

JIGSAW TALENT MANAGEMENT

# MONTHLY MARKET REPORT

October 2021



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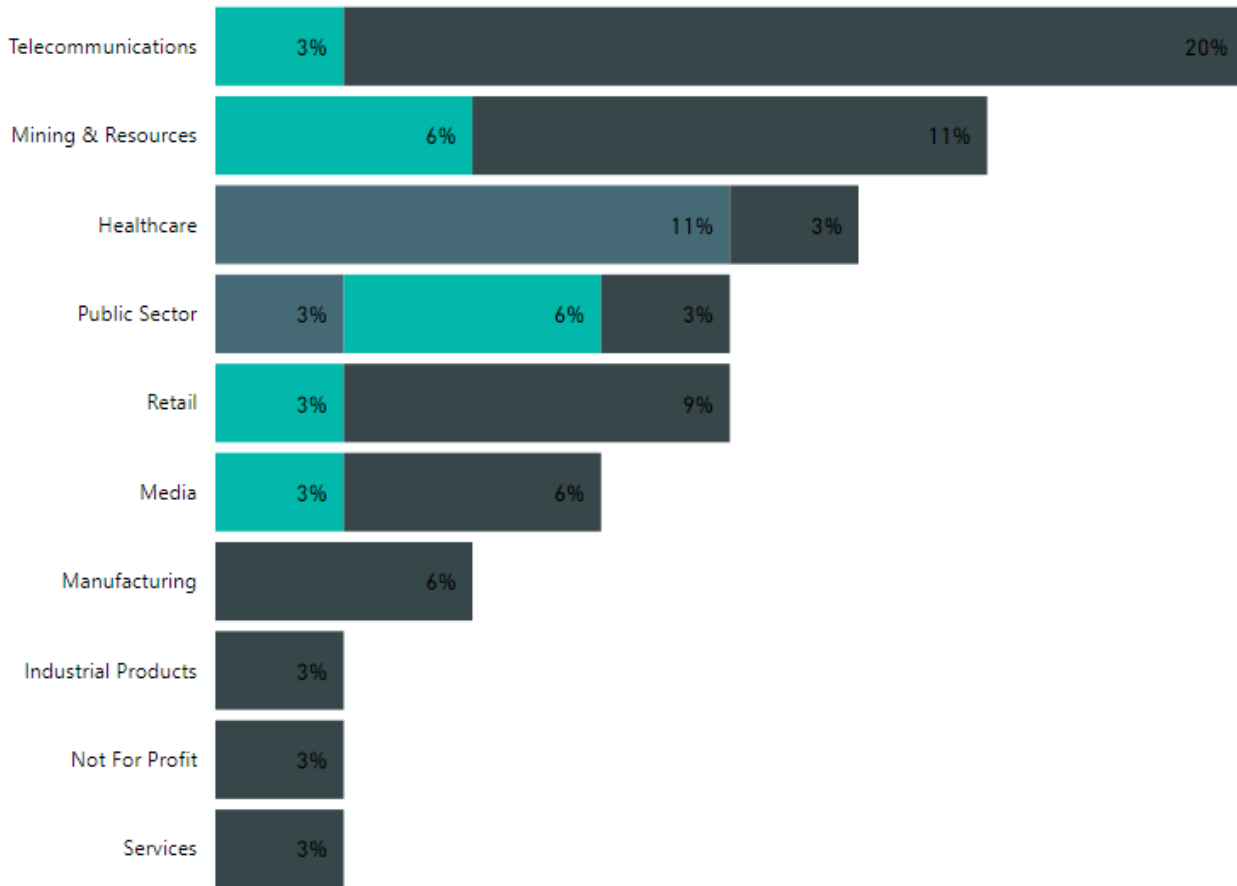
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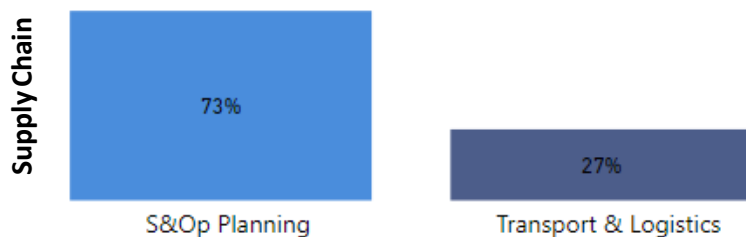
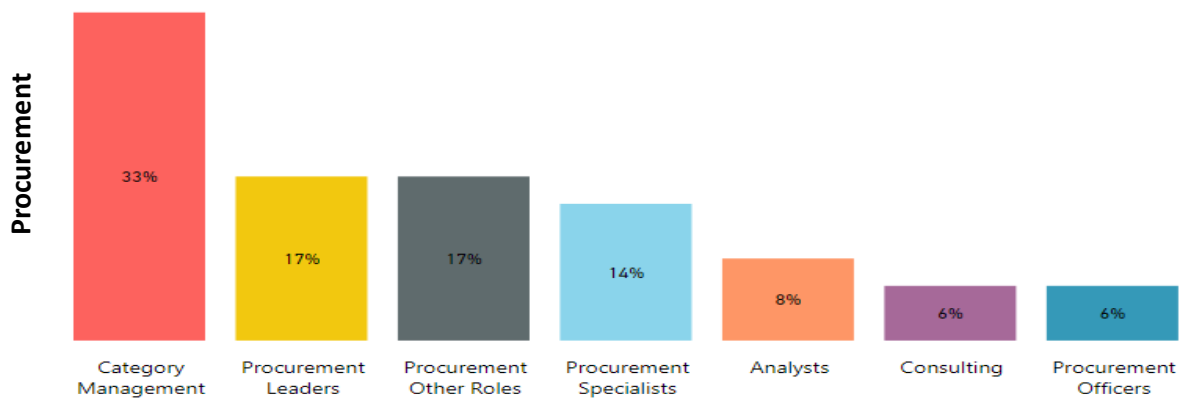


## Live Roles by Industry

Type ● Contract ● FTC ● Permanent



## Live Roles by Job Category





It's that time again, within Jigsaw we cannot believe 2021 is nearly over and like most of 2020, it seems like a lost year. Surprisingly just 2 more reports to go until Christmas. Sadly, with each passing month, conditions for many businesses and hardworking Australians are deteriorating. Many rational individuals would be forgiven for thinking the policies are nothing to do with health management at all, only serving to transfer wealth and increase government powers. At Jigsaw we very much hope you are coping, taking into account the broader spectrum of societies needs like mental health, economic stress, family engagement and alternative health issues that seem to be sacrificed for the never ending Covid frenzy mostly driven by media.

For Jigsaw's October report, we will offer a high-level snapshot of the Australian supply chain market and the wider Australian economy. Then Jigsaw will focus on the critical issue of supply shock, drilling in on the semiconductor market for our example, even though we could have selected other supply shocks that are about to surface globally such as food or energy. We then explore the technical aspects of the broader supply chain, asking questions such as: what is it? What operations contribute to it? How will the 4th industrial revolution of artificial intelligence, predictive analytics, robotics, automation, and smart apps potentially disrupt both how supply chain is executed and labour markets that support it.

## **Macro**

September 2021 has been an interesting month. We have seen the US fall further from grace as Joe Biden's vaccine mandates coupled with his handling of the withdrawal from Afghanistan has critically damaged his popularity even amongst hard core democrats. His stimulus package of \$3.5 trillion is now looking unlikely and it is questionable how long he can remain in office. The latest tax agenda targeting unrealised capital gains could be the final nail in the coffin.

The UK has withdrawn in the short term from implementing vaccine passports, although it is hard to see Boris Johnson not enforcing further lockdowns as we approach the UK winter season. With the threat of ever rising gas prices and a food shortage, the UK will have a moral dilemma. Locking a population down is considered by many tyrannical enough, locking people down in a food and energy crisis could ignite further social unrest. Then there is the issue of submarines. The tri-agreement with Australia and the US to build nuclear submarines has created tensions with France and further prodded China, who have incorrectly labelled Australia as planning nuclear capability in turn making itself a nuclear target. Australia pulled out of the contract with France for construction of submarines it commenced back in 2016. The French were to build the fleet valued at AUD\$55 billion over a 25-year period. It seems Australia's flip on the deal was as much to realign loyalty with the US than anything ESG related (nuclear over diesel), who have a strong military presence in Oceania. Australia was always going to be put in the position to pick a side, with no matter which pivot it took negativity on one side or another would prevail.

Other global events include Russia raising rates to curb inflation to 6.5%, the sharpest increase since 2014, with higher rates likely to follow so that it's inflation target of 4% can be reached and Angela Merkel, the Chancellor of Germany, has now bowed out of her 16-year tenure which will create significant impacts to the German economy. The critical news for September however involves our Iron ore trade partners - China.

China is experiencing a fiscal bomb to potentially rival Lehman Brothers (\$600b debt) back in 2008. The 2nd largest property developer in the country Evergrande is about to default on its debt obligations. With official debt of USD \$300 billion and a potential USD \$300 billion in off balance sheet liabilities (shadow banking) the situation is a serious threat to global markets.

