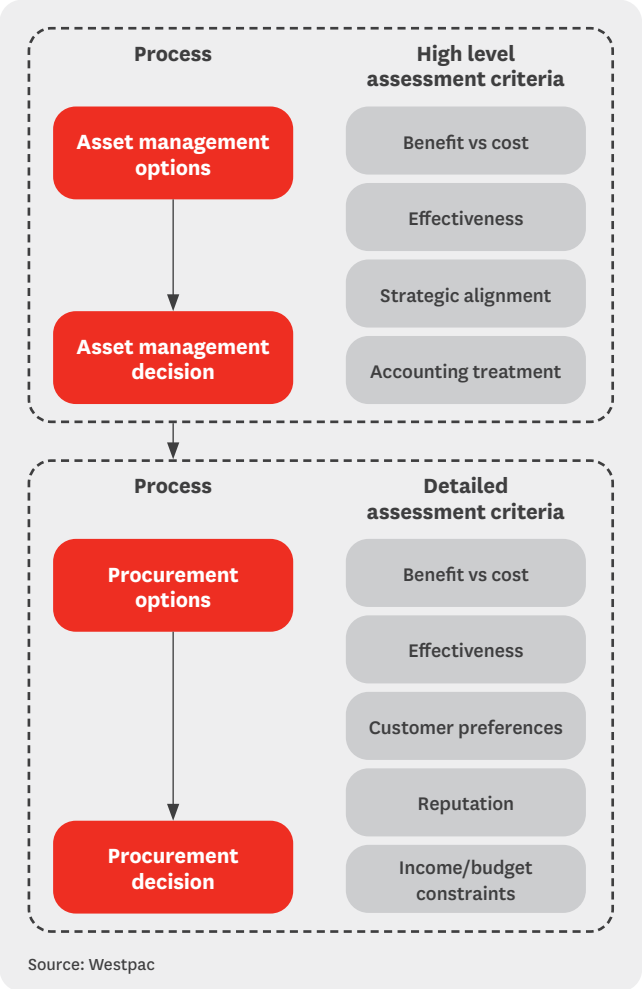
It should also be noted that replacing machinery and equipment is not the only source of demand for the machinery and equipment manufacturing sector. Indeed, upgrades (including overhauls), repairs and maintenance of existing machinery and equipment are key activities undertaken by ship and boat builders as well as aircraft manufacturers in New Zealand. While most of this work focuses on extending service lifetimes, they can also lead to operating efficiency gains. An industry source in the ship building industry, for example, suggested fishing boat owners often look to redesign deck layouts when upgrading their boats.

Once a course of action has been decided upon, the next step is to procure, with decisions by consuming firms being driven by a more detailed assessment of relative costs and benefits of procurement options as well as the effectiveness criteria referred to above. That at least is the theory. In practice customer preferences, often shaped by past experiences and heavily influenced by reputation, play a key role in procurement choices. These criteria apply to downstream firms and households/individuals alike.

Another important decision-making factor when procuring is income/budgetary constraints. That's true for downstream consuming industries as well as final consumers. Firms that are struggling, especially during an economic downturn, are more likely to defer purchases of machinery and equipment and opt instead for less costly maintenance and repairs. Indeed, some will refrain from making any investment at all. Similarly, households with lower discretionary income are much more likely to defer expenditure on electronic and electrical equipment as well as costly services that might use

highly specialised equipment, when the economy is slowing, and job security is under threat.

Figure 19: Procurement decision making framework



Source: Westpac

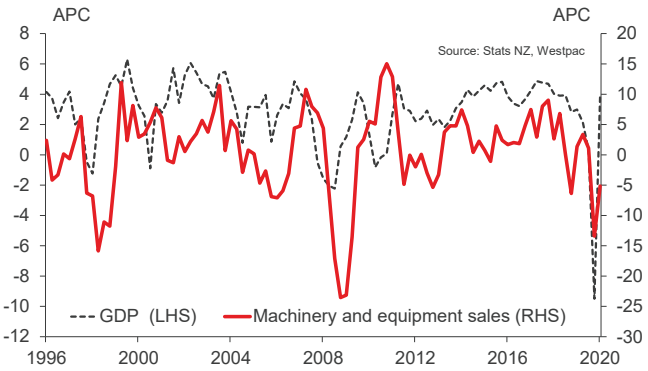
Changes in income can trigger much larger changes in investment in machinery and equipment.

Cyclical factors of demand.

Economic activity.

Demand for machinery and equipment shows a positive correlation to economic activity, although the cycle tends to reflect more exaggerated peaks and troughs over time. To a large extent this reflects the diverse nature of machinery and equipment, its performance attributes, and the myriad of ways that it can be applied across both the productive as well as non-measured sectors of the economy, including households. It also reflects the level and direction of activity in these sectors as well as their propensity to invest in new machinery and equipment.

Figure 20: Economic activity vs machinery and equipment sales

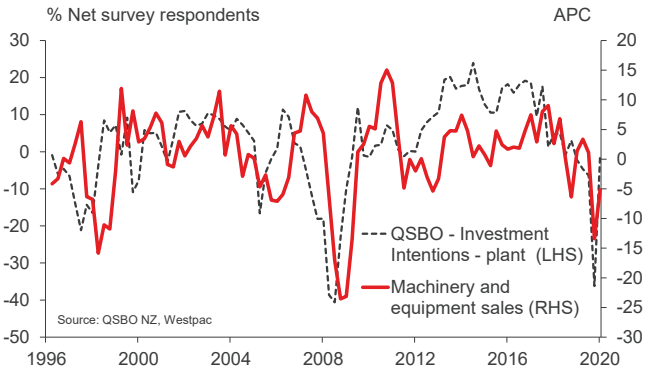


The machinery and equipment sector reflects a high degree of cyclicality, with the recent slowdown compounded by additional headwinds.

Activity along the value chain.

Demand for machinery and equipment partly reflects changes in activity in consuming sectors at each point in the value chain. That refers to the vertical chain of activities that use machinery and equipment as well as the final point of consumption.

Figure 21: Intentions vs actual purchases of machinery and equipment



All things being equal, the more activity there is in an industry the higher the income it generates, the greater the likelihood that firms in that industry will look to invest in machinery and equipment (subject to the micro- factors referred to above which drive asset management and procurement decisions). That is especially so if there is an expectation of more activity to come. For example, the spread of Covid-19 and a resultant increase in hospitalisations has led to a sharp increase in global demand for respiratory and associated equipment. In a similar vein, accelerating demand for newly developed vaccines to fight the spread of the virus has resulted in

a ramp up in manufacturing and distribution capacity to meet anticipated demand for new medical equipment, including syringes.

Competitive dynamics in downstream industries underpins demand for machinery and equipment that delivers cost advantages.

Similarly, demand for building products, like heating, ventilation, and air conditioning units as well as for lighting equipment increases when construction activity or the intention to build increases. That said, non-residential activity tends to have a stronger influence on total demand for lighting equipment than residential building activity, mainly because of the highly specialised and advanced nature of lighting products which are more suited to commercial applications.

The same is true for conditions in the agricultural sector, which drives demand for agricultural equipment used for tasks such as soil preparation and crop harvesting. Similarly demand for dairy in key export markets is a big factor that is helping to drive demand for on-farm milking equipment.

