Institute for
Sustainable Futures

Creating demand for recycled organic compost

Social research on the Sydney compost value chain – from farmer to consumer

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ABOUT THE AUTHORS

The Institute for Sustainable Futures (ISF) was established by the University of Technology, Sydney in 1996 to work with industry, government and the community to develop sustainable futures through research and consultancy. Our mission is to create change toward sustainable futures that protect and enhance the environment, human wellbeing and social equity. For further information visit: **www.isf.uts.edu.au**

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DISCLAIMER

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Contents

Figures

Tables

1 Introduction

1.1 Project overview

This report presents the findings of the social research component of the Creating Demand for Recycled Organic Compost (CRED) project, undertaken by the Institute for Sustainable Futures in partnership with Greater Sydney Local Land Services and NSW Farmers (see also CRED Summary Report and supporting technical reports).

The overall goal of this project is to investigate and unlock the demand potential for recycled organic compost in vegetable production. There is a strong need to increase diversion of organic waste from landfill, and increase the beneficial reuse of recycled organic compost. However many studies have focused on supply-side issues like the compost collection and treatment process. Moving from the current supply-driven market to a demand-driven model means better understanding and removing demand-side barriers that are limiting current use of recycled organic compost. This means addressing the variability and suitability of the recycled organic compost product, lack of soil testing (and hence understanding of soil needs), to lack of end-user experience with such products and perceived saturation of the market by poultry manure.

The social research presented in this report sought to better understand the needs, preferences and priorities regarding recycled organic compost for stakeholders in the value chain – including growers, retailers, consumers and compost producers. The research explored the key knowledge, technical, financial and institutional barriers that are preventing or limiting the uptake of compost. The project will provide recommendations for marketing and messaging to overcome the key barriers identified through the research. This messaging has been utilised within the broader CRED project by NSW Farmers to effectively target and communicate the benefits of compost in production through their networks and establish an on-going communications plan (see the Compost Portal on the AgInnovators website http://www.aginnovators.org.au/project/next-gen-compost). The social research and engagement components of the project are explicitly designed to 'inform awareness, knowledge, behaviours and practices around the use of recycled organic products'.

1.2 Research approach

The social research approach takes an explicitly demand-side and systems approach to understanding the compost value chain, meaning all stakeholders—and their relationships—are investigated, with a particular emphasis on identifying opportunities and barriers among farmers, food retailers and food consumers.

Specifically, the objectives of this social research component were to:

- Identify key barriers to the use of compost, through understanding stakeholder needs, preferences and drivers
- Overcome key identified barriers by recommending targeted marketing and messaging
- Identify key potential individuals change makers
- Test/stimulate consumer demand for recycled organic compost by engaging consumers and retailers of niche produce (local, organic, etc) to better understand their level of awareness, interest and potential drivers to buy food produced using recycled organic compost
- Demonstrate to farmers the potential for a niche market for compost grown vegetables
- Link/connect farmers with local vegetable distributors who could potentially distribute compost grown vegetables

To achieve this, the project team undertook the following interrelated and participatory analytical tasks:

1. **Farmer and supply chain stakeholder surveys:** to understand perspectives on the barriers and opportunities to using compost from farmers and other stakeholders at the field days and online, building on previous studies
2. **Consumer surveys**: to better understand the level of awareness, interest and potential drivers to buy vegetables produced using recycled organic compost of a sub-group of sustainability-orientated consumers
3. **Food retailer interviews:** in-depth interviews with retailers, to better understand the food value chain, values, key barriers and opportunities and identify potential retail markets.
4. **Workshop engagement at demonstrations days at the field sites:** multi stakeholder engagement activities to link, demonstrate and survey farmers, agronomists, compost producers and food retailers. Three field days were undertaken.
5. **Stakeholder network analysis:** analysis of findings from interviews, surveys and workshop engagement, including systems diagram to map retailer stakeholders and social network analysis of farmers and other supply chain stakeholders, from which communication/dissemination material can be developed.

The research process was somewhat emergent and iterative, in that the design of one task may be informed by the outcome of another. The project began by reviewing a pivotal piece of market research undertaken by The Right Mind (TRM, 2014) from which this study could build upon, rather than duplicate. For example, the present study sought to fill in gaps by focusing on demand-side actors and drivers, by probing deeper into Sydney vegetable growers, and to engage with existing users of compost as ‘champions’ or leaders of change.

2 The Sydney compost value chain

2.1 The importance of a thriving compost value chain

The beneficial reuse of organic waste as compost in vegetable production in and around Sydney plays a crucial role both in terms of diverting the methane-producing organic waste from landfill, and equally, in underpinning food security in the city.

Avoiding landfilling organic waste means avoiding GHG generation, freeing up valuable real estate in a growing city and potential cost savings. Indeed, this is a key driver behind the EPA-administered Waste Levy[1] and the associated Waste Less Recycle More initiative[2].

However food security in Australia's urban centres is often taken for granted, and thus the benefits of growing food close to cities is often not acknowledged (ISF, 2016a). However there are enormous benefits to growing fresh food in the Sydney basin – and, indeed, near any city. High-value perishable foods such as Asian greens and eggs can be grown close to market, reducing spoilage, waste and food miles, and buffering against spikes in fuel prices. Local vegetable production also contributes to the economy: while vegetable production only occupies less than 2.7% of Sydney's agricultural land, it contributes some 13% by value to agriculture in the Basin (approximately $174 million)[3].

To produce this food, we can, and need, to tap into an important resource at our doorstep – our organic waste – such as the food and green waste from our homes and businesses.

Every year, Sydney generates almost 2 million tonnes of organic waste, which unless recycled or avoided, ends up in our landfills. Our foods systems are inherently wasteful with long value chains: Approximately 40% of all food grown in this country is wasted (equal to around 4 million tonnes)[4]. In the home, around 20% of the food households' purchase ends up in the bin, equating to some $1 billion of edible food thrown away each year by Sydney's households (ISF, 2016c). Interestingly, this is equal to the income of all farmers in the Sydney Basin (ISF, 2016b).

However each year Sydney is getting better at separating waste and finding beneficial uses for clean organic material. Today, recycling companies can supply large volumes of compost made to the Australian standard and suitable for use in Agriculture. Our modelling indicates that Sydney's compost could theoretically supply all 72,000 ha of veggie growers in the Basin, diverting some 290,000 tonnes of compost from landfill[5].

Huge opportunity for our farmers: agricultural soils in the Sydney basin are typically depleted of organic matter which means that farmers rely on chemical fertilisers to produce vegetable and other crops.

But compost restores the health & fertility of soils, In addition to recycling garden and food waste (diverting from landfill), reducing on-farm water & fertilizer use, GHG emissions