The Evergrande Group have over 1.5 million house deposits on new homes that are incomplete, yet the business is not liquid enough to honour its creditors. What makes the matter worse is the prepay model for such property is often up to 50% - 100%. If these are investment properties backed by reverse mortgages or other personal liabilities, the fiscal casualties will be huge causing a domino effect of insolvencies. As the Evergrande scandal rolls forward we can expect other property developers in China to be heavily impacted. Already the SINIC Holdings Group lost 87% of its stock value, and any business heavily leveraged could be in the spotlight. If properties are given away at a further discount to investors caught short or to create liquidity to honour bond liabilities, the impacts will be drastic for other developers, banks and raw material suppliers

who have exposure. This Ponzi scheme, no doubt the 1st of many to be exposed in China, will also impact commodity markets, automotive and device manufacturers. China is a huge market for German cars, accounting for 50% of Germany's GDP. These luxury car purchases are supported by the revenue generated from the property assets increasing equity, as Chinese salaries alone cannot support such purchases of BMWs and Mercedes. Who knows, this event alone could re-align automotive demand and semi-conductor chip supply.

The question for the CCP will be, is Evergrande too big to fail? Will the CCP devalue their currency further to bail out Evergrande at a time when the US dollar is rising against other fiat currencies, placing further stress on USD denominated bond commitments across the entire sector and potentially creating a dollar liquidity crisis. A large US debt default could enable China to create more damage to western markets than any trade sanctions could achieve, hence it would not be surprising if the CCP let Evergrande fail. The chaos of the derivative markets, where many transactions have limited transparency to counter party risk, it's likely many foreign investors may not know they have capital tied up in Evergrande and the wider Chinese economy. Evergrande employs over 200,000 people across 280 cities throughout China, if Evergrande collapses and the sector itself rapidly contracts, mass unemployment will also occur with the fiscal implosion further impacting social unrest. According to the latest news reports, Evergrande will honour its national debt obligations to Chinese investors but will shun foreign investors. This tactic is likely in play to appease the social unrest that is already unfolding within China, yet a long-term solution to the foreign investors at time of writing is not announced. Evergrande is the largest holder of offshore bonds in China, a default on direct foreign investment could heavily impact future capital flows into the country. We can assume the deposit holders on incomplete properties will have to be first in line for fiscal fulfilment, with foreign equities and debt holders being last in the line for consideration. It all depends on the CCP strategy. At present, it seems China is withdrawing from being a globalist nation, pro-actively withdrawing relations from the US, Sweden, Australia, and other countries. Could it be that Xi could be unravelling the past 20 years of economic prosperity and taking the country back to its nationalist socialist past? Maybe the miracle that has been China's economy was not a miracle after all, and a nightmare is on the cards. GDP in the west is highly dependent on trade with China.

So how did Evergrande get in such dire circumstances? We have to acknowledge, the entire market for property development in China is in trouble, it has been since 2018. Evergrande was operating in a space that was already stressed since the CCP were actively trying to reign in the property bubble by capping net debt. This policy was to close the gap in debt to asset ratios. The CCP acknowledged the risk of the property bubble to the wider Chinese economy, which accounts for 25%-30% of GDP. As property prices started falling as a result of the CCP's new policies, Evergrande's heavily discounted model where 25% discount on property was offered to buyers for upfront payment, whilst the company was paying above market value for land would have come under stress. In the past, the discount offered to attract deposits for build's coupled with over market price for land acquisition did not matter, as the assets being built quickly rose in value to off-set the continued land purchases. However, as credit was tightened, property values stopped appreciating and the Ponzi started to unravel. In addition, the company was offering wealth management products backed up by its ever-growing balance sheet that was at huge risk of economic and government changes. The balance sheet itself was also questionable as many of Evergrande's assets were not in premium locations (Tier 3 & 4 cities), and the valuation of assets was woolly at best.

So, what will be the likely outcome to solve this potential economic crisis for China and foreign investors? A takeover or asset fire sale seems unlikely. Any takeover would struggle to complete the commitments and turn a profit as the property values in China have been falling and only recently stabilised. Will the CCP step in and make Evergrande a State-owned company? Will Evergrande be divested and broken up into separate parts. According to many analysts, the general consensus is that the CCP will want to ensure the private businesses in China are punished for over leveraging and creating economic risk, and it will no doubt allow them to fail, especially if they are not large enough to create economic implications (unlike Evergrande). The CCP will not want any of these private unicorns to damage state owned corporations' value. It is in the CCP's interest to ensure capital is injected into other sector of the economy, in areas such as semi-conductor manufacturing and complex production enabling a more self-sustaining economy. This is a smart play by China and is something Australia should be taking notice of. Credit creation for current assets or non-producing assets always leads to economic catastrophe and China is recognising the error of western economies.





For Australia, whose economy is comprised of public sector, iron ore and property, the impacts will be devastating should no capital restructuring take place for Evergrande. The correlation between iron ore exports and the insular national property market backed by easy credit could unravel. Iron Ore continues to fall (futures market now under \$90, each \$10 drop in ore equals \$6.5 billion drop in GDP), with China's property markets not arousing much hope of an upsurge prior to Christmas. The correlation is not easy to see, at least it wasn't for us in Jigsaw. As China's property bubble unravels and demand for iron ore is withdrawn (now both politically and economically driven), many Chinese investors could dump Australian assets to stay afloat. This will both hammer the large cap miners who are essential for Australia's trade surplus and prick the bubble that is the Australian housing market. It could hit Australia with a tri-facto, crippling its currency raising the cost of imported goods, collapse housing and annihilate exports. This is when the Liberals stimulus packages for Covid, which were entirely centred on Australia's own property Ponzi will come back to bite them.

Then there is Australia's handling of Covid-19. At a time when Australia's economy is contracting it is empowering a police state and coercing businesses to mandate employees into medical procedures or lose their jobs. In addition to causing businesses to lose staff who refuse to comply to government overreach, the government are also enforcing fines on struggling businesses who serve people who have decided to not take the vaccine. This is economic suicide for businesses who are desperate to recoup lost earnings yet now have to reject a large segment of their customer base. Australia should be embracing the global economic situation, encouraging entrepreneurs to exploit the China withdrawal from global trade, leveraging its educational system, raw materials etc to become a leading exporter to the US, Europe, and other Asian emerging markets. Scott Morrison is meeting with India, US, and the UK, he is talking alliances, yet this is all just talk without a country with the trust, freedom, confidence and means to exploit any trade deal.

Then there is Germany, a country that is heavily reliant on manufacturing (contributes 18% to GDP) and relies heavily on exports to China, accounting for well over 200 billion euros annually. Germany, like Australia, has relied so heavily on Chinese demand for its supremely well engineered cars that its own economy, although superior in sophistication to Australia's, is also at risk should China contract. Like many countries including the US, UK and Australia, Germany has been far too dependent on China. Aside from the obvious risk directly to GDP, the automotive sector has sucked up much of the capital, leaving Germany exposed re the digital revolution. Germany still heavily relies on engineering expertise over digital and technology expertise and this could have huge impacts for its economy over the next two decades, especially if this slow uptake in digital is combined with a demand shock for its exports. This can be seen at a product level, as the likes of Porsche, BMW and Mercedes have been far slower to launch EVs than other manufacturers.

No doubt a Chinese fiscal collapse could be globally devastating. China is a huge factor in economic projections of raw material demand for the global economy. An upset could downgrade previous projections on demand across semi-conductors, energy and raw materials creating a global crisis that is far larger than we witnessed in 2008.

## The National Economy - How are we looking?

*Note – Dates in column are not accurately reflecting month or qtr., they are the dates of recording only*

**Re GDP**, annual growth is up 9.6% compared to the same period last year, yet overall growth has been hit hard, down from 1.8% to 0.7%. GNP (Gross National Product = total value of goods/services owned domestically) is up for the quarter as is investment in inventories. From the table below it seems most growth has come from the agriculture sector, hitting levels not seen in the past decade and public sector. Recent lockdowns having negative impacts on mining, construction and manufacturing overall slowing any recovery.

<b>GDP</b>	<b>30/07/2021</b>	<b>30/08/2021</b>	<b>17/09/2021</b>
GDP Growth Rate	1.8	1.8	0.7
GDP Annual Growth Rate	1.1	1.1	9.6
GDP	\$1,330.90	\$1,330.90	\$1,330.90
GDP Constant Prices	\$501,065.00	\$501,065.00	\$505,134.00
Gross National Product	\$510,848.00	\$510,848.00	\$521,999.00
Gross Fixed Capital Formation	\$115,937.00	\$115,937.00	\$120,588.00
GDP per capita	\$56,307.28	\$56,307.28	\$56,307.28
GDP per capita PPP	\$48,697.84	\$48,697.84	\$48,697.84
GDP From Agriculture	\$12,627.00	\$12,627.00	\$13,185.00
GDP From Construction	\$34,574.00	\$34,574.00	\$34,908.00
GDP From Manufacturing	\$27,893.00	\$27,893.00	\$28,139.00
GDP From Mining	\$49,257.00	\$49,257.00	\$48,557.00
GDP From Public Administration	\$27,926.00	\$27,926.00	\$28,011.00
GDP From Utilities	\$11,529.00	\$11,529.00	\$11,735.00

**Re Labour** - According to ABS, the unemployment rate is making marginal improvements from the previous month (4.5 down from 4.6), with unemployed persons dropping across the past 3 months (701.14 to 679.15 to 639.24). August has seen a dramatic impact on part-time employment workers (-78200) from the previous month which coincides with a rise in youth unemployment (10.23 – 10.67). Inflation is hitting the labour market as can be seen in the rise of labour costs and the drop in productivity. Overall labour participation rate is down (66 – 65.2) and this is a key reason why the figures look more impressive than they really are.

