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AVATARS TO SEE THE FINANCIAL IMPACT OF INDUSTRY CYCLES ON REGIONAL QUEENSLAND

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ABSTRACT

Customer avatars are employed to better understand the financial and social impact of industry cycles on earnings and housing occupancy costs, in regional Queensland. The avatars Doug, Zac, and Bernie, live and work in communities dominated by tourism, mining, and agriculture industries respectively. During the past 10 years their earnings and job security have experienced rises and falls, and this has had a profound impact on their financial wellbeing, and that of their avatar families.

This paper commences with a review of existing research into the financial impacts of industry cycles on earnings and housing rents and prices. The review extends to consider the use of personas, or customer avatars, from marketing and systems research, to better understand and communicate the financial wellbeing of residents in communities subject to changes in financial security. The research then describes the development of the three fictious people, using statistics, to reveal their financial and social wellbeing.

Keywords: industry cycles; customer avatars; personas; financial wellbeing; housing costs; regional development, housing.

INTRODUCTION

The relationship between industry growth, regional development and community prosperity, or personal financial wellbeing, is complex. Further research into regional industrial diversity, industry cycles, differences in median salaries among the regions and initial house prices may create a clearer higher-level perspective. That said, alternative means to share the impact of industry cycles is required to inform decision makers and residents in regional communities.

We are focusing on the mining region as mining industry has been a driving force in changing housing markets in regional Queensland. We compare the mining region with two other regions which are predominantly agricultural and tourism regions. This comparison helps to assess the extent of the effect of the coal mining cycle on regional housing market beyond the mining regions.

This research commences with a review of existing research into the financial impacts of industry cycles on earnings and housing rents and prices. As a novel approach to share the impact of industry cycles on regions, personas, or avatars from marketing and systems research are considered. The review specifically considers the benefits and detriments of personas and avatars to better understand and communicate the financial wellbeing of residents in communities subject to changes in financial security. We then approach avatar development in a mixed method approach considering the common persona creation steps and strengths and weakness uncovered in the Jansen et al. (2021) study. The development also considers the persona creation problems and the approach adopted by Microsoft in the research shared by Pruitt and Grudin (2017).

PREVIOUS RESEARCH

This review considers existing research into the financial impacts of industry cycles on earnings and housing rents and prices. It extends to consider the use of personas, or customer avatars, from marketing and systems research, to better understand and communicate the financial wellbeing of residents in communities subject to changes in financial security.

Financial impacts of mining industry

Past studies have found that there is a clear relationship between industry prosperity and rising house prices (Higgins & de Valence 2000; Connell-Variy & McGough 2020; De Valck, Williams, & Kuik 2021). That said,

the relationship is anything but simple. The relationship does not apply uniformly to other classes of property, as found in research by Higgins and de Valence (2000), and there are key stakeholders such as financiers and property developers causing delays or disruptions to predicted property cycles (Rottke and Wernecke 2002).

Connell-Variy and McGough (2020) tested the industry and property relationship in their research into house price movements in Queensland resource communities. They found a clear relationship between increasing prosperity, during a mining boom, and an initial increase in house prices. They argue that the mining boom was only one stage of a more complete cycle, and the impacts of this resource cycle on housing were particularly nuanced (Connell-Variy and McGough 2020).

Besides the nuances relating to residential house pricing Williams and Nikijuluw (2020) examine socio-economic indicators between coal mining and non-mining local government areas in Queensland. They found residents in coal mining areas had better income and employment indicators. That said, they also found coal mining activities had the potential to create inequality problems, leading to higher rent stress for low-income households.

De Valck, Williams and Kuik (2021) specifically compared coal mining, livestock grazing and nature conservation expansion scenarios in the coal mining region of Bowen Basin, Queensland, Australia. They combined the cost benefit analysis and social risk matrix to estimate the net benefits of each option over 31-year period. The findings showed that mining had a negative net present value, while other options had positive net value over time. That study demonstrated that the long-term impacts of coal might indeed be negative when the economic, social, and environmental costs are taken into account.