Demand for transport equipment is somewhat different and in general is more closely correlated to overall levels of economic activity rather than a specific sector. However, there are two exceptions. Demand for commercial aircraft and the associated need for maintenance and repairs is more closely linked to tourism than other sectors. Meanwhile, the publicly funded part of the transport sector is not very responsive to the economic cycle.

Demand for machine tools is driven by transport equipment and industrial machinery manufacturers.

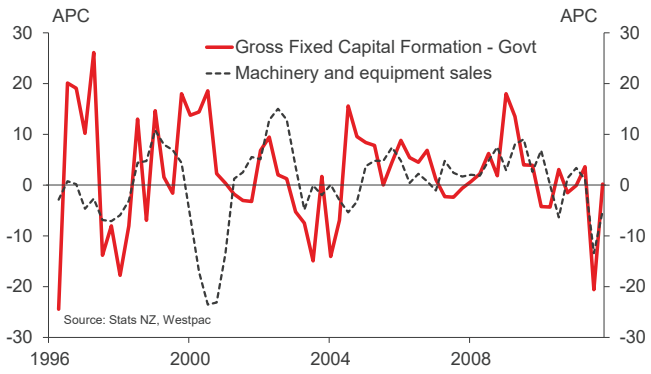
Seasonality.

In some cases, demand from downstream industry can be highly seasonal. For example, the repair season for ships typically runs from September until July in the following year when the commercial fishing season comes to an end. Similarly, demand for specialised horse floats tends to rise during the eventing season, which runs from August until March.

Government spending.

Demand for some types of equipment is more closely linked to spending by government than private sector activity. For example, spending on medical, surgical, and scientific equipment is largely driven by how much government spends on healthcare, hospitals, and medical practitioners. Around 85% of New Zealand's healthcare is government-funded and delivered through a network of District Health Boards (DHBs), which have discretion on procuring medical devices (although shared procurement is encouraged). Healthcare providers require laboratory equipment, testing equipment, as well as medical and surgical equipment like syringes, scalpels, and stethoscopes.

Figure 22: Government capital expenditure vs actual purchase of machinery and equipment



Civil construction activity, most of which is publicly funded in New Zealand, drives demand for heavy earthmoving machinery and lifting and access equipment from contracting firms that undertake this work. At a detailed level, demand for such equipment largely reflects the nature of the works being undertaken and the inherent performance of characteristics of the equipment at hand.

Similarly, an increase in military spending from the public purse supports for demand for machinery and equipment, although all major ticket items such as ships, aircraft and sophisticated weapon systems are manufactured abroad and imported. That said, the resulting increase in capital stock does create opportunities for maintenance, repair and overhauling work, which is also undertaken by firms in the sector.

Government spending has mostly an indirect impact on demand for machinery and equipment.

Disruptions.

Shocks or disruptive events can significantly affect demand for machinery and equipment. For example, the rebuilding of Christchurch following the 2011 Canterbury earthquake prompted increased investment in construction equipment in the years that followed.

More recently though it has been Covid-19 that has loomed large. Indeed, as efforts to fight the virus plunged the economy into recession in mid-2020, many of the sector's customers were forced to pull back on their investment in machinery and equipment. Demand for mechanical machinery, machine tools, vehicle bodies, truck chassis, general use trailers and more specialised horse floats, all plummeted as a result. The same was true for new production boats used for recreational purposes.

There were, of course, exceptions. For example, demand for medical and surgical equipment, used in the fight against the virus accelerated, boosting the fortunes of the handful of firms that manufacture those products. Similarly, demand for some types of electrical and electronic equipment, such as televisions and computers, increased sharply as people were forced to stay at home.

Since then the economy has largely recovered. Some businesses have flourished, and this has been evidenced by a sharp pickup in demand for most types of machinery and equipment. In some cases, spending has surged, reflecting pent up demand from earlier lockdowns. Indeed, several industry sources involved in the manufacture of truck trailers, general trailers and boat building all reported an initial surge in demand when New Zealand moved out of lockdown, with demand remaining at elevated levels since. With the construction industry a key driver of New Zealand's Covid-19 recovery, demand for imported earthmoving equipment and machine tools has picked up strongly.

Table 6: Demand outlook for machinery and equipment

Market segment	Short term outlook	Medium term outlook	Comment
Transport equipment			
Motor vehicle and motor vehicle parts	Slightly negative	Slightly positive	Demand following post lockdown pickup to moderate but is expected to improve thereafter as Covid-19 becomes more manageable, the normal economic cycle returns, and international tourism begins to recover.
Other transport equipment			
Electronic and electrical equipment			
Professional and scientific	Slightly positive	Slightly negative	Demand for medical and surgical equipment required to deal with Covid-19 to weaken over time as the virus becomes more manageable. Demand for optical equipment is likely to normalise as labour market and household finances stabilise.
Electronic	Positive	Slightly negative	Demand for computer and communication equipment reflects the ongoing need for greater connectively, but should weaken once purchases have been made, the normal economic cycle resumes, and need for social distancing recedes.
Electric	Positive	Slightly positive	Demand to reflect a return to a more normal economic cycle and should continue to be supported by ongoing strength in residential and non-residential building activity.
Domestic appliances	Positive	Slightly negative	With offshore travel restricted, consumers will continue to divert spending towards whiteware and small domestic appliances but are likely to switch out again when these restrictions fall away.
Machinery			
Pump, compressor, heating and ventilation	Positive	Positive	Demand to reflect a return to a more normal economic cycle and should be supported by ongoing strength in residential and non-residential building activity.
Specialised (industry specific)	Slightly positive	Positive	Demand driven by a more positive outlook for global growth, a return to a more normal economic cycle domestically, and ongoing strength in residential and non-residential building activity.

Source: Westpac

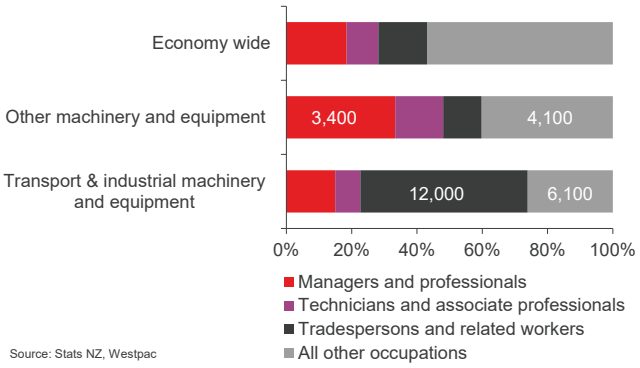
Supply drivers.

Suppliers of factor inputs, such as labour, raw materials, and technology used in the manufacture of machinery and equipment are benefitting from a pickup in downstream demand in many market segments. Although the adoption of circular economy principles poses a threat to some, especially those that supply raw materials, supplier power is on the rise.

Access to skilled labour.

The supply of machinery and equipment depends on having the required quantity and quality of human capital. However, that varies, with the transport equipment and mechanical machinery market segment relying far more on tradespeople, including apprentices, than other market segments. By contrast, firms that supply other machinery and equipment, including specialised industry, electronic and electrical as well as professional and scientific equipment, place far more emphasis on management and professional skills, the key difference being that much of this equipment is imported into this country for distribution.