Let's look at Roy Morgan's statistics which will likely give less spin. According to Roy Morgan there were 1.36m unemployed Australians in August, the 1st time since the 1st half of 2020 the labour force has contracted two months in succession. Roy Morgan indicates the true unemployment rate in Australia is a whopping 9.5%, with employment down from July by 157,000 workers with a drop-in full-time employed worker of 111,000. According to Roy Morgan statistics, far fewer people are looking for employment (a drop of 127,000) due to lockdowns with more people actively seeking part time employment (an increase of 67,000).

So, we have two sets of figures, but what is it really telling us? It seems the official figure of 4.5% is including employers who are doing zero hours through lockdowns. This is a key reason productivity is dropping. Jigsaw can attest there is a very real labour shortage in Australia in our vertical of supply chain, which is a result of zero immigration, a nervous market and increased investment in supply chain transformations increasing demand for skills. As corporations attempt to push for vaccines as a condition of employment, the unemployment rate across all sectors of the economy will be further impacted. Jigsaw would not be surprised to see even the official figures touching double digits in 2022 should the mandates persist. In combination with people being sacked for not complying to mandates that are arguably against federal law, (after all, why would you resign and lose your benefits and legal rights?) many foreign nationals are just waiting for the international borders to open and flights to resume so they can leave the country they once called home.



Labour	30/07/2021	30/08/2021	17/09/2021
Unemployment Rate	5.1	4.6	4.5
Employed Persons	13125.15	13165.4	13165.4
Unemployed Persons	701.14	639.24	639.24
Part Time Employment	17700	6400	-78200
Full Time Employment	97500	-4200	-68000
Employment Change	115200	2200	-146300
Labour Force Participation Rate	66.2	66	65.2
Youth Unemployment Rate	10.7	10.23	10.67
Labour Costs	102.1	102.1	104.9
Productivity	103	103	102
Job Vacancies	362.5	362.5	362.5
Job Advertisements	211854	206819	195995

**Re Money** - The central bank rate stayed at 0.1% and the money supply increased across M0, M1 and M3 adding to the inflation and devaluation of the Australian currency. Of the money supplies listed in the table, it is M3 money that is most relevant to inflation forces as it is the broadest categorisation of money considering M2 and M0 in addition to large deposits. M1 is more transactional. It is stored in checking accounts and demand deposits. If you look at the M3 chart over the past decade (see chart 1 - Money Supply M3 in Australia) you can see the money supply is ever increasing from AUD \$1,400 billion in 2012 to where we are today at AUD \$2,542 billion.

As the money supply has increased, so have loans to the private sector (construction sector) in addition to interest rates for the same time decreasing at an equal rate. This is the cause of inflation, rising house prices and the destruction of purchasing power for Australians. If we look at the central bank balance sheet for the same span of time, we can see it rises at a very gradual rate from 2012 to 2020, then it aggressively spikes upwards to the present day. This is further evidence that broad money is created by the primary and secondary financial institutions and not the central banks, who currently can only act as a capital support for the primary lenders. For the RBA to tighten its balance sheet, it must sell over AUD \$4,000 billion of assets into the marketplace to get back to 2020 levels. This will drive interest rates through the roof with the only tapering happening in the verbal use of the word itself, the actual change in fiscal policy will likely not happen. Foreign reserves spiked in August as the IMF issued Australia's allocation of SDR's (Special Drawing Rights) worth USD \$6.3 billion. It is worth noting that SDR's, unlike currency issued by a central bank is not a debt, as is the case with all other types of currency.

Money	30/07/2021	30/08/2021	17/09/2021
Interest Rate	0.1	0.1	0.1
Money Supply M0	\$329.50	\$390.97	\$457.90
Money Supply M1	\$1,461.09	\$1,484.51	\$1,497.44
Money Supply M3	\$2,468.46	\$2,512.40	\$2,542.43
Foreign Exchange Reserves	\$64,734.00	\$64,001.00	\$78,658.00
Banks Balance Sheet	\$5,169.50	\$5,169.50	\$5,169.50
Central Bank Balance Sheet	\$559,360.00	\$587,333.00	\$579,872.00
Loans to Private Sector	\$1,000.74	\$1,016.09	\$1,023.56



**Chart 1 - Money Supply M3 in Australia (1965 – 2021)**



SOURCE: TRADINGECONOMICS.COM | RESERVE BANK OF AUSTRALIA

Actual	Previous	Highest	Lowest	Dates	Unit	Frequency
2542.43	2512.40	2542.43	10.19	1965 - 2021	AUD Billion	Monthly

Source: [Trading Economics](https://tradingeconomics.com/australia/m3)

**Re Australian Trade** - Australian trade surplus hit a new record for July because of exports increasing 5% MOM (\$45.9 billion) driven by Asian demand for gas, coal and ore. Imports also increased by circa 3% (according to Reuters this was increased demand for telecoms equipment) yet the fact exports are still exceeding imports in value is highlighting an increase in TOT index. Foreign debt has also increased which is likely on account of overseas financial institutions expanding holding of Australian bonds to diversify investments, backing the strong trade surplus from commodity exports. This could all rapidly change with the potential collapse of the Chinese economy as indicated earlier in this month’s report. The biggest holders of external debt in Australia are the US and UK. If Iron ore prices continue to collapse and China continues to punish Australian exports, the nuclear submarine deal is another poke at the tiger’s flanks, then overseas capital may not find a home with Australian miners and Governments in future. More concerning is the lack of foreign direct investment, which has always assisted the Australian economy create jobs, innovation and stay competitive. By example, in 2015 FDI supported 1 in 10 jobs, accounted for 11,000+ businesses and contributed to over 41% of exports accounting for \$2.7 trillion in total assets. No doubt, if Australia can shift from exporting simple commodities to more complex finished goods through integrated supply chain investments from overseas manufacturers considering materials such as graphene, hydrogen and solar materials, then the future could still be bright. Analysts are predicting FDI to reach AUD \$48000 million by end of 2021 which looks unlikely. As Jigsaw highlighted in our introduction, the global press showing heavy handed police tactics on citizens, the fragmentation of the state premiers, lack of federal leadership and the irrational lockdowns will no doubt be a strong disincentive moving forward.

Australian Trade	30/07/2021	30/08/2021	17/09/2021
Balance of Trade	\$9,681.00	\$10,496.00	\$12,117.00
Current Account	\$18,283.00	\$18,283.00	\$20,461.00
Current Account to GDP	2.5	2.5	2.5
Imports	\$32,552.00	\$32,840.00	\$33,834.00
Exports	\$42,233.00	\$43,337.00	\$45,951.00
External Debt	\$2,126,051.00	\$2,126,051.00	\$2,150,759.00
Terms of Trade	114.3	127	127
Foreign Direct Investment	\$29,274.00	-\$15,363.00	-\$24,448.00

**Re Business** - Shockingly business confidence rose in August (up to -5 from -8) which if the figures are accurate would only be synced to the promise of the lockdowns easing at an 80% vaccination rate. Industries that would benefit most from an easing of lockdowns would be transport, property, and utilities. The true test of economic sentiment though is across retail, construction, and mining and with the continued



trade tensions, fiscal stress, and ever-increasing debts, it is not surprising these sectors are continuing to weaken. Both services and manufacturing PMIs are continuing to decline as a result of government policies across all States. MOM industrial production is forecasted to be further down by end of quarter (-0.2 to -0.5), with total production increasing (0.8 to 1.5). Manufacturing production is up from same period last year by 9.5% because of demand from a booming agriculture sector, strong exports and supply shocks impacting imported products. Long term projections are far more humbling and predictions for 2022 are at 1.3% compared to the just under 5% for 2018.

More interesting is the statistics between corporate profits being up, which was supported by sectors such as transport, postal, logistics communications, mining, and professional services. Sectors struggling and not contributing to the best results in 3 Qtrs.' were construction, retail, hospitality and manufacturing.