Outside of regional Queensland, Betz, Partridge, Farren, and Lobao (2015) investigated the effect of coal mining on the economic development in Appalachia, USA. They found the negative association between coal mining and population growth, stating that coal mining is likely to hinder the entrepreneurship and therefore future economic growth. Similarly, Sincovich, Gregory, Wilson, and Brinkman (2018) identified several negative impacts from coal mining on mining communities including housing issues, lower education, income inequality, and higher mortality rates.

The relationship between industry growth and community prosperity, or personal financial wellbeing, is complex. And as shared by Connell-Variy and McGough (2020), the longer-term impact of industry on societies needs to be considered to inform the funding of services and establishing appropriate support programs. While further research into industry cycles and higher median salaries and initial house prices may create a clearer higher-level perspective, alternative means to assess and share the impact of industry cycles is required to inform decision makers and residents in regional communities.

One novel approach to assess and share the impact of industry cycles on regions, is to employ personas, or avatars from marketing and systems research.

Consumer avatars

Segmenting, or grouping customers, is embedded in modern approaches to strategic marketing, product design and system development. The approach is not new, and there is a body of knowledge informing customer segmentation since Smith (1956) presented market segmentation and product differentiation as strategies in marketing. Due the availability of online data and social media, approaches to customer segmentation in marketing have advanced with a focus on user personality and cognitive style profiles (Antoniou 2017 and An, Kwak, Jung, Salminen & Jansen 2018).

Personas, or even avatars, are an extension of customer segmentation, with an actual segment of customers presented as an imaginary or fictional person. Even though a persona is not a real person, a name and a picture are selected to represent the fictional representative (Maiaskiewicz and Kozar 2011). The persona narrative starts with a description of the type of individual that the persona is, likes and dislikes, occupation, and so forth. Then, the persona's specific needs and personal goals in the context of the product being designed are described. This segment of the narrative helps to inform the resulting design decisions (Maiaskiewicz and Kozar 2011).

Avatars may be developed from a prescribed set of attributes or even used as one means to reveal a user's the cognitive style (Antoniou et al 2013). While abstract user representations originated in the marketing, Cooper (1999, cited in Pruitt and Grudin 2017) applied personas to design and systems development. The personas were seen to overcome designers vague or contradictory sense of their intended users (Pruitt and Grudin 2017). According to Cooper (1999) and Pruitt and Grudin (2017), personas can engage team members in a more

nuanced way, providing '…a conduit for conveying a broad range of qualitative and quantitative data, and focus attention on aspects of design and use that other methods do not' (Pruitt and Grudin (2017, p.1.). They see the value in personas as providing a shared basis for communication.

Through incorporating expert opinion with Delphi methodology Maiaskiewicz and Kozar (2011) examined the benefits of incorporating personas into design process. They found the most significant benefits of persona use to be associated with focusing on the end user, prioritizing product requirements and audience while challenging long-standing assumptions. Maiaskiewicz and Kozar's (2011) ten most significant identified benefits are detailed in table 1.

Table 1 Benefits of persona use

Audience focus	Focus product development on users/customers and their goals (rather than the specific limitations or opportunities presented by technology)
Product requirements prioritization	Prioritize product requirements and help to determine if the right problems are being solved
Audience prioritization	Prioritize audiences and bring about a focus on the most important audience(s)
Challenge assumptions	Bring to the surface and challenge long-standing (and often incorrect) organizational assumptions about the users/customers
Prevention of self-referential design	Help individuals realize how the users/customers are different from themselves
Decision guide	Are the basis for product design decisions by providing a clear picture of customer needs, and the context/environment for these needs
Agreement catalyst	Aid in achieving agreement on product definition decisions by clarifying the user/customer goals to varied stakeholders and interests
Engagement and unification	Engage, unify, and educate individuals who are not close to the users or the user research (such as potential investors, product marketers, or engineers) by creating a clear picture of the product or service
Empathy creation	Create an understanding of and emotional identification with the users/customers
Innovative thinking	Stimulate innovative thinking that produces new and better solutions that meet the user goals

(Maiaskiewicz and Kozar 2011)

According to Buisine, Guegan, and Barré (2016) exposure to personas also leads to behavioral assimilation, but the embodiment of personas, through an avatar, is expected to lead to even stronger behavioral effects. This is supported by a study exploring immersive virtual environments, where Yee (2009) found that identity cues in a digital self-embodiment led to a greater amount of behavioral change than in the condition where the identical visual stimulus was provided without digital self-embodiment.