Figure 23: Composition of employment in machinery and equipment sector

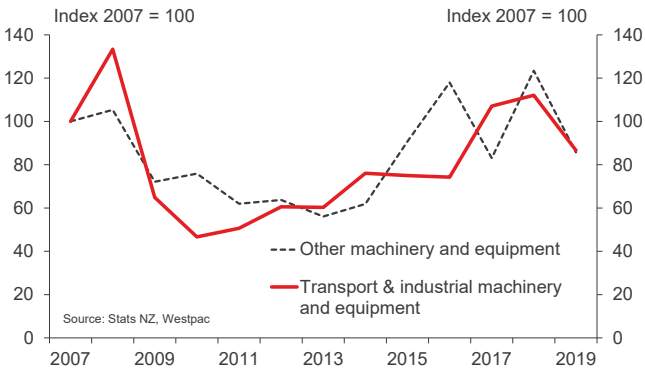


For the most part the composition of employment has remained relatively stable over time, despite a slight pickup recently in the technical skills required by firms that manufacture transport equipment and mechanical machinery.

Many firms in the sector struggle to fill vacancies. According to Stats NZ, just on 70% of transport equipment and mechanical machinery firms sector reported having moderate to severe difficulties in filling job vacancies during 2019, compared to just 10% of firms supplying other machinery and equipment, and 30% for all manufacturing firms. Indeed, an industry source that manufactures boats suggested that difficulties in securing specialised tradespeople had worsened recently with efforts to curb the spread of Covid-19 drastically reducing the number of skilled people entering New Zealand.

In part, these difficulties reflect New Zealand's labour pool, which is shallow and generalist in nature, and as such a barrier to expansion for many firms. This in turn has reinforced the level of fragmentation in the sector.

Figure 24: Proportion of firms facing moderate and severe difficulties filling vacancies



Difficulties in filling vacancies is only likely to get harder over time given the growing digitalisation of workplaces and an increased need for digital skills to maintain competitiveness. Finding these skills will also be difficult given the level of competition coming from other sectors of the economy.

As it becomes more difficult for these firms to fill these vacancies, many firms in the sector will be forced to pay higher wages, which in turn will push up costs of production. That can be significant. Indeed, an industry source involved in ship repairs suggest that wages make up as much as 70% of total production costs. Another industry source that manufactures electrical components indicated that the raising of the minimum wage is also becoming a big issue within their market segment.

It is becoming more difficult for firms in the sector to fill vacancies and that is pushing up wage costs.

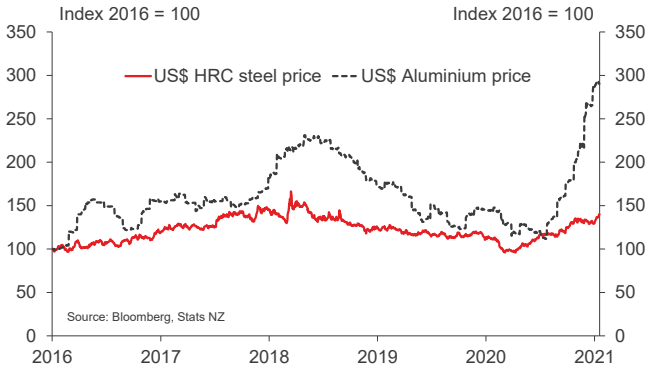
Access to materials.

Having access to the right quantity and quality of raw material inputs at the right time is critical for manufacturers of new machinery and equipment and a key focus of their

supply chain management efforts. To a large extent, that is because raw materials form a big component of production costs, accounting anywhere between 40% to 70% of unit costs of production depending on the type of machinery and equipment being manufactured. Many of these raw material inputs are globally traded commodities, so global commodity price movements are important, as are the vagaries of the exchange rate. Price rises seen recently, mostly due to improved global demand, are likely to have added to these costs.

The main raw material inputs used by manufacturers differ depending on the type of machinery and equipment being produced, but most would use a combination of ferrous metals, like steel and stainless steel, non-ferrous metals like aluminium, brass, titanium and copper, as well as fibreglass, basic and engineered plastics, and even wood. Whiteware, for example, is predominantly made of steel, constituting up to 90% for clothes driers and stoves/ovens, and about 60% in the case of dishwashers. Steel is also used extensively in repairs/upgrades to aircraft, rail stock, other transport equipment, and agricultural equipment, while aluminium, fibreglass and plastics are commonly used in boat building.

Figure 25: Indexed US$ prices for HRC steel and aluminium



Most machinery and equipment manufacturers can usually source the raw materials they need, although this differs by market segment. A major ship repairer indicated that they import steel in bulk at a cost lower than what they get from the local supplier in New Zealand, and they have yet to experience major issues in securing supplies. By contrast, an industry source in the boat building industry indicated that imports of aluminium from Europe, South Africa and China were severely affected by disruptions to global supply chains caused by Covid-19. Compounded by limited inventory levels, many boat builders were forced to seek other suppliers at a higher cost. A similar situation was faced by a major supplier of electrical components.

Manufacturers need a competitive and secure supply of raw materials.

However, there are times when accessing raw materials can be problematic, especially when global demand is strong. In such cases, offshore suppliers may opt to focus on the needs of large more profitable customers in bigger markets. For example, an industry source in the transport equipment market segment indicated that they had experienced difficulties gaining access to some vehicle parts because they had been diverted to vehicle manufacturing operations in other countries.

The same applies for domestically sourced raw materials. Indeed, there have been examples in the past where some industry operators have been forced to import cheaper substandard metal product in order to meet local demand for machinery and equipment from downstream industry, because domestic product has not been available.

The strong rebound in Chinese economic activity post the initial impact of Covid-19 has helped to reduce disruptions to raw material supply.

Access to productive capacity.

For some market segments, the lack of suitable facilities is a major constraint to growth. Nowhere has this been more evident than in New Zealand's ship building industry, with several local shipyards being forced to close as competition from international shipyards intensified. Indeed, an industry source suggested that a lack of dry dock facilities has made it much more difficult to service clients within acceptable timeframes.

At an operational level, the ability of manufacturers to supply machinery and equipment is directly related to how they have organised their workflows and laid out their factories. Given the scope of activities undertaken by the sector, these differ markedly depending on the type of machinery and equipment being manufactured. For example, our largest medical and surgical equipment manufacturer runs long production lines involving many sequential processes. For the most part they are volume producers. Truck trailer manufacturers also run assembly lines, but these tend to be smaller, incorporate a limited number of sequential processes, with fewer volumes being produced. By contrast, boat builders, ship repairers and firms involved in maintaining, repairing, or overhauling of aircraft operate on an individual job basis, where a small number of jobs are progressed in parallel.

Circular economy.

The global shift towards the circular economy is gaining momentum, with machinery and equipment manufacturers increasingly focusing their efforts on ensuring their products can be recovered, reused, and ultimately recycled at the end of their useful life. The emphasis is on eliminating waste and pollution while regenerating the natural environment.

New Zealand's machinery and equipment manufacturers are just starting to make moves in this direction. Most still cling to linear supply chains that start off with product design, then the sourcing of raw materials, followed in sequential order by manufacturing, transportation, marketing and sales, product use and disposal at end-of-life.

Most recycling in the machinery and manufacturing sector relates to waste materials generated during the production process.