Business	30/07/2021	30/08/2021	17/09/2021
Business Confidence	11	-8	-5
Services PMI	57.8	60.8	51.6
Manufacturing PMI	63.2	51.7	45.6
Industrial Production	-1.6	-1.6	0.8
Industrial Production Mom	1.2	1.2	-0.2
Manufacturing Production	-0.5	-0.5	9.5
Capacity Utilization	83.89	81.17	81.17
New Orders	28	28	28
Changes in Inventories	\$3,339.00	\$3,339.00	\$2,529.00
Bankruptcies	431	449	423
Corporate Profits	\$110,721.00	\$110,721.00	\$118,299.00
Total Vehicle Sales	110664	84161	81199
Car Registrations	23361	23361	17339

**Re Consumer** - Like with business confidence, consumer confidence was depending on the easing of lockdowns and this resulted in a lift in September from August of 2%. Retail sales have dipped further from June to July (-1.8 vs -2.7), being safe to assume August will demonstrate further losses. Worst hit are cafés and restaurants. Overall, retail sales are down from this time last year (-3.1%) with analysts predicting a return to 2.5% by end of quarter. Jigsaw see this as unlikely as 40% of households are under mortgage stress and stimulus cheques are being saved not spent to make up for depleted savings, which have been rapidly decreasing since peaking in July 2020 along with consumer credit which has gone from AUD \$500 billion in the late 90's to now a staggering AUD \$3105.64 billion. As inflation takes hold, as can be seen by rising gas prices, savings will increase. Overall household debt to GDP is at 123.5% as recorded in Jan 21, with predictions of it increasing to 126% by mid-point of 2022.

Consumer	30/07/2021	30/08/2021	17/09/2021
Consumer Confidence	108.8	104.1	106.2
Retail Sales MoM	-1.8	-2.7	-2.7
Retail Sales YoY	25	2.9	-3.1
Consumer Spending	\$268,245.00	\$268,245.00	\$271,490.00
Disposable Personal Income	\$342,480.00	\$342,480.00	\$341,835.00
Personal Savings	11.6	11.6	9.7
Consumer Credit	\$3,059.06	\$3,088.77	\$3,105.64
Private Sector Credit	0.9	0.9	0.7
Gasoline Prices	1.09	1.09	1.12
Households Debt To GDP	123.5	123.5	123.5

**Re Housing** - As can be seen in the figures, building permits are down, construction output is down, construction PMI is down and home loans are also down by 0.4% (2nd straight month as June was a 2.5% drop), yet household sales are up. Home sales increased by 5.8% MOM with 7,446 Units sold in August. SA experienced the highest increase in sales followed by QLD. VIC and WA performed worst falling -10.8% and -11.8%. Lockdowns or borders have no doubt impacted WA. Jigsaw are seeing a growing appetite for supply chain professionals to relocate to SA and QLD and the economic future for these states is looking good on a backdrop of energy and commodity demand. The constraints of lockdowns on the construction of new houses have been reported as the core reason for increased house prices, and no doubt there is a supply shock happening at present pushing up prices. Still, increasing house prices is a direct result of low interest rates, poor tax laws on investment holdings and high-risk lending. In 2008 the housing crash impacted household capital, this time the dynamics are different. There is more capital now from financial institutions flooding into housing than any time in history. We have truly crossed the void of housing being shelter, it is now a financial instrument to be exploited by BlackRock and other global hedge funds. This makes future pricing of the housing market very challenging to predict and at Jigsaw, we are hoping the Evergrande situation will help give some insights into how strong the housing sector really is.

Housing	30/07/2021	30/08/2021	17/09/2021
Building Permits	-7.1	-6.7	-8.6
New Home Sales	5841	7038	7446
Housing Index	5.4	5.4	6.7
Home Loans	\$23,437.40	\$22,860.40	\$22,770.00
Home Ownership Rate	65	65	65
Construction Output	2.4	0.8	0.8
Construction PMI	55.5	48.7	38.4

## Step aside Finance, Supply Chain has Arrived

Welcome to the era of supply chain. For the past 100+ years, the business world has focussed predominantly on the sectors of finance, sales, and marketing to drive business growth and attract future C-suite leaders. With the onset of the pandemic the only function consistently hitting the media has been supply chain. By default, this trend has raised important awareness to how critical the chain of operations relating to product flow are and how rigid global supply chains have become. The good news is the uncovering of inadequate supply chains has a silver lining. Media coverage of the Suez Canal, supermarkets running out of inventory, container shortages and port closures will have no doubt stoked the fire of curiosity amongst future students, who will have spent many of their teenage years confined indoors whilst being exposed to ongoing media coverage of global supply chain shortcomings. This will have many school leavers selecting supply chain as a tertiary education, as its criticality to business success in addition to its true complexity are now hard to deny for anyone aspiring to make an impact in their corporate career. As Jigsaw has previously written, future supply chain graduates will understand the shortcomings of rigid supply chain thinking, how JIT concepts, lean and offshoring pose systematic risk to businesses, focussing on cost reduction and efficiency with not enough weighting on risk and flexibility. Unlike supply chain leaders of the present, they will have the advantage of growing up in global volatility where finance, healthcare, geopolitics, and pandemics have created a disruption of which the world has never seen outside of world wars. Prior to this, the mechanics of supply chain operations were turnkey, a result of the golden age of globalisation. The smooth still surface of the economic pond of debt and trade harmony hiding the jagged edged dangers of true risk. Turnkey best practice supply chain was lubricated by cheap money and the exploitation of unregulated countries, who sacrifice the health and lifestyle of their citizens to claw some economic gains and catch up with western prosperity. The west become too complacent and in turn helped decrease their countries overall wealth, all supported by governments. It's a harsh truth, but this never-ending drive for greater profits led the west to gut out its own economic infrastructure and turn its citizens into consumption zombies, whilst the east turned many of its citizens into production slaves for the lowest opex on the dollar.



Fortunately, tomorrow's supply chain leaders will have greater insight into supply chain risk, supply shocks and demand shocks. The supply chain courses will have a new curriculum based on real world evidence of operational fragility that the global lockdowns have presented. The unfortunate news is supply shocks are not going away anytime soon. Broken supply chains will impact populations in the not-too-distant future across energy, food and materials. As governments continue to push a nefarious agenda to coerce their citizens into vaccines that neither prevents the transmission of Covid or prevents the sickness of Covid, the labour markets are pushing back. As time progresses, many countries will see continued supply breakdowns resulting in supermarket shelves running out of inventory, manufacturing being halted and energy systems failing as governments and companies attempt to push healthcare mandates against the will of its citizens. This misguided government direction will not just break domestic supply chains, it will create more business insolvencies. Take France, as vaccine passports are in place to eat in restaurants the population have taken to having picnics in the streets, outside the very restaurants who are supporting the mandate, in turn driving them into insolvency. These mandates will not end well for businesses or the government over time. People do not like to have their human rights violated against no matter if they are vaccinated or not. When it comes to citizens having a choice between freedom and perceived safety, the bulk of people in the world will always select freedom. Safety is an illusion and can never be guaranteed or achieved for the living, yet freedom can, its attainable, real and is critical to our success as a species. It is a luxury the west has fought for too hard for to let go of.

## Supply Chain Breakdown – Semi Conductors

The most critical supply shock that looms heavily over global businesses right now is in the semi-conductor shortage. A semi-conductor is a critical component to many business operations around the globe that encapsulates everything from phones to cars. A conductor is a device that allows electrons to flow freely creating electric current. An insulator prevents the flow of electricity. A semi-conductor has the qualities of both an insulator and a conductor, depending on the voltage provided. The most used material to produce semi-conductors is silicon which is made from silica sands. The silicon atoms electrons can be manipulated by adding impurities (doping) such as Boron or phosphorus creating either N-Type or P-Type structures. As semi-conductors are flexible to voltage inputs, they are critical for sensors and many other complex electronics etc. As a result of this property, they are used in almost everything from phones, computers, cars, fridges, in fact every modern appliance is reliant on this technology, so a supply shock will impact the economy in a very big way in both consumption and investment. This is a detail that many investors and consumers need to be aware of as we move forward. No doubt the disruption of the semi-conductor supply chain could throw a curve ball into projected EV growth. As the capital flowing into commodities relating to battery technology such as graphene, cobalt, lithium, and manganese will experience a demand shock should semi-conductor supply chains lower production rates of vehicles and other appliances.

As an example of this risk, many vehicle manufacturers are already warning of elongated lead times for vehicle production and some manufacturers are forecasting a 40% reduction in volume due to semi-conductor shortages. Goldman Sachs estimates the supply shock will cost the automotive industry over USD \$20 billion for this year alone (2021). Bosch, which is the world's largest car parts supplier has gone on record stating that the semi-conductor supply chain model is no longer a fit for purpose and requires a transformation. This statement is not surprising when we consider a standard fossil burning vehicle utilises about 300 semi-conductor's vs an electric powered vehicle in the same category requiring 3000 semi-conductor chips. No doubt, the entire commodity supply chain is not fit for purpose. Electronic vehicles require vastly more lithium, copper, graphene, aluminium, and other exotic minerals. Two additional forces that will create supply shocks across the entire electronic consumable matrix is lack of capital investment in commodities and a lack of large mineral deposits being sourced by the mining sector. Again, this topic has been covered by Jigsaw in detail in previous articles.

So, what is the reason for the current supply shock of chips? Is it simply a result of the lockdowns throwing out inaccurate S&OP data? No doubt, the semiconductor market, like many other supply chains, must manage production in line with prediction of supply and demand. When the economy closed and economic projections were dire, many FAB's (Fabrication Facilities) were closed, and production of chips was heavily reduced, due to both real time order cutbacks and forecasted long term demand shock from consumers.