Approaches to the avatar and persona creation may be categorized into qualitative, quantitative, and mixed methods approaches. Jansen et al. (2021) systematically contrast the strengths and weaknesses of these approaches to evaluate the potential of personas for the domain of digital innovation. Strengths of qualitative persona creation include enhanced complexity with multi-layered and nuanced user behaviors, while weaknesses include bias, with profiles plagued with biases and idiosyncrasies. Quantitative approaches benefit from early-stage evaluation, where hypotheses may be tested before the personas are created, but suffer from segmentation disconnection, with goals and objectives not reflecting the end users. Jansen et al. (2021) do not suggest a single approach but note that the best way forward, when resources and data permit, is to use a mixed approach that may provide more subtle explanations of observed behaviors. Through the review of literature, they found five common steps in persona creation, being: decide the purpose, gather data, analyze the data, identify archetype users, and create persona profiles. Steps 2 (gather data) through 4 (identify archetype users), relate to data gathering, analysis and segmentation.

AVATARS DEVELOPMENT

We use the mixed method approach following the steps by Jansen et al. (2021): decide the purpose, gather data, analyze the data, identify archetype users and create persona profiles. The development also considers the persona creation problems and the approach adopted by Microsoft in the research shared by Pruitt and Grudin (2017). Our design and development stages are discussed as follows.

Step 1: Decide the purpose

Create personas as a foundation for avatar development to enhance the understanding of the financial and social impact of industry cycles on earnings and housing costs in regional Queensland. The regional Queensland areas were chosen based on their industry specialization, as sourced from Queensland Government Statisticians Office (Queensland Treasury 2021a, Queensland Treasury 2021b, & Queensland Treasury 2021c).

The shires of Isaac, Douglas and North Burnett have significant employment specializations in the industries of mining, tourism, and agriculture respectively. In Isaac the prominent industry by employment is mining at 37.7%, followed by Agriculture, forestry and fishing at 10.4% (Queensland Treasury 2021b). The leading industry in Douglas is Accommodation and food services (24.5%) then Retail trade (Queensland Treasury 2021a). North Burnett has Agriculture, forestry and fishing as the main industry of employment (31.9%) followed by Health care and social assistance at 9.8% (Queensland Treasury 2021c).

Step 2: Gather data

Broad demographic information has been sourced from regional profiles prepared by the Queensland Government Statisticians Office. From the most prominent responses, or groupings, three personas emerge for the three regions as detailed in table 2.

Table 2 Demographic profile

	Douglas Shire	**Isaac Shire**	**North Burnett Shire**
Predominant gender	Male	Male	Male
Median age	44	33	47
Family	Partner but no children (50.0%)	Partner and child (53.4%)	Partner but no children (50.6%)
Home	Rents 2-bedroom unit	Rents 3-bedroom house	Owns 3-bedroom house
Cars	1	2	2
Education	Y11-12 with Cert. Food Hospitality and Personal Services	Y11-12 with Cert. Engineering and Related Technologies	Y11-12
Work	Accom (Hospitality, Retail and Service Managers)	Coal Mining (Machine and Stationary Plant Operators)	Agriculture (Farmer / Farm manager)
Median pay per week	$676	$1,030	$501
Median partners pay per week	$493	$1,335	$416
Median rent / mortgage per week	$315 (2-bedroom flat/unit)	$330 (3-bedroom house)	$250 (3-bedroom house)

(Queensland Treasury 2021a, Queensland Treasury 2021b, Queensland Treasury 2021c)

Quantitative data relating to house prices and rentals is gathered from CoreLogic, and Residential Tenancies Authority (RTA). The rents reflect the respective medians as reported in the Median Rents Quarterly Data (RTA 2021). For consistency the median rentals relate to three-bedroom houses which do not specifically align with the estimated weekly rental provided in the regional profiles as detailed in table 2.