That said, there are some firms in New Zealand that do operate on circular economy lines. Most of these, however, are importers/distributors of machinery and equipment that has been manufactured overseas. That includes some of the world's largest construction equipment manufacturers, who are redesigning their products so they can be re-engineered. Many large global electronic office equipment manufacturers have also started to introduce schemes to re-use (for spare parts) and/or recycle end-of-life equipment that they have taken back from their customers.

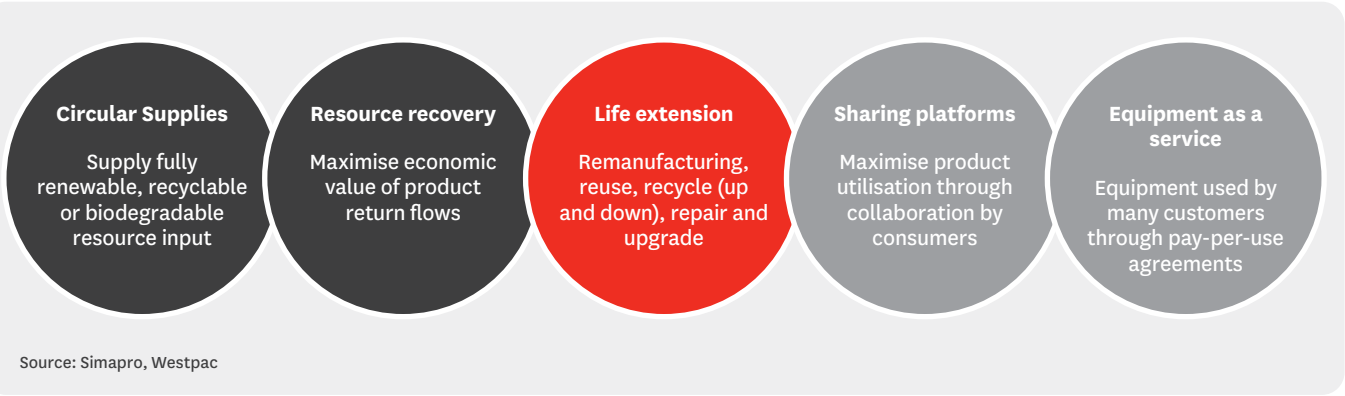
In addition, changes in procurement have helped to support the move to a circular economy. Examples include the use of electronic platforms to maximise the use of already existing, but underutilised machinery and equipment. Peer-to-peer sharing reduces the need to manufacture new machinery and equipment, resulting in material savings.

There are also signs of a shift in the traditional buyer-seller model, especially for equipment that requires large upfront capital outlay. The option of renting and leasing equipment can be attractive for consumers not wishing to spend heavily on equipment, or if they need to use it for a limited period. Manufacturers have started to move into this downstream space, effectively selling the capital services that machinery and equipment is able to produce, rather than the physical asset itself. Importantly ownership of the asset resides with the manufacturer. Similar to peer-to-peer sharing, the adoption of the equipment as a service (Eaas) model helps to increase asset utilisation, reducing the need for newly manufactured equipment.

For machinery and equipment manufacturers, operating an Eaas model implies a mindset shift, with the focus squarely on how to reduce ownership costs. That is especially pertinent given that machinery and equipment designed to be remanufactured, reused, and recycled is typically more costly to manufacture and so carries with it a higher upfront price premium. Most if not all of this could be offset by lower operating and maintenance costs over its lifetime, with additional cost savings coming from using less materials and energy in the remanufacture and recycling process at the end of its lifetime.

Research indicates circular practices globally could achieve materials savings of more than US$1 trillion by 2025.

Figure 26: Circular business model design for machinery and equipment manufacturers



Source: Simapro, Westpac

Digitisation and supply chain management.

Having access to the right quantity and quality of raw material inputs at the right time is largely a function of supply chain management (SCM). Simply put, SCM refers to the centralised management of the flow of goods and services and includes all processes that transform raw material inputs into final products.

Supply chains have traditionally been drivers of efficiencies and scale.

The traditional SCM model involves a linear set of discrete, sequential and event driven processes, which start out from the sourcing of raw materials and components, their transportation to manufacturing, actual production, and ends up with distribution and storage. These traditional models involve many manual processes and have limited levels of automation.

Most machinery and equipment manufacturers in New Zealand manage their supply chains on this basis. To a large extent, that reflects their relatively small size as well as the fragmented nature of the sector in New Zealand. It also reflects the level of investment required to overhaul current factory settings, which can be daunting for some.

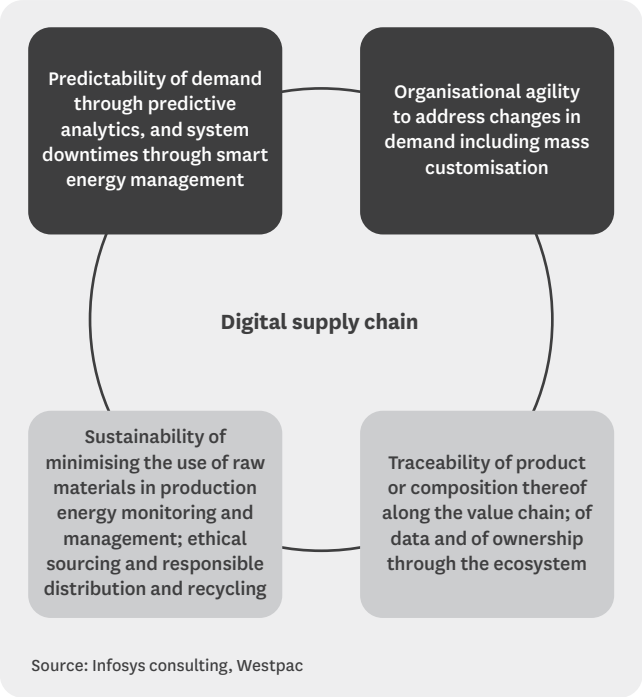
And that has largely worked up until now. However, with machinery and equipment supply chains becoming increasingly complex: firms having to manage increasingly numerous relationships, components, products, services, logistics and money flows; and with the nature of demand becoming more challenging, more firms are looking to make a step change in SCM capabilities.

An ever-growing range of potential disruptions and risks to the supply chain can lead to lost components, waste, increased downtime, and other inefficiencies.

Indeed, in a 2017 report by Grant Thornton on the future of growth in the manufacturing industry, 44% of survey respondents viewed supply chain complexities as a key barrier to their growth ambitions. Issues such as underused assets, high asset transportation and rework costs, and the inability to react quickly to unexpected risks, such as quality problems with a supplier located abroad, were seen as putting the brakes on growth, and affecting customer service.

To address these issues, machinery and equipment manufacturers globally are shifting from traditional linear shaped supply chains to intelligent, agile digital networks that integrate suppliers, manufacturers and customers to create an end-to-end view of the supply chain. This in turn, allows these firms to respond rapidly to fast-changing customer needs. Benefits of a digitised supply chain include integrated planning, increased transparency, visibility to all participants along the value chain, the ability to predict demand patterns as well as maximise the use of assets. That in turn translates into improved output quality, a reduction in material and downtime costs, and better use of labour. All of which gives firms the possibility of a competitive edge.