This lowering of production was on the back of declining demand for chips in the tail end of 2018. As Jigsaw touched on in last month's report re the economy, peak global growth was 2018, and from here the world has been contracting. Don't ever buy the narrative that Covid damaged the economy, not a chance. The economy was already broken in 2007 yet we limped on by making money almost free and removing accountability. From late 2018 the demand for chips started to plummet as consumer sales softened across phones, computers, and other electronic products. In 2019, the semi-conductor market was hit with its worst fiscal performance in over 20 years dropping 12%.

Jigsaw wrote about the abnormality of the modern economy in last month's report, where pre-2008, markets could correct, companies failed, and interest rates were allowed to rise. The Frankenstein economy struck again in 2020 with its unpredictable nature caused by government intervention. Central banks again distorted natural market forces and printed away the problems in the economy, supporting poorly run businesses and injecting free cash to the public, in turn driving up consumer spending, creating labour supply shocks and putting consumer demand on steroids. The combination of cash and lockdowns steered consumption into technologies that could enable in house entertainment or private commuting. This drove the semi-conductor markets back in to growth, and they achieved a 6.8% growth in 2020 and a staggering 19.7% growth in 2021. The chips mostly in demand were logic, sensor, and memory chips. In addition, fear and propaganda induced by media, governments, and healthcare sectors (who are profiting from fear) ensured that people avoided public transport if possible, resulting in car sales spiking, with the used car market being a key beneficiary, appreciating to all-time highs as new car production came under strain due to chip shortages.

Many supply chains can adapt quickly to volatile market conditions, especially if the product has a slow development and innovation cycle and the capital to enable production is cheap or utilised over a long cycle before upgrades are required to meet consumer demands. Labour is often the component that enables the expansion or contraction of production for such supply chains. Of course, in 2021, there is more complexity added with ocean freight rates, container shortages, port congestion, port closures and the impacts of the wider value chains that feed into individual supply chains. The semi-conductor supply chain has a few hurdles that make it especially vulnerable to volatility.

Let's explore some of the key factors.

Semi-conductor production is limited throughout the globe to a few key players. There are under 60 semi-conductor manufacturers existing today, which are tasked with meeting global demand for chips. Intel Corporation, Taiwan Semi-Conductor Manufacturing and Texas Instruments being 3 of the largest re MCAP. Other large brands include Samsung, Micron, Toshiba and Broadcom. These companies are mostly based in Taiwan, US, South Korea, Japan, and the Netherlands. In terms of global market share projections, by 2027 the US is expecting to increase chip capacity share from 18% to 24%, with Taiwan holding circa 40% of global capacity. South Korea will retain circa 17%. China by this time will be very far behind such markets with a chip capacity share of only 6%. These figures clearly bring to light China's economic interest in Taiwan, as a takeover of the country would secure China's economic relevance in the EV revolution with a dominant 46% global capacity share. Without this strategic manoeuvre, the past 20 years of strategy for economic dominance could be destroyed. As the market demand for chips increases coupled with ever increasing technological advances, only 3 suppliers (TSMC, Samsung, Intel) can provide the most advanced chips to the market.

Just like the Manufacturing markets in other sectors, semi-conductor companies can choose to invest in their own integrated supply chain which includes R&D, NPD and Production or can utilise an OEM (Original Equipment Manufacturer) that produces other businesses designs and product specs. The difference between these two models is labelled a FAB or Foundry or IDM (Integrated Device Manufacturer). Companies that outsource their chip fabrication include Nvidia, MediaTek, Qualcomm and Avago. IDM examples include Intel, Samsung, Toshiba, Sony, and Micron. As you can guess, the growth of FABS (Foundry's that do not design) and businesses that are Fabless (businesses that outsource fabrication) are closely correlated. IDM's do not sync with these two models as they control all their own design and fabrication so produce more advanced semi-conductor chips. In terms of revenue, comparing Fabless company sales vs IDMS, Jigsaw's research concluded in 2020 Fabless companies sold USD \$127.9 billion in integrated circuits. An increase from USD \$106.6 billion in 2019. IDMS accounted for USD \$257 billion in 2020, up from USD \$251.8 billion in 2019. IDMS must compete with both the innovation of fabless corporations and the foundry's profit margins via fabrication efficiency.



Although both models experienced growing revenues with Fabless revenue seeing the larger increase from previous year due to less cost and greater operating profit, the future will likely see IDMS prevail with their larger market share, scale and government backing across certain geographies that are required to mitigate supply chain risk coupled with the ability to produce more complex chips to meet market demand in AI and 5G.

The capital required for a foundry is in the USD billions. For example, in March Intel's CEO announced a strategy for expansion to design and build two new FABs in Arizona to the cost of USD \$20 billion, so that is USD \$10 billion per foundry. Initiatives like these are happening in many places around the world to strengthen domestic supply chains. Even a FAB (OEM equivalent) would typically have to invest anywhere between USD \$1 – USD \$2 billion to manage the production of outsourced designs. The core of any FAB is the clean room, which is a super clean environment where dust cannot exist, as the nano environment has particles far smaller in scale than dust particles. These clean rooms must operate at fastidiously narrow margins of temp and humidity and avoid vibration. The equipment required is both advanced and expensive, with each component ranging in value between USD \$700k and USD \$130m (such as EUV scanners). With this intensive investment required to produce chips, the semi-conductor supply chain is expensive and fragile. In addition to the plant costs there is the time lag to produce the actual chips. It takes between 2-3 months to produce a semi-conductor chip (6 months with testing), and delivery of product typically takes between 12 – 15 months. This creates a highly inflexible supply chain that cannot easily pivot when markets are volatile. Once chips are produced, it is critical they are sold to write off the huge build and running costs of the fabrication operations, which is almost entirely automated. If market demand drops and chips production drops, the losses are significant. Still the supply must be delivered no matter if the volumes do not cover the cost of operations as holding market share for these corporations is more important than profit. With the advancement of 5G, many of the world's FABs will require upgrade equipment to develop both new chips with increased volume of fabrication. To achieve this goal the wafers will have to increase in size by at least two-fold. A wafer is a thin slice of crystalline silicon which is used to produce integrated circuits. According to Dale Gai who is a Director of Research at Counterpoint, as more applications are migrated to 5G, data centres, autonomous cars, phones and defence systems, the increase in wafer demand per chip produced will hit 320,000 per month. In total, many analysts predict for the semiconductor supply chain to meet advancements in AI, 5G and onshoring or operations, investment in the semi-conductor sector will exceed \$3 trillion over the next decade.

We can conclude that the semi-conductor supply chain shocks the world is experiencing is complex, yet like many issues the world is facing right now, it was the lack of investment by both governments and corporations, lack of understanding of risk and too much globalisation that has led us to this point of multiple supply shocks. It is hard to ignore that the 1st domino to be pushed was the pandemic, which both induced lower production forecasts in a narrow, costly, and inflexible supply chain. Yet, government stimulus exacerbated the issue. Forced lockdowns + free cash prompted households to upgrade computers, phones, games consoles, cars and increased renovations surged the sale of white goods. The ever-fragile economic system compounded an already critical issue, with container shortages and ocean freight prices adding to the carnage. Material shortages will be the next problem, which are currently only held back by chip production limitations. The world of electric cars, chargers and 5G infrastructure is going to demand far more raw materials such as steel, Silica-Sands, aluminium, graphite, cobalt, and copper, which for an electric world is essentially the new oil.

As political a statement as this is, and Jigsaw are aware this report is a little political, western leaders have continued to prove they are too reactive, not strategic and are often too busy fighting among themselves or focussing on the wrong issues to actually deliver to economic requirements in which they were voted to govern. Government leaders cannot be at the mercy of corporations or outside institutions for their insights alone. To lead a country surely must require a cabinet that is highly qualified in healthcare, pharmacy, defence, supply chain, social sciences, and economics, so outside inputs can be considered, yet also questioned with confidence. Somewhere over the course of time we have strayed very far off the right path and we are all now paying the cost of this ignorance, neglect, and lack of accountability. We can only hope that



the recent events can lead us down a different path, with different leaders and one that every individual can impact. Never has an individual's vote mattered so much to future generations.

## The Supply Chain

What is a supply chain? In Jigsaw, we have been truly surprised over the past 18 years how fragmented business operations can be and how these fragmentations create huge losses in cost, efficiency and even impact the businesses culture. When Jigsaw preview an Org chart to lead a transformation, which we are often selected to do, it is common to see titles such as GM of Operations or COO (Chief Operations Office) and then downstream reporting in or as a peer, GM of Supply Chain or Chief Supply Officer. Often, procurement, which in the direct materials space should be solely under the eye of supply chain, is often reporting to the CFO. This indicates to Jigsaw, in line with our understanding of supply chain, the business has a narrow view of what supply chain is and it's questionable if the Board truly understand the value and risks associated with the supply chain function to their shareholders. At the very least, they are taking the end-to-end supply chain and dividing it into two, sometimes three separate parts. This results in the business failing to have a true commander with deep supply chain expertise who can coordinate the entire material/product flow of the business. For many companies, the term supply chain encapsulates material planning, storage, and distribution. As a result, the supply chain practitioners must engage and influence stakeholders in connected disciplines to obtain operational info flow in an attempt to create operational synergy. If the culture of the business is non-fluid, egotistical, vertically selfish, or simply ignorant to the requirements of other operations goals and requirements, you have a fragmented business that leads to increased risk, cost, waste, and shareholder value is greatly reduced. No technology can fix this issue, which is also why many businesses invest \$millions in ERP systems but get minimal value out of the investment. The only fix is to truly understand what supply chain is and implement the right structure in the business so the relevant operations fall under the right mandate to maximise value.