The sales information represents the medians for normal residential sales across the three shires. Some data cleaning was required to remove nonresidential properties and transactions of multiple properties or part interests. The median sale prices and rentals are presented in table 3.

To measure industry performance the Gross State Product by industry has been obtained through the Queensland Treasury (Treasury 2021). The Gross State Product for the dominant industries in the three shires are presented in table 4.

Table 3 Median sale prices and rentals

MEDIANS	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021
Rents $/week (RTA)											
North Burnett	N/A	192	203	195	220	226	233	225	220	260	N/A
Isaac	900	1,800	500	380	220	250	250	175	N/A	420	375
Douglas	370	415	395	350	340	220	240	220	220	220	270
Sales $ (RP)											
North Burnett	150,000	155,000	186,000	165,500	198,000	154,250	165,000	175,000	172,500	150,000	149,000
Isaac	442,000	455,200	261,000	248,000	200,000	147,500	142,500	177,500	200,000	240,000	250,000
Douglas	250,000	230,000	258,000	279,500	270,000	285,000	290,000	270,000	320,000	326,250	345,500

(RTA 2021, and CoreLogic 2021).

Table 4 Queensland Gross State Product

GSP (Q $million)	2009-10	2010-11	2011–12	2012–13	2013–14	2014–15	2015–16	2016–17	2017–18	2018–19	2019–20
Agriculture, forestry, and fishing	6,609	6,680	7,595	7,400	6,704	7,775	9,249	10,362	9,708	8,352	7,891
Mining	18,834	23,017	22,764	17,480	17,782	18,055	18,759	32,629	40,334	48,199	39,291
Accommodation and food services	6,374	6,764	7,208	7,564	7,706	8,033	8,353	8,367	8,512	8,747	8,644

(Treasury 2021).

Step 3: Analyze the data

The demographic profiles present a stark contrast when it comes to weekly incomes. With a median family income of $2,365 ($1,030 and $1,335), a resident from Isaac shire has a high level of discretionary income. For the Isaac shire family, they earn 7.2 times their rental commitment. Residents of Douglas and North Burnett shires do not have the same financial freedom with their median incomes representing 3.7 times their median rental.

The sales prices for the three regions present vastly different profiles. The Isaac region presents a clear cycle with a peak in 2011 and trough in 2017. The fall in Isaac shire house prices supports the assertion from Connell-Variy and McGough (2020) that '…housing prices fell back even more sharply than coal prices. House prices have not shared in the resurgence of the mining industry in more recent years' (p.184). The sales profiles for the other two regions are less pronounced with Douglas trending upwards and North Burnett providing little growth over the past 10 years. The modest growth trend for Douglas may, in part, be due to the COVID-19 pandemic and progression of residents from cities to amenity rich regions, such as those on the coast in Douglas shire.