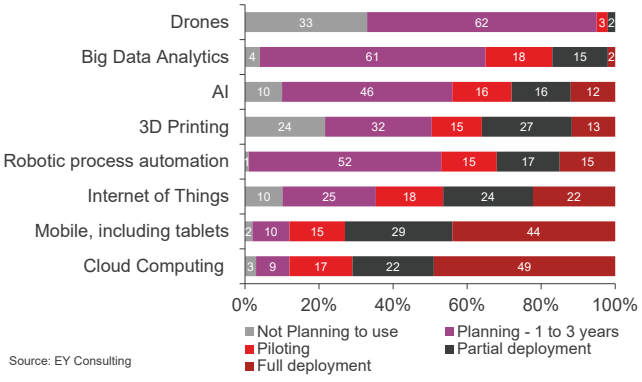
Figure 27: Digital supply chain pillars



Source: Infosys consulting, Westpac

It is the connectivity of an increasingly digital supply chain that transforms performance.

Figure 28: Use of digital technologies in the supply chain



Source: EY Consulting

In large part, this shift to intelligent supply chains is being underpinned by the introduction of new devices incorporating digital technologies such as cloud computing, mobile computing, Internet of Things (IoT), robotics process automation, 3D printing, big data analytics and artificial intelligence (AI). The emergence of radically new business models arising from supply chain disruptions caused by Covid-19 has added further momentum to the shift.

Machinery and equipment manufacturers are developing platforms that offer a new level of interconnectivity in manufacturing.

A 2020 survey by EY Consulting showed that some of these digital technologies are already in play. Mobile and cloud computing, as well as 3D printing are popular already, while many firms (across many sectors) are planning on adopting big data analytics, robotics, machine learning and drones within the next three years. And while it is true that most firms operating in New Zealand's machinery and equipment sector tend to be technological laggards, that not the case for all. Indeed, an industry source involved in manufacturing truck trailers indicated that they are big users of mobile computing in their design and manufacturing activities.

Research and development and innovation.

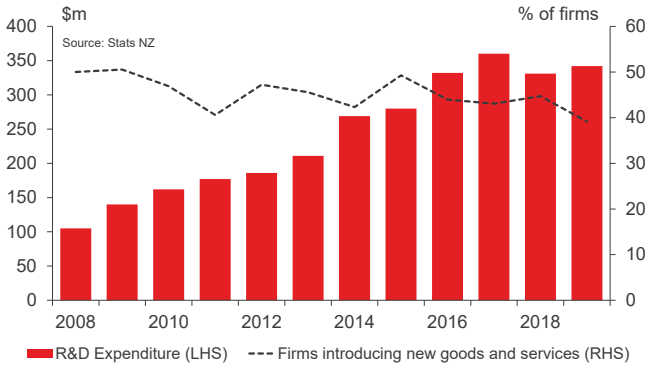
The machinery and equipment sector is a big investor in research and development (R&D) in New Zealand. That's not surprising considering that manufacturers tend to be innovators, designing creative solutions to address complex problems. Simply defined, R&D activities enable firms to obtain new knowledge to develop new systems and processes, and/or innovations in products and technologies, which can then be used to increase operating efficiencies or create new revenue generation possibilities. R&D is seen as one of many factors that drive innovation. For example, agricultural equipment manufacturers in New Zealand use their R&D to produce cutting-edge machines that meet the standards of consumers in export markets.

Ultimately, firms realise a return on their investment in R&D from increased revenue or lower costs.

R&D by machinery and equipment manufacturers amounted to about $450m in 2019, accounting for about 19% of total R&D spend in New Zealand, third behind the information communication and telecommunications (ICT) and "other services" sector, which covers a multitude of sectors and sub-sectors across the economy. Just under 19% of transport and industrial machinery and equipment manufacturers and 32% of other machinery and equipment firms invested in R&D in 2019, with one of the biggest contributors being the medical and surgical equipment market segment.

Between 2008 and 2019, investment in R&D by machinery and equipment manufacturers increased by a whopping 225%. Despite this increase, levels of innovation in the sector resulting from this investment have trended slightly lower. Indeed, the percentage of machinery and equipment firms that are introducing new goods, services and services to market has fallen in recent years, with this trend becoming more evident as growth in R&D investment has moderated.

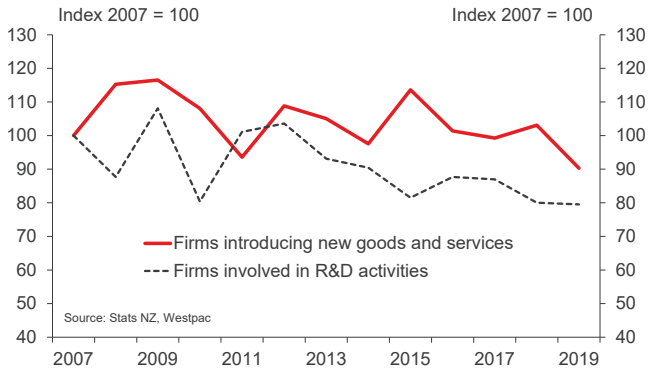
Figure 29: R&D expenditure vs introduction of new goods and services



Innovation within the sector is slowing.

A closer correlation is evident when indexing the percentage of machinery and equipment manufacturers involved in R&D activity and comparing them to levels of innovation, both of which have trended lower in recent years. The clear implication is that R&D investment is being made by fewer firms. That is likely to reflect the fact that many machinery and equipment manufacturers in New Zealand are small concerns that focus more on immediate day-to-day operations than on longer term strategic investments.

Figure 30: Proportion of R&D activity vs firms introducing new goods and services



The New Zealand Government has committed to raising investment in R&D to 2% of GDP over 10 years.

Investment in capacity.

New Zealand's machinery and equipment sector invests more overseas than foreign firms invest in this country. This in contrast to other manufacturing sectors in New Zealand where inward investment tends to dominate. In 2019, for example, 150 New Zealand based machinery and equipment firms had an ownership or shareholding interest in a firm located overseas, whereas individuals or businesses located overseas held an ownership or shareholding interest in 84 New Zealand machinery and equipment manufacturers.

Figure 31: Investment into and out of machinery and equipment manufacturing

Not only that, but this is becoming an established trend, with the percentage of local firms taking advantage of opportunities overseas and/or improving their proximity to key markets rising to 13% in 2019, up from 9% in 2014. Over the same period, the percentage of offshore individuals or businesses with an interest in New Zealand machinery and equipment manufacturers has remained relatively constant at about 7.5%.

Local manufacturers are moving offshore and becoming much more integrated into global production networks.

Basis for competition.

New Zealand's machinery and equipment manufacturers are largely limited to niche markets where the ability to deliver products tailored to customer requirements is paramount. While there is some competition within these niches, firms are largely insulted from the threat posed by imports and benefit from medium to high barriers to entry.

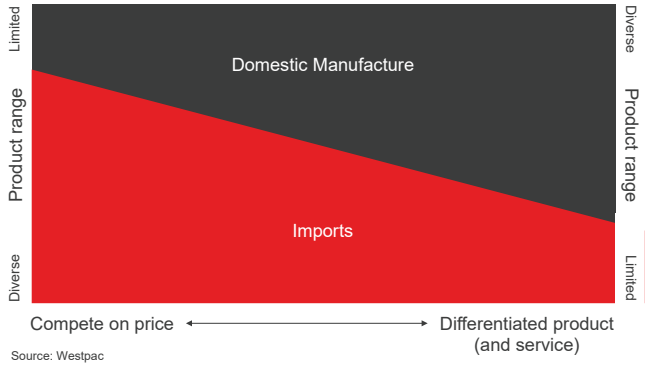
Industry rivalry.