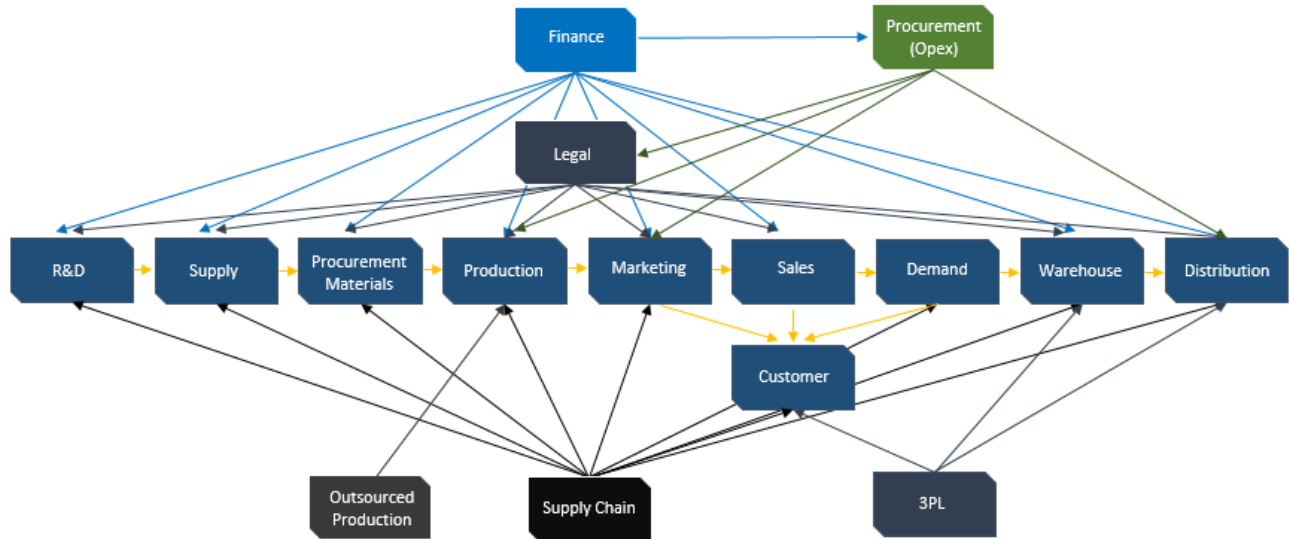
Supply Chain is the core operations of any business that is providing a tangible non serviced based product to the market. From design and development through to the stickiness of customers, supply chain is involved in almost every aspect of a business. It includes technology, finance, marketing, legal, production, sales, procurement and all the obvious functions such as distribution and storage. The question is, should supply chain have a complete control of the functions that contribute to direct materials/products created by the business and distributed to the customer? If that is to be recognised a supply chain leader must have knowledge of all verticals across the business and coordinate the Directors of these verticals as a cohesive team. Influencing and no mandate to gain an understanding of business verticals that contribute to supply chain effectiveness is not going to deliver optimal outcomes. If shareholders knew that employees in the same company were not enabled to deliver the maximum value of their function because Geoff or Tina in Sales does not have the time or is bothered enough to care about material supply and waste, then Geoff or Tina should be shown the exit and the board should approve. This is the same for any input function of the supply chain. Moving forward, the Board and the Managing Directors of businesses must deepen their understanding of what supply chain is, the real value that can be created and the real risks of not getting it right. Org charts require a true C suite leader who can drive the entire material flow with expert heads of engineering, procurement, finance, technology, marketing, logistics and production working as a cohesive seamless team to deliver shareholder value. However, as we move into the future, this will all be automated, as we will discover in the next section.

Below Jigsaw have structured a typical supply chain operation. We have attached how each department interacts with other departments to give an example of how connected the function should be to achieve maximum shareholder returns and mitigated internal risk of below par operations. We have then looked at how the digital revolution may impact these functions over the next decade, attempting to make some predictions to how these core functions may change as the world embraces 4.0.

As always, we welcome any opinions from our network of topics or trends that we have not considered .



## The Supply Chain Matrix



**R&D** - Time compression and energy optimisation are the themes that will shape the future of research and development. In the past, engineers were reliant on hardware to evaluate the feasibility of future products. Digital systems would be utilised only as a complementary phase of the end process. Typically, a design would be digitally fabricated using computers, such as the wing of a plane or the chassis of a vehicle and a physical prototype would have to be constructed out of raw materials and tested. Should this structure prove not optimum, the design would be scrapped, tweaked, rebuilt. Of course, this process of assessment takes time and money, elongating product to market, increasing the cost of the R&D process and indirectly resulting in opportunity losses. With the increasing power of semi-conductors, 5G networks, AI and digital thread, innovation will be empowering engineers to fully design and test products in the digital world without having to build the physical product until it is certain the design is 100% accurate for the customer and business requirements. Rapid prototyping will be the future and it will be cloud based. This of course will reduce costs across labour, energy, materials and compress the time it takes to go from concept to launch. It also means that R&D will be more agile, integrated and potentially could lead to a large disruption of the labour force. As new product development is compressed, competition will heat up for the most innovative engineers. As the process is entirely digital, global talent will be easily accessible, which will require huge investment in background checking and cybersecurity to ensure IP is secure. It also could mean a deflation of incomes across the global engineering community. As talent attraction and utilisation becomes ever more global, currency arbitrage will be a real threat to professionals who are in expensive countries. As technology evolves to be ever smarter, the volume of R&D teams will also contract, creating a similar disruption as that of the manufacturing sectors via the evolution into automation.

**Supply** – The issue with a fully integrated supply chain is third party suppliers. No matter how well a business connects to its customers at the front end, many advancements in a business’s own supply chain efficiency are limited by the sophistication and reliability of its tail end. The construction sector is a strong example of this. Construction as a sector has struggled to transform supply chain effectiveness at the same pace as other sectors of the economy such as retail and manufacturing. A key reason, aside from its project bias, is supply fragmentation and sophistication. A large part of the construction sectors supply base is small, unique, crude family-owned businesses that do not warrant the investment in digital integration due to volume of supply or costs of implementation. Jigsaw see a future where supply integration of raw materials or MRO components will be a favourable outcome, enhanced by ownership of the supply rather than connected via supply agreements. The shift from supplier of direct materials to complete material integration and ownership will create superior knowledge, control, and cost management by enabling digital end to end integration of the entire supply chain, giving full control of automation and communication integration, and removing the need for direct procurement entirely as a heavily administered contract heavy operation. As businesses build or acquire their own supply base of direct materials by either equity split arrangements of in ground resources across the junior exploration and production complex, or through private ownership of land and farms, the

more success and value will be driven from integrated material planning, production solutions whilst heavily reducing 3rd party risk. This however will only be a model that can benefit a small portion of businesses, but for those that can fully own direct material supply and integrate a digital chain the commercial advantages will be exponential. Key to the decision will be a cost benefit analysis of capital investment required, location of supply to customer, market size and predictability of long term demand, flexibility of the chain and life cycle of product coupled with materials required.

**Procurement** – For businesses that do not have the scale or access to fiscal investment and resources to integrate raw supply, procurement will still be a much needed digital/analogue hybrid component of the supply chain. In a digital world where cloud ledgers become a normality, paper contracts will be obsolete. As digital procurement gains momentum from transactions through to digital category management, there will potentially be two models that compete for market share. Outsourced end to end procurement operations will be leveraging the cloud based digital business landscape, attempting to inject themselves seamlessly into a broad array of supply chains. The offering will be centralised aggregation of big data, AI, predictive analytics and seamless eco systems that create value to the two-sided customer base of suppliers and buyers. Competing with this model will be insourced procurement enabled by market aggregators who will develop supplier ecosystems removing the requirement for tenders. Supplier data will exist in real time taking into account its fiscal, product, Service, ESG, Leadership, Acquisitions and other business structure changes. Suppliers will either offer a standard service offering to the B2B markets if controlling a monopoly and smaller growth sectors will use flexible offerings to gain share. Such supplier eco systems will enhance transparency between supplier, business, and customers. As cyber security advances, more value chain transparency will result enabling more informed acquisitions and informed operational integration. As the digital world advances, many organisations that typically procure physical supply will have to quickly advance the learning curve of software and digital service procurement. Getting this procurement investment wrong will lead to huge risks across the digital supply chain network and open the business up to in-efficient supply chains, inflated deals with trailing costs that do not deliver on expected value in addition to the risk of cyber-attacks.