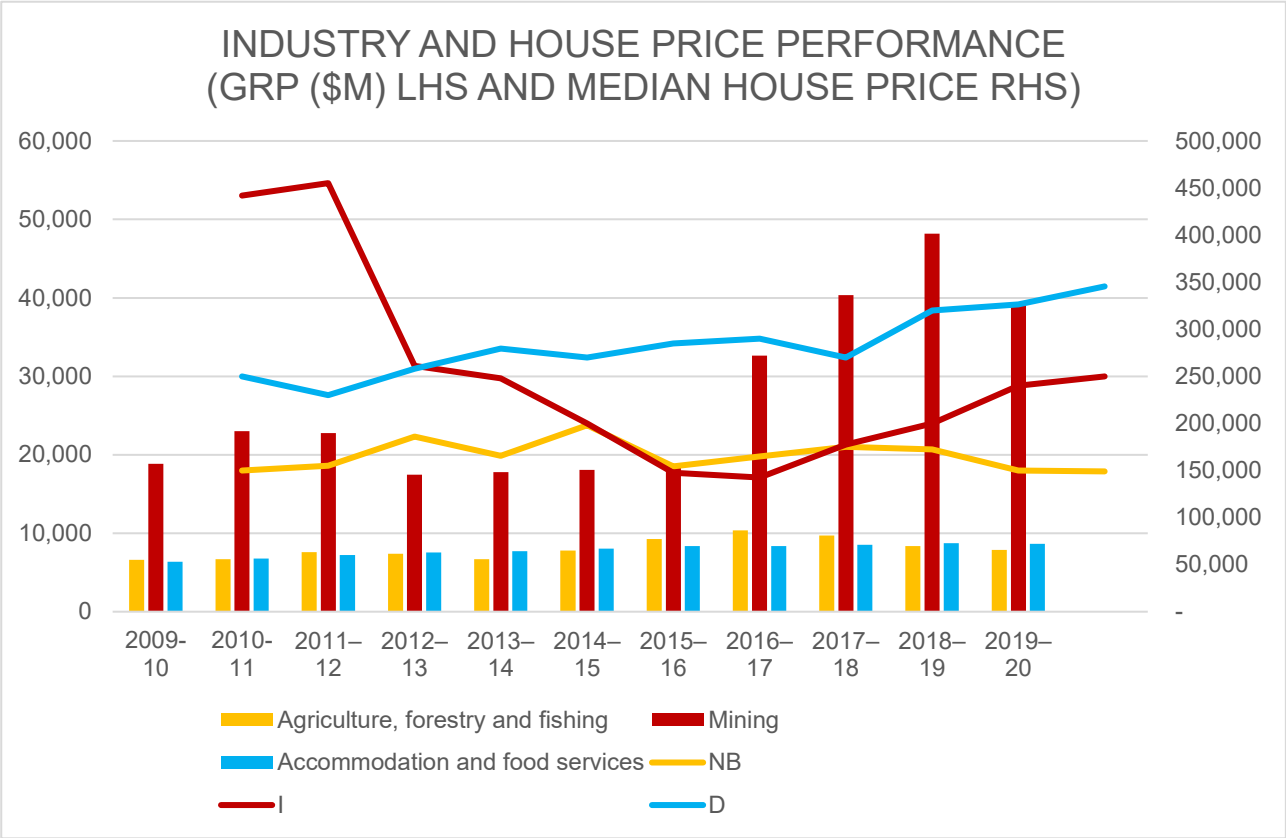
With respect to rents, the RTA medians reflect the median weekly rentals from three-bedroom houses. Rents in the Isaac region fell from an unstable high of $1,800 per week to a low of $175 per week from 2012 to 2018. North Burnett rentals remain in the $192-260 per week band with modest growth. For Douglas shire the median rentals declined from 2012 to 2020, picking up only in the last year.

Unemployment and labour force estimates from the Australian Government Department of Employment, Skills, Small and Family Business Employment (Queensland Treasury 2021a, b & c) present Isaac Local Government Area with near full employment with an unemployment rate of around 2.0%, since 2016, which sits 5.3% under the State figure of 7.3%. In Douglas and North Burnett, the 2021 rates are closer to the Queensland estimate at 7.0% and 6.7% respectively. Notably both Douglas and North Burnett experienced lower unemployment rates of around 4.0% or under in 2019. The employment trends over time can provide for a more accurate view of the region. That said, for the purpose of the persona, or avatar, creation the analysis has only focused on the headline figures.

The Gross State Product contributions from agriculture (Agriculture, forestry, and fishing), mining, and tourism (accommodation and food services) vary significantly over the past 10 years. Agriculture peaked in 2016-17 with the tourism reaching a high just before the COVID-19 pandemic. That said, the peaks and cycles in those two industries appear modest compared to that shown in mining. Mining presents a lower peak in 2010-11 which falls in 2012-13, leading to a boom from 2015-16 through to a high in 2018-19.

Following the 2011-12 mining boom house prices in Isaac shire fell, not picking up again until the most recent mining boom had established. While there is a lag, figure 1 demonstrates the connection been the trend in mining contributions to Gross State Product and house prices. For tourism and agriculture, the relationships are less pronounced but there does appear to be some correlation. This relationship may be better investigated through a more thorough regression analysis.

Figure 1 Regional Industry and house price performance



NB North Burnett; I Isaac; and D Douglas

(RTA 2021, and CoreLogic 2021; Treasury 2021).