Competition between New Zealand domiciled firms and the large industrial powerhouses that import and distribute equipment into this country is limited. Large multinational firms dominate the markets for domestic appliances, audio and visual equipment, and earthmoving equipment. Indeed, very few local firms have the financial muscle to produce these products at scale, and those that have, have already moved their capacity offshore to take advantage of low labour costs and proximity to large markets.

For the most part, machinery and equipment manufacturers in New Zealand do not compete with imports.

Imports, in effect, demarcate the limits of the local machinery and equipment manufacturing sector, forming to all intents and purposes a separate market. That doesn't mean that imports of some products do not compete with locally manufactured product, but to the extent that they do, it is at the margin. Indeed, industry sources, particularly in the agricultural equipment, transport trailer and electrical component spaces, have each indicated that cheap imports do pose a threat to some of their product categories. It is not uncommon for firms in this situation to reinforce the "Buy NZ" call, as well as the proximity advantages of having a local supplier.

Figure 32: Competition – price vs product differentiation spectrum



Source: Westpac

Faced with these constraints, most machinery and equipment manufacturers in New Zealand compete by targeting valuable niche markets, the high quality and reliability of their products, the innovation and creativity in their design, and the excellence of their service offering. That may explain why some of New Zealand's larger machinery and equipment manufacturers have already moved capacity offshore, while still retaining their design capabilities at home. It might also explain why New Zealand machinery and equipment manufacturers invest in R&D.

Most machinery and equipment manufacturers in New Zealand focus on maximising revenues through product differentiation and value-added services.

Price is still important, particularly in some product categories, but it is not the primary basis for competition in the machinery and equipment manufacturing sector. In addition to the quality factors already referred to above, firms compete on delivering the required quantity of product within agreed timeframes and standards. Proven ability and experience are important differentiators, as are the reputations that they build. An industry source in the boat building industry suggested that having skilled labour is a key point of difference. Several industry sources suggested that relationships are important when looking for repeat businesses.

Firms compete the ability of their skilled labour through the stages of development, production, and service delivery.

It is also important to note that local manufacturers compete at each point in the value chain, i.e. from investigation and design all the way through to final delivery and servicing over the lifetime of the asset. In the future, firms will also have

to consider the shift towards a circular economy and the digitalisation of supply chains.

Barriers to entry and exit.

The machinery and equipment sector reflects medium to high barriers to entry, although these differ by market segment. The same applies to barriers to exit, which tend to be higher in market segments where initial capital costs are significant.

Medium to high barriers to entry in the machinery and equipment sector also reflects the level of industry rivalry that already exists within the sector, the large number of well entrenched competitors already present, the high degree of customer loyalty, an established customer base, and the relatively small size of the domestic market.

Levels of R&D investment required, patent protections, and inherent complexities associated with manufacturing processes may also be barriers to entry in some market segments, such as medical and surgical equipment. Similarly, regulations and product standards may also discourage some potential entrants.

The lack of economies of scale across most market segments is likely to force new entrants to enter at a small scale, and possibly at a cost disadvantage to already established competitors.

Other barriers to entry include high set up costs within some market segments. In addition to new machinery/equipment and machinery tools, costs include expenditure on creating new factory layouts and work organisation methods, as well as the establishment of forward and backward linkages along the value chain.

Other barriers include establishing access to raw material inputs. Difficulties in recruiting technical skills across many market segments are also likely to be a key stumbling block for most potential entrants.

New entrants are also likely to face difficulties getting customers to switch from incumbents. That's particularly true for those market segments that focus on tailored products and depend heavily on established reputations and brand loyalty. Motor vehicle body, trailer and boat manufacturers fall within this group. The possibility of a customer switching is further reduced if the machinery and equipment manufactured by new market entrants means that customers must make wholesale changes to their own work organisation methods and factory layouts.

However, there are also factors that might reduce the barriers to entry. For the most part, the industry is not heavily regulated, although again this differs by market sector. High fragmentation and lack of vertical integration in the sector are also factors likely to encourage new market entrants.

Substitutes.

There are very few substitutes for machinery and equipment. Substitutes refer to those goods or services that from the point of view of the customer perform the same functions as those produced by the machinery and equipment sector.

Appendices.

Appendix A.

This report focuses on the manufacture of a diverse range of machinery and equipment in New Zealand at various stages of beneficiation. More specifically, this report focuses on the firms that manufacture:

Transport equipment.

Motor vehicle and motor vehicle parts – firms in this market segment focus on the assembly of motor vehicles, truck cabs and chassis, the manufacture/modification of motor vehicle bodies, typically truck trailers and general use trailers, as well as the production of electrical and mechanical automotive components.

Other transport equipment – firms in this market segment focus on ship and boat building, the manufacture of railway rolling stock and aircraft, together with associated maintenance, repair and overhauling services. Firms are also involved in the manufacture of hovercrafts, bicycles, motorcycles, wheelbarrow, wheelchairs, and scooters.

Electronic and electrical equipment[1].

Electronic equipment – firms in this market segment manufacture computer hardware and electronic office equipment, as well as studio equipment for television or radio broadcasting, data transmission equipment, telecommunication receivers and/or other transceiver equipment. They are also involved in the manufacture of audio and visual receiving sets, sound reproducing and/recording equipment, radio and television receiving sets, as well as headphones.

Electrical equipment – firms in this market segment manufacture cables, wires or strips that can conduct electricity, including fuse wires, optical fibre cables for data transmission and telecommunication cables. Also included are firms that manufacture electric lighting equipment, such as bulbs or tubes, electric light fittings, flashlights, infra-red and ultra-violet lights and illuminated signs. Firms in this market segment are also involved in the manufacture of batteries, carbon brushes, distribution boards, electric motors, electric furnaces, and generators.

Domestic appliances – firms in this market segment manufacture a range of whiteware and other domestic appliances. That includes the manufacture of dishwashers, refrigerators (and freezers), ovens, rangehoods, stoves and clothes driers. Other domestic appliance manufacturing covers air conditioners, electric blankets, electric toothbrushes, electric fans, heaters, hairdryers, and hot water systems.

Professional and scientific equipment.

Photographic, optical, and ophthalmic equipment – firms in this market segment manufacture a diverse range of equipment, from binoculars, telescopes, and cameras, to contract lens, microscopes and optical instruments. Also included are firms that manufacture spectacles and sunglasses and are involved in grinding lens (both optical and spectacles).

Medical and surgical equipment – firms in this market segment manufacture artificial eyes, joints, and limbs as well as a range of materials, instruments and equipment typically used by dentists. Also included are firms that manufacture electromedical, first aid and hearing aid equipment, medical diagnostic apparatus, magnetic resonance imaging, ultrasound equipment, pacemakers, respiratory equipment, surgical tools, orthotics, thermometers, syringes, and hypodermic needles.

Other professional and scientific equipment – firms in this market segment are mainly involved in manufacturing navigational equipment, such as GPS, nautical instruments, and navigational systems, measuring and control equipment, such as gas meters, parking meters and taxi meters, signalling equipment, including traffic signals, radar systems and radio remote control equipment.

Mechanical machinery.

Pumps, compressors, heating, and ventilation equipment – firms in this market segment manufacture a range of air and gas compressors as well as hydraulic, petrol and electric pumps. Firms also manufacture air conditioning equipment and parts, beverage dispensing equipment, cool room refrigeration plants, commercial refrigeration equipment, space heating systems, vending machines, water coolers and water heaters.

Specialised machinery and equipment – firms in this market segment manufacture a huge range of machinery and equipment used in the agriculture, forestry, construction, and mining sectors. That includes planting, irrigation and harvesting equipment, concrete mixers, crushing machinery, earthmoving equipment, graders, drilling machinery and bulldozers. Also included are firms that manufacture woodworking and metal working equipment, such as lathes, milling machines, metal moulding machinery and welding or cutting equipment; as well as power operated hand tools, dies or die sets. Firms in this market segment also manufacture equipment used in downstream manufacturing industries, notably food and beverage, chemicals, textiles, pulp, and paper.

1 Although a separate activity, the manufacture of professional and scientific equipment is sometimes classified as being part of a broader electronic and electrical equipment market segment. This report also adopts this approach.

Other machinery and equipment – firms in this market segment, which are not easily classified elsewhere, manufacture lifting and material handling equipment, bearings, industrial furnaces, marine engines, outboard motors, gas generators, gas burners, oil burners, and industrial ovens.

Appendix B.

Turnover of the sector.

New Zealand's machinery and equipment manufacturing sector is large, generating revenues of just over $13bn in 2019. That's equivalent to about 2% of all income generated by industry in New Zealand.

Mechanical machinery manufacturing is the largest individual market segment, generating turnover of about $4.8bn in 2019. Meanwhile, transport equipment, and electronic and electrical equipment manufacturing each added a further $4.3bn.

Turnover by market segment.

Mechanical machinery.

With sales of about $4.3bn, mechanical machinery manufacturing is dominated by specialised machinery that is used within a specific industry or for a specific purpose. For example, combine harvesters, ploughing and dairy processing equipment is used extensively in New Zealand's agricultural sector, but has limited application elsewhere. By contrast, forklift trucks are used in many sectors but only for the purpose of handling materials.

Table B1: Size – machinery manufacturing market segment

Machinery	Estimated Turnover ($bn) - 2019
Pump, compressor, heating, and ventilation equipment	**0.5**
Fixed space heating, cooling and ventilation	0.3
Pumps and compressors	0.2
Specialised machinery and equipment	**4.3**
Other machinery and equipment	2.3
Agricultural machinery and equipment	1.0
Mining and construction	0.2
Machine tools and parts	0.3
Other specialised machinery and equipment	0.3
Lifting and material handling equipment	0.2
Total	**4.8**

Source: Stats NZ, Westpac

Revenues generated from the manufacture of other mechanical machinery, a sub-category of specialised machinery which includes difficult to classify industrial products used by manufacturers in other industries, totalled about $2.3bn in 2019. Examples include burners, furnaces, heaters, water treatment equipment and outboard motors.

Meanwhile, the manufacture of agricultural machinery and equipment, from planting and harvesting equipment to lawn mowing, irrigation systems, dairy milking systems and poultry incubators, generated additional revenues of about $1.0bn in 2019.

Locally manufactured mining and construction machinery added a further $0.2bn to revenues. Most heavy equipment is imported, with domestic manufacturers focusing on smaller bespoke equipment. Ditto for machinery tools typically used in downstream manufacturing, which we estimate to be in the region of $0.3bn. Specialised machinery and equipment used in the manufacture of food and beverages, textiles and paper among other things, added a further $0.3bn.

Transport equipment.

The manufacture of transport equipment is dominated by other transport, which focuses on non-road-based transport equipment manufacturing.

Table B2: Size - transport equipment manufacturing market segment

Transport equipment manufacturing	Estimated Turnover ($bn) - 2019
Motor Vehicle and motor vehicle parts	
Motor vehicles	0.1
Motor vehicle bodies and trailers	0.6
Automotive electrical components	0.0
Other motor vehicle parts	0.3
Other transport	**3.2**
Aircraft manufacturing and repair services	
Boatbuilding and repair services	1.0
Shipbuilding and repair services	0.3
Railway rolling stock manufacturing and repair services	0.2
Other transport equipment	0.0
Total	**4.3**

Source: Stats NZ, Westpac

Aircraft manufacturing and repair services is the biggest contributor to transport equipment manufacturing in New Zealand, generating revenues of at least $1.7bn in 2019. About $1.4bn of this was generated from maintenance, repair, and overhauling services. The remaining $300m was generated from the manufacture of components and small plane assembly. Planes manufactured in New Zealand are either based on overseas designs or on local designs that have been tailored for specific applications, e.g. crop spraying.

New Zealand's boatbuilding and repair industry is also a big contributor to market segment revenues, posting sales of about $1.0bn in 2019. Of this, boat building generated about $600m, with the remainder coming from the refitting and maintenance of boats already built. New Zealand has a relatively large and diverse boat building industry, that focuses mainly on manufacturing, repairing, and the

maintaining of a diverse range of standard production boats. According to an industry source about 90% of boats manufactured in New Zealand are production boats, with the remainder being customised to order.

The remaining $0.5bn in sales of other transport was generated from upgrading, repairing, and maintaining of ships and railway rolling stock. With all new railway rolling stock now being imported, activity is focused on maintenance and repairs.

The shipbuilding industry, which posted sales of about $300m in 2019, is mostly focused on the repair and the refitting of already built ships. Very little, if any ship building occurs in New Zealand, mainly because of the competitiveness of foreign shipyards. The decline of ship building activity also reflects New Zealand's geographic location, a lack of suitable ship building facilities and a decline in the availability of specialised skills. In the past, firms operating in the ship building industry had undertaken some limited manufacture of tugs, but the last one to be produced in New Zealand was in 2003.

The manufacture of motor vehicle bodies and trailers is also estimated to have generated just over $600m in revenue during 2019. Most of the this came from the manufacture of truck bodies and trailers. That excludes a further $1.3bn generated from repairing damaged motor vehicles, which falls out of the scope of this report.

Although long production runs are a thing of the past, some limited motor vehicle manufacturing still takes place in New Zealand. Generating about $0.1bn in revenues, most of this relates to the manufacture of specialised vehicles, which are generally produced on small scale assembly lines.

Electronic and electrical equipment manufacture.

With respect to electronic and electrical equipment manufacture, the largest market segment is professional and scientific equipment, which generated sales of about $1.8bn in 2019. About $1.4bn of this is estimated to having come from sales of medical and surgical equipment, such as syringes, scalpels, thermometers, orthopaedic and diagnostic imaging equipment. In 2020, demand from healthcare providers treating increasing patient numbers infected by Covid-19 resulted in a huge lift in sales of respiratory and associated equipment.

A further $0.3bn was generated from the sales of other professional and scientific equipment, which includes the manufacture of clocks, control and signalling equipment

Sales of locally manufactured electronic equipment accounted for a further $1.2bn, with audio and visual equipment contributing just under $0.9bn, and communication equipment accounting for just over $0.2bn. Very little computer and electronic office equipment is manufactured in New Zealand and as such the country's needs are addressed through imports.

Meanwhile, sales of locally manufactured electrical equipment amounted to $0.9bn, with other electrical products, which includes batteries, switchgears and electric motors, contributing $0.6bn in 2019. That excludes the manufacture of electric cabling and electric lighting equipment, each of which added another $0.1 to sector revenues.

The manufacture of whiteware and small domestic appliances in New Zealand generated $250m and $160m, respectively in 2019. Domestic appliances would include products such as air conditioners, electric fans, heaters and hot water systems. Most whiteware and appliance manufacturing has long since left New Zealand, although some components are still made in this country.

Table B3: Size – Electronic and electrical equipment manufacturing market segment

Electronic and electrical equipment	Estimated Turnover ($bn) - 2019
Professional & scientific equipment	**1.8**
Medical and surgical	1.4
Other professional & scientific	0.3
Photographic, optical, and ophthalmic equipment	0.1
Electronic equipment manufacturing	**1.2**
Other electronic equipment	0.9
Communications	0.2
Computers and office equipment	0.1
Electric equipment manufacturing	**0.9**
Other electrical equipment	0.6
Electric cable and wire	0.1
Electric lighting	0.1
Domestic appliances	**0.4**
Whiteware	0.2
Other domestic appliances	0.2

Source: Stats NZ, Westpac

Appendix C.

Shape of the sector.

The machinery and equipment manufacturing sector is highly fragmented with most firms being small operators confined to specific niches. On average these firms employ just 6 people each, although that can differ depending on the market segment. Firms that manufacture electronic and electrical products, for example, employ about 13 people each, which is more than double the size of those that manufacture transport equipment and mechanical machinery.

Shape of the sector by market segment.

Mechanical machinery.

Firms that manufacture machinery are generally smaller than those that produce transport equipment and electronic and electrical equipment.

The largest firms in this market segment manufacture and supply fixed space heating, cooling, and ventilation equipment. Major firms include Temperzone, Skope Industries and Rheem with respective market shares of 20%, 17% and 10%.

Firms that manufacture agricultural equipment are also among the larger firms in this market segment. Industry concentration levels among agricultural equipment manufacturers are low, with no firm in New Zealand having a market share of more than 10%. The largest of these is Waratah NZ, a manufacturer of forest harvesting equipment, owned by John Deere Forestry Group LLC. These firms are significantly smaller than the huge multinational corporations that import and distribute equipment locally.

Firms that manufacture specialised machinery for the mining and construction industries are the smallest within this market segment and focus on niche areas. Most of the machinery and equipment used in these sectors is imported.

Table C1: Shape – mechanical machinery

Mechanical machinery	Number of Employees (2020)	Number of Firms (2020)	Average employee per firm (2020)
Pump, compressor, heating, and ventilation equipment	**1,440**	**75**	**19.2**
Fixed space heating, cooling and ventilation	1,150	48	24.0
Pumps and compressors	290	27	10.7
Specialised machinery	**15, 090**	**3,246**	**4.6**
Other machinery	10,000	2,664	3.8
Agricultural	2,050	192	10.7
Mining and construction	240	42	5.7
Machine tools and parts	930	159	5.8
Other specialised machinery	1,200	129	9.3
Lifting and material handling equipment	670	60	11.2
Average	**16,530**	**3,321**	**5.0**

Source: Stats NZ, Westpac

Transport equipment.

The largest firms that manufacture transport equipment are involved in the repairing of existing railway rolling stock rather than manufacturing from scratch. Although New Zealand still maintains a manufacturing capability, virtually all new rolling stock is imported.

Firms that build and repair ships are the second largest of those that manufacture transport equipment. Like rail, New Zealand has no real ship building industry to speak of. Indeed, most activity relates to the repairing of existing vessels registered in New Zealand, with some work being caried out on ships from other countries. Ditto for aircraft manufacturers, who primarily focus on maintenance, repairs, and overhauling activities, although they tend to be quite small.

The same is true for motor vehicle and aircraft manufacturing. New Zealand does not have the scale to manufacture road-based vehicles or aircraft in any great quantity, and as such activity focuses on repairs and overhauling, while still producing limited volumes of specialised equipment.

Most firms operating in this market segment are involved in manufacturing vehicle bodies, mostly for trucks and truck trailers, general use trailers and/or specialised trailers, such as horse floats. Many small firms also build, refit, service or maintain boats, mostly small vessels used for recreational purposes.

There are also numerous small firms that produce mechanical parts for motor vehicles, from clutch assemblies and gearboxes to roof racks and car accessories.

Table C2: Shape - transport equipment

Transport equipment	Number of Employees (2020)	Number of Firms (2020)	Average employee per firm (2020)
Motor vehicle and motor vehicle parts	**4,175**	**585**	**7.1**
Motor vehicles	250	66	3.8
Motor vehicle bodies and trailers	2,600	318	8.2
Automotive electrical components	75	18	4.2
Other motor vehicle parts	1,250	183	6.8
Other transport equipment	**5,090**	**954**	**5.3**
Aircraft manufacturing and repair services	1,900	291	6.5
Boatbuilding and repair services	2,400	573	4.2
Shipbuilding and repair services	520	42	12.4
Railway rolling stock manufacturing and repair services	150	3	50.0
Other transport equipment	120	45	2.7
Average	**9,265**	**1,539**	**6.0**

Source: Stats NZ, Westpac

Electronic and electrical equipment.

Firms that are involved in the manufacture of electronic and electrical equipment are on average more than double the size of those that manufacture transport equipment and mechanical machinery.

However, that figure is distorted by the handful of firms that manufacture whiteware, a market segment which is dominated by Fisher and Paykel, although the company's operations in New Zealand are limited to product development and design. However, some specialist componentry and production equipment is still produced locally.

Firms that produce medical and surgical equipment, are on average second largest, although this masks the dominant

role played by Fisher and Paykel Healthcare, which employs just over 2,700 people at its various manufacturing facilities in New Zealand.

The large number of firms that manufacture "other" electrical equipment, such as batteries, electric motors, dynamos, and distribution boards, are of significant size. The same, however, cannot be said for the large number of small firms that manufacture "other" electronic equipment, ranging from amplifiers and loudspeakers to digital recording devices, headphones, and other media devices.

The smallest firms operating in this market segment are involved in the manufacture of communication equipment, from radio receivers and transmitters to telephone switching equipment, intercom equipment and data transmission equipment. These firms are also involved in the manufacture of cellular phones. Other than the limited manufacture of componentry, most communications equipment is imported into New Zealand.

Table C3: Shape – electronic and electrical equipment

Electronic and electrical equipment	Number of Employees (2020)	Number of Firms (2020)	Average employee per firm (2020)
Professional & scientific equipment			**12.6**
Medical & surgical	4,100	282	14.5
Other prof. & scientific	790	102	7.7
Photo optical & ophthalmic	200	21	9.5
Electronic equipment			**14.1**
Other electronic	2,900	204	6.5
Communications	720	24	4.2
Computers & office	95	36	12.4
Electric equipment			**9.5**
Other electrical	1,900	141	13.4
Electric cable & wire	310	57	5.4
Electric lighting	300	66	4.5
Domestic appliances			
Whiteware	1,400	12	116.7
Other dom. appliances	410	57	7.2
Average	**13,125**	**1,002**	**13.1**

Source: Stats NZ, Westpac

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