**Production** – The automated production market is going to grow to a USD \$13 billion sector by 2023 and smart factories are going to be critical to any business seeking to compete on the global stage. Less volatility, lower cost, less energy, and reduced waste will be required to meet ESG requirements and produce product of superior quality at a cost that makes a commercial operation feasible. Agility is the key to optimising supply and demand shocks with production being a key component of the supply chain. Real time data, condition monitoring and predictive maintenance will ensure a seamless supply chain that can pro-actively signal maintenance requirements, apply accurate economic order quantities and reduce production downtime. Robots and AI will advance quality control and material flow throughout the production complex in turn optimising time to produce. The sad reality of the 4th revolution is human labour will not be required for most of the globe's largest manufacturers. This will equate to a labour supply surplus which could drive down incomes across the small to mid-cap business matrix. It also poses a moral hazard for growth businesses who aspire to gain in size and scale to advance to the full suite of digital supply chains. Workers will essentially be helping business gain enough scale and revenues to where they are no longer needed. You could argue this is no different to how westernised workers aided company growth to where offshoring and outsourcing also took their employment opportunities away. The difference being that labour was still required, and just migrated to other geographies. Somewhere, someone in the world did benefit. In the future, the labour disappears entirely throughout the globe. ESG is the perfect commercial weapon to empower large oligarchs who have the scale and resources to exploit modern technology that fit the ESG narrative to place pressure on businesses that do not have the capital or scale to invest or benefit from such models. The question is which came 1st, the technology or the ESG mandate.

**Marketing** – Surprisingly there are a lot of companies globally that still do not see Marketing as a component of the supply chain. In Australia this is particularly true. For many years companies have thought of supply chain as an interchangeable phrase with logistics and this mislabelling and understanding has caused major operational flaws. Supply can be driven by demand and demand can be driven by supply. Which is the driving force depends heavily on marketing, price, uniqueness of the product, opportunity, quality and accessibility. Marketing is the key function that exists in a business to promote a product and create consumer appetite. Typically, this is done by playing on the individual's psychology by making them feel a fear of missing out (FOMO), insecure, fearful or directed at the ego, essentially making the target believe the product being



promoted will make an individual more attractive, cooler or more successful. Along with sales, marketing is synced to the volume of product required for consumption which in turn drives the volume of raw materials required to produce.

No doubt, digital marketing is the future, no surprises there. Jigsaw have already written in detail about the ongoing trend to omnichannel strategies across the retail sector which is enabling an integrated and sticky brand experience. The future success of many businesses, especially start-ups, without an already sunk investment and huge volume of subscribers will be digital marketing. Historically most of the start-up costs to a new business was spent on engineering and product development. In the future, 50% of all start-up capital will go towards digital content. Performance based digital marketing across Google, LinkedIn, Facebook, and SEO will continue to expand with customer engagement being the primary marker for success. Engagement is customer interactivity which is “likes” but more importantly “comments”. According to Jigsaw’s research, new content will be less impactful moving forward, what will matter is content update via blogs. Translation will be another important contributor, especially if global capture is the strategy. The more your content is converted into local dialogues, the more audience and engagement will be captured, in turn driving the required ROI. The future of digital marketing and smart apps will enable businesses to capture and understand individual behaviour patterns (micro targeting) that will be able to promote goods and services in real time, taking into account a person’s mood and situation. This will no doubt create an arms race between consumers defending exploitation and marketing ROI. No doubt there will be a power play between content control and a balance will need to be found to who controls who between consumer and marketers. As with digital production, the future does not look good for human dependence, as advancements in AI will enable marketing to be automated entirely, with algorithms and big data empowering the outcomes. If marketing is automated, what does this mean for the sellers?

**Sales** – Jigsaw have always understood the difference between solution design and selling. Whenever we hear the word sales, to be blunt, we cringe. Why? Selling is the art of pushing a product onto somebody that they do not need. Marketing exists to soften the sell by creating the need for the product that did not exist previously, so the seller can then have an easier time pushing the product to the target audience. If marketing is done extremely well it removes the need of a seller entirely by creating demand via the promotion itself. Selling is a skill that is arguably redundant in the modern world, even now. When the world was fragmented, when the internet did not exist and people were not walking round with computers in their pockets more powerful than what it took to launch a man into space, sure, it was needed. In 2021, if any business invests in cold calling or door knocking and compared ROI to modern digital campaigns, the cost to benefit gap would be night and day. Yet, we still hear of businesses that do it. For many businesses the sales rep has been replaced with an account manager, whose role is to pretty much trouble shoot issues between the B2B relationship, attempt to farm the client across a wider product range or understand in more detail how the marketing team can channel appropriate strategies to increase product uptake. As Jigsaw covered in our Marketing segment, as AI and smart apps gain more traction via advancement, the need for a person to leverage a relationship will be less. Relationships, no matter how warm, often have barriers. As apes it’s how we have evolved. We are by nature political, tribal, and manipulative creatures. It is a key strength in our makeup that led us to where we are today. The point is, people will be more open and honest with a device than with another human, especially when it comes to consumption and desires. This is because AI will be able to capture the unintended tells of the human who is interacting with it and the outcome will enable superior marketing to be channelled. People are good at interacting with other people, we have evolved to do this. We are not so good at interacting with a device and our guard is dropped. So, it seems, the future of the salesman and the account manager may well be under threat as the digital revolution takes hold.

**Planning** - The world has had the raw components to enable a genuine end to end supply chain for many years. Robotics, AI, ERP Systems, Machine Learning etc. What has changed is a company’s ability to systematically integrate these technologies to drive a seamless, coherent material flow from design to consumption. Supply chains, as Jigsaw have written in multiple articles, has gone global over the past 20 years, which presents a new criteria of risk and complexity. The complexity, scale and cost of demand driven supply chains have been a catalyst for new technologies to be implemented and this evolution of replacing people

with technologies is going to accelerate like never before. According to Amy Thorne, who is the CEO of Supply Chain Leaders, asset leverage and human behaviour will be the biggest disruption for supply chains in the future, yet she has no doubt, supply chains are quickly transforming into profit centres, where the capital invested into the digital supply chains will be less than the dollars extracted. When it comes to supply chain planning, automation driven by big data and predictive analytics will be key to enhancing the heart of the supply chain function. All actions of procurement, production and design will be connected to the outcomes of digital marketing, product adoption and customer behaviour. The data capture on product uptake, customer mood, lifestyle and cycles will build accurate predictions of consumption. Flexibility and agility will be the criteria of the future and the technology will have to capture and pivot across every SKU in both local, regional and global markets, pro-actively tweaking the levers of price, volume, materials, etc. The question will be, are consumers driving the supply chain process or is the supply chain process driving consumer behaviour. Jigsaw believe the technology of the future will be powered by Google, who will be an aggressive competitor to current supply chain systems in play. This would make sense as Google will be the key platform driving digital marketing so it would make sense for them to exploit this and capture market share

**Logistics and Warehouse** – Like all other components of the supply chain, the future of storage and distribution will also be transformed using flexible automation, big data and AI. From tracking and tracing each SKU from cradle to grave to smart warehouses that self-optimize via full automation and self-learning programs. Labour and capacity have always been a challenge at the tail end of supply chain. Typically, turnover is high within the storage sector due to geographics, low wages, mundane work and alternative options available in other sectors. Remote warehouse operations will open up the labour force to a broader spread of people. Enabling people to work a remote forklift from home will remove many of the issues that create labour volatility and allow people with disabilities to have access to jobs that prior were physically not possible. As businesses advance and invest in robotics and automation, no doubt the overall demand for human labour will decrease, enabling increases in productivity, cost reduction and waste reduction. TMS (Transport Management Systems) will connect with ELD (Electronic Logging Devices) systems and will be cloud based with real time insight into the ordering, transport, and customers. API's (Application Programming Interfaces) will enable elastic logistics, where rigid storage is replaced by rented storage containers close to ports that are fit for purpose at specific cycles or timeframes. This can only be made possible with real time data being processed to enable such options to be adopted. From macro distribution to micro distribution, drones and automated vehicles could well be a theme to deliver parcels more efficiently, removing the constraints of civil infrastructure and the time lag of human labour having to climb stairs, ride bikes or use lifts. In summary, the future of warehouse and logistics will be one of 24/7 connectivity, real time communication and learning between product, systems, storage, and transport, all of it centrally controlled and managed via big data, chips, and processors.

**Channel Management (Customer) Info Gartner** – How will businesses treat customers in the future? How will they assist the people who engage with them and procure their products and services? No doubt, in the past and even today, many businesses focus on the customer at the end of the supply chain process, via call centres etc. Customer centric strategy will require the customer to be considered not just at the R&D and delivery phase but through the entire supply chain process. Again, AI will be a key innovation to cementing customer loyalty. According to Gartner, by 2022 50% of large-scale businesses will have not succeeded in unifying engagement channels, stagnating customer experience against competitors. They also predict by 2023 30% of large-scale businesses will have AI driven customer strategies that will be pro-active and provide a continuous intelligence and by 2024 these same organisations will be providing a holistic customer experience resulting in a 25% improvement in customer satisfaction across end consumers and employees who deliver the experience. So, what will all this involve? Well, the trend again will be a lack of human involvement as Gartner predicts in the next decade business will have a fully automated customer centric digital process that will involve chatbots driven by AI with complete access and understanding of company records and operations, video, digital source to pay, digital order to cash, virtual customer assistance, process automation, customer management BPAAS, learning BPO and customer analytics. All these systems that connect to the wider digital supply chain will result in greater attention to detail, speed, emotional fulfilment, and a tailored service to the individual expectations and requirements.



## Conclusion

As we look into the future it seems there are some very real challenges as a result of advancements in technology. For future CEO's and Equity holders, the opportunity to run a business on absolute logic and efficiency without compromise is getting closer to a reality. Business transformation could be a label that perishes as businesses adapt constantly to the ever-changing world around them, all assisted by applications, software, data, semi-conductors, algorithms and robots. Change Management will likely be executed by a data supply chain scientist and software engineers, not skilled persons with a discipline in human emotion, processes, systems, and governance. The values we cherish and the liabilities that haunt us such as emotion, passion, loyalty, human rights, pension obligations, health and safety, human resources and lawsuits could fall by the wayside. The future head of supply chain will likely be a hybrid role of technology and operations. The head of every business function will be digitally inclined with small teams of programmers and data scientists to support them. Over the prior 18 years Jigsaw have often dealt with complaints from employees of businesses adopting strategies that work great on the white board yet fail once implemented in a real world as idealism clashes with emotion and values. It seems in the future this issue could vanish; the white board will connect to reality and the only people to be considered will be the data scientists and programmers limitations.

And here is the dilemma. As businesses become less dependent on human skills to make their operations succeed, higher levels of unemployment will occur throughout the world, and the population is increasing. In future, if people are not required in the work force, then how can they still be a customer for future enterprises? If people cannot work, they cannot earn money, resulting in them not being able to afford the products and services that are being designed, produced, and marketed to them by software and chips. There is no point having a ruthlessly efficient business that can reduce its cost base by 50% with almost zero human induced volatility, if you have in the process destroyed the very customer base that allows you to make a profit.

Will this 4th revolution of the economy succeed as planned out by global leaders and influencers who attend the World Economic Forum? Could it be that there is an oversight at play? We may be able to conquer human emotion and volatility in a single supply chain, yet there seems to be a built-in dependence for consumption for the new world order to succeed. If you eradicate employment on mass, you eradicate the worlds means to enable consumption. Does our need for constant change, innovation, efficiency, and profit hit a tipping point that sends humanity backwards? Like a wheel spinning so fast it seems to be going backwards, at what point do our creations equally destroy. The world is full of choices, yet there are no solutions with zero cost, in every aspect of our lives, whether it be relationships, diet, career, investments, exercise or pandemics, there is a balance of costs and benefits that have to be assessed. Should our desire for innovation not be so focussed on the destruction of labour and be targeted on recycling raw materials, solving disease, hunger, poverty or any other thousand issues that are facing humanity? It seems most innovation comes from the desire for increased control, power and profit. That was the truth of our past and it seems it is going to be the truth of our future. We are evolving technologies at a superior pace than our brains can process the potential carnage these advancements can create to the aggregate population. At least that is the kind rationale for what is happening, as the alternative rationale is truly scary.

Digital advancements across the supply chain work well in a vacuum. For the businesses that are the 1st movers to exploit these new technologies the benefits will be dramatic, as there will still be consumers with a means to exploit. Profits will surge and shareholders will be happy as the top 25% of global businesses leverage the digital revolution to increase even greater market share. In the short term, tier 2 businesses may benefit, as the employees that are made redundant from the top 25% seek new employment in companies that have not had the budget or scale to exploit the autonomous operations. These businesses then leverage the expertise of the newly acquired blue-chip workforce and learn the secrets of the top 25% at drastically less cost, these hires push out the less experienced 25% and as time goes by, wage deflation escalates as the oversupply of labour bleeds into the market. In time, the tier 2 businesses embrace digital as technology becomes cheaper and their human expertise appreciates. Now they too embark on the full digital autonomous supply chain journey and make their own workforce redundant. Now we have 50% of all businesses at full



autonomy supported by a minimal human head count. The remaining 50% of operating businesses are now pushed out of markets entirely and in a short span of time go bankrupt. They cannot compete re cost, efficiency, predictability etc that the newly digitised supply chains can achieve.

The big questions are, do we end up with an economy made up of fully automated businesses that have zero means to make profit? What does the bulk of the population do if labour is not required of them by corporations? Do the mostly autonomous businesses eventually also go bankrupt via lack of demand? Has the innovation cycle eaten its own tail?

If this sounds farfetched, we can evaluate what rapid globalisation of the supply chain achieved for employment prospects and economic risk in the western world. It started in the very same way as this 4.0 revolution. The outcome achieved seems to be short lived. The world is in debt, with no economic security, already mass unemployment, crime, and poverty is on the increase and with ever lowering GDP per capita in the western world. Rapid globalisation looked fantastic for the first decade, was acceptable in the 2nd, yet as time passed the cracks appeared. What was a good initiative for a few businesses (1st movers) became catastrophic in aggregation? Then there is the service sector which is a secondary economy that feeds off the businesses that actually produce real stuff. The service economy was a key beneficiary of the offshoring and BPO movement, but it will not fare so well in this new digital transition. If businesses in the primary economy run at full automation, then there are less lawsuits to attend, banks will have less customers to provide credit to, as many people will not have jobs to repay loans and other sectors will perish as income per capita stalls. Adding to the deflationary carnage is the central banks. As the digital central currency is deployed by central banks, tax accountants and other services attached to the current monetary system will be destroyed. In future the central banks will compete with mainstream banks, eventually wiping them out. People's ability to work, spend and be free will be removed entirely.

Have no doubt, social credit systems are the future, which is the key reason behind the vaccine agenda that is in play. The digital world is not going to benefit the 98%, it will only serve the 2%. The central banks cannot execute the transition to central currency without the people throughout the world accepting vaccine passports. To make this happen we have been exposed to the most sophisticated, coordinated agenda driven by media, pharma, finance and governments with fear and social divide being the catalyst to drive change. A central digital currency would not be accepted as a social re-engineering for transactions alone. The future is bleak if this continues. Our children will live in a world where passports and social credits will be required to have access to consumption, travel, careers, and shelter, all empowered by data, algorithms, bots and AI. The chance of them being an entrepreneur in control of their own wealth, property and destiny will be destroyed. The world is now connected enabled by Facebook, Google and other integrated channels, and the elites have an idealistic view of how things should be. The technological idealism has moved from an individual company to a New World Order, where control of the masses is digitally empowered and centralised, apparently for our own benefit. How we medicate, spend, travel, socialise and leisure are all heading towards a permission pass and our own individual property is being eroded.

Many in society of course will disagree with this analysis, or even agree with it and be ok with it. Some will see it as journey of natural advancement. Some people may believe it is great news. We hopefully get to consume more, have more free time, and have the advancements in technology to produce for us, track crime and simplify money. If in the future the world requires less labour, does this mean the governments have to literally pay people to eat, live and consume with zero receipts collected? Could we really live in a world where MMT is the normality, and we are paid to play? It's doubtful. The cold hard truth is the world was broken and had been broken for some time. The elite class knew this only too well, and slowly the citizens around the world were catching on to the global Ponzi scheme that was running out of fools. 2019 saw a series of protests that no corner of the globe escaped. Over 6 continents were under siege by their disgruntled citizens. Paris, US, UK, Baghdad, Hong Kong, New Delhi, London, Beirut, Seoul, Jakarta, Moscow, Berlin, Prague, and Manila to name a few. These global protests varied in cause, but all were targeted at a discontent with the governments and a collapse of wealth. Many of the protests were due to the devaluation of currency, be it the price of bread, gas, or travel rapidly rising. Many were to do with government corruption, and some were driven by media induced divide using race to light the fire. Riots achieve two things for governments. They divide populations so that the focus of their suffering is blamed on their neighbours and not the true cause, the governments. It also destroys the value of real estate to be picked up by hedge funds. It is no



surprise that all US riots were in States where a central bank was based. The people of the world were suffering prior to lockdowns and the pandemic. Societies conditions were deteriorating, wealth was contracting, whilst elites were struggling to get richer. The lockdowns turned the tide and made them richer still. In 2019 the middle class were getting demolished at a rapid rate, the poor were simply getting poorer (see the homeless in California as an example), and no doubt this trend has increased 500% in 2021. Globalisation had hit the tipping point. Countries have had their economies gutted to enrich the elite classes over the last two decades and it seems in 2019 the world had had enough. The pot was at boiling point. Only global lockdowns empowered by media, control information and disinformation changed the focus of the masses. People had two values in the past to governments, labour and consumption (you could debate voting as a 3rd). In future it seems, 50% of this value is removed. All economic systems have a beginning and an end. No different to segments of time impacting a species, such as the Triassic, Jurassic, and the Cretaceous. History teaches us how fragile civilisations are. Greeks, Egyptians, Romans, it does not matter, eventually a civilisation runs its cycle and collapses rapidly once the dominos start to fall. It seems the US is close to its own sunset, with its best years behind it. These collapses have similar trends. They usually fall because the people lose their freedoms as the leading class fear the civilians they rule over. Or there is a devaluation of the monetary system due to the elite class abusing the system, in turn transferring wealth away from their citizens into their own pockets.