As a homeowner, the median North Burnett resident would have received little or no capital growth on their home investment over the past ten years. Fortunately for Douglas shire residents rent commitments did not change in the same way house prices did. That said, the assumed Douglas shire resident would have trouble purchasing a home given the modest median income, raising house prices and relatively poor performance of the tourism industry.

For an Isaac region resident, the notional financial position is very different. Rentals are affordable and the median family income provides plenty of space for discretionary spending or purchasing a home in Isaac shire or even and investment property elsewhere. Given house prices in Isaac are still high relative to quality it is likely the notional Isaac resident may choose to invest elsewhere.

Step 4: Identify archetype users

The analysis the three regions and dominant industries lead well to the categorization of three personas, one from each local government area. From the most prominent responses, or groupings, the personas for the three regions are all males as detailed in table 1. Further personas or avatars may be developed to represent other segments such as renters and homeowners. But for this purpose of understanding the financial and social impact of industry cycles on earnings and housing costs in regional Queensland the three, region set personas fit.

Step 5: Create persona profiles

Naming of the virtual people has considered the regions name, with North Burnett adapting to Bernard, or Bernie. Our three personas or avatars become Bernie, Zac, and Doug. They are all males with partners. The youngest at 33 years, Zac, is the only character with a child (53.5%) (Queensland Treasury 2021b). As the

oldest Bernie is the only homeowner (43.1% fully owned and 23.9% being purchased) (Queensland Treasury 2021c)). That said, Bernie did not receive any significant capital return on his home investment.

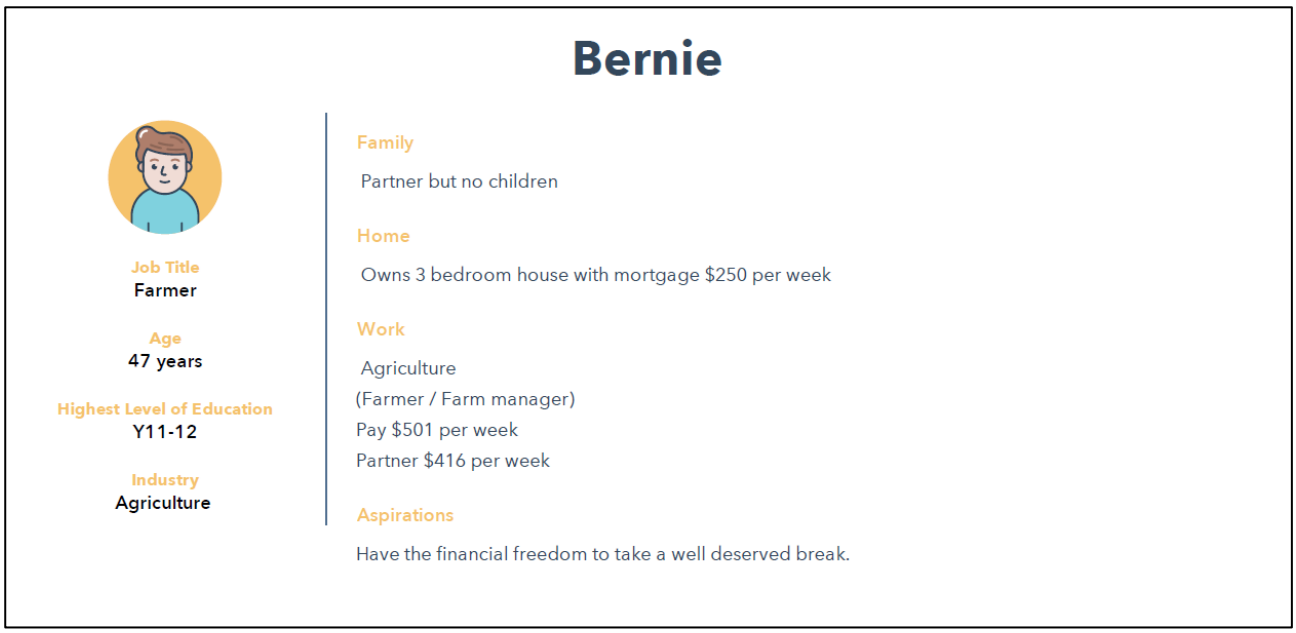
Both Bernie and Doug may be defined as strugglers with modest incomes. For Doug, his financial position is poor with a low income, raising house prices and the prospect of raising rental and living expenses. He is further disadvantaged by being trained, qualified and working in an industry that has limited growth potential in the current pandemic. He would need to upskill and potentially undertake further studies to enter and alternative industry.

Zac is in a financially sound position. Rental affordability and high family income provide plenty of space for discretionary spending. While he has a child to look after, his family is well placed to purchase a home or even invest elsewhere. Mining may not be a longer-term plan for Zac, but the high earnings give him the financial freedom to explore other career choices.

As a property owner and farmer with only high school level education Bernie may find it difficult to pursue and alternative career. As he and his partner age they may find the physical side of maintaining their land taxing. This may be further complicated by not having any children to look after the property when planning a break or when they choose to retire. Without capital appreciation, they are somewhat dependent on agriculture, the weather and seasons, for their financial wellbeing.

By elaborating and incorporating aspirations, the personas of Zac, Bernie and Doug develop. The personas and avatars as developed with the assistance of HubSpot (2021), are presented in figures 2 through 4.

Figure 2 Bernie persona and avatar

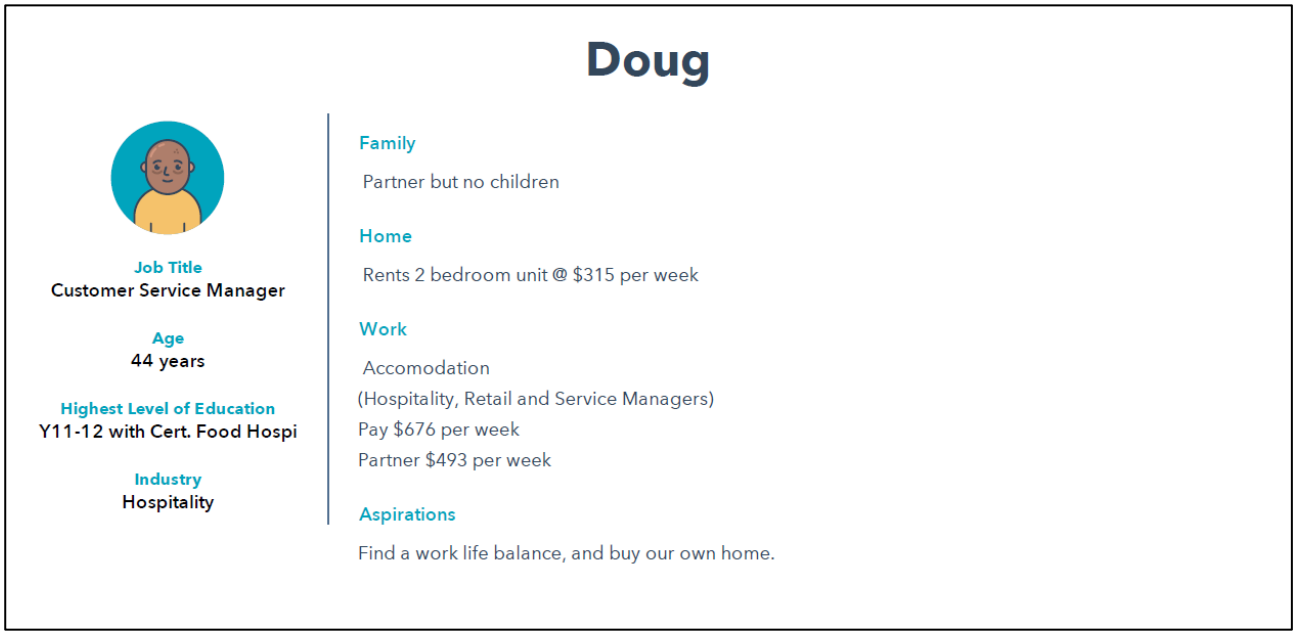


(HubSpot 2021)

Figure 3 Zac persona and avatar

(HubSpot 2021)

Figure 4 Doug persona and avatar



(HubSpot 2021)

Having established a baseline for these personas there are a couple of ways to extend the study and focus further. The stories of Bernie, Doug and Zac may be developed as a full narrative. This full narrative will require reviews as we have found segmentation disconnection (Jansen et al. 2021) matters to consider. For example, if we attributed a median miners salary to Zac his income may be even higher (higher than his partners) and encourage him to live in a more desirable location with the mining companies managing accommodation requirements. Perhaps Zac could be split into two avatars, with the development of his partner Isa, who works in an industry outside of mining.

Teasing out the emerging aspirations and even developing the characters with fears, concerns, religious profiles, and even political viewpoints. This more explicit persona may prove helpful in better understanding the economic financial and social impact of industry cycles on their wellbeing. Similarly, the three virtual people may be employed by policy makers such as the State and Federal governments to test government interventions such as first home buyer grants and taxation changes.

Another pathway forward relates to the full development of avatars for a virtual world or even serious game. As shared by Buisine et al. (2016), there are further benefits associated with the embodiment of personas. Through an avatar the human player can develop a deeper understanding of life as Zac, Doug, and Bernie. This has the potential to help the human player develop an awareness not available through other means.

LIMITATIONS

This research is conceptual in nature. As far as the authors are aware this is the first attempt to develop personas, or avatars, in an aim to better understand the financial and social impact of industry cycles in regional communities. The research presents a means to develop such personas and share potential benefits in their use. That said, the paper does not extend to testing and the benefit or otherwise of using personas and avatars in policy decision making is better suited to subsequent empirical testing.

The information collected and analyzed to frame the economic and financial environments, our fictious characters live in, is real and current at the time of writing. The analysis is somewhat limited with a focus on medians and modes as opposed to more accurate and nuanced quantitative analysis. For example, the primary source of information regarding demographic information is sourced from Queensland Government Statisticians Office (Queensland Treasury 2021a, Queensland Treasury 2021b, & Queensland Treasury 2021c) through their publication, Queensland Regional Profiles. Subsequent more detailed analysis would draw from the Australian Bureau of Statistics and other sources, especially the latest census data (when available).

Further quantitative analysis will provide a more accurate representation of the environment and the relationship between industry cycles and housing costs. Initial analysis presents a connection been the trend in mining contributions to Gross State Product and house prices. For tourism and agriculture, the relationships are less pronounced but there does appear to be some correlation. This relationship may be better investigated through a more thorough regression analysis.

Another clear limitation in the approach and use of personas and avatars is inherent bias towards character development that fits a population grouping or segment. In doing this we exclude minorities and a diversity of characters. While this may be overcome by developing further personas and avatars it becomes difficult to assess which minorities to include or exclude to maintain a workable number of characters.

CONCLUSION

This research introduces Bernie, Doug and Zac, the virtual residents of regional Queensland. Through their systematic creation we have developed a greater understanding of how the financial impact of industry cycles may impact people living and working in regional Queensland.

Both Bernie and Doug are struggling financially with only modest incomes associated with agriculture and tourism. For Doug, his financial position is poor with a low income, raising house prices and the prospect of raising rental and living expenses. He is further disadvantaged by being trained, qualified and working in an industry that has limited growth potential in the current pandemic. He would need to upskill and potentially undertake further studies to enter and alternative industry.

Zac is in a sound financial position. Rental affordability and high family income provide plenty of space for discretionary spending. While he has a child to look after, he and his partner are well placed to purchase a home or even invest elsewhere. Mining may not be Zac longer term plan, but the high earnings give him the financial freedom to explore other career choices.

Having established a baseline for these personas there are a couple of ways to extend the focus further. The stories of Bernie, Doug and Zac may be developed as a full narrative. Teasing out the emerging aspirations and even developing the characters with fears, concerns, religious profiles, and even political viewpoints. This more explicit persona may prove helpful in better understanding the economic financial and social impact of industry cycles on their wellbeing. Similarly, the three virtual people may be employed by policy makers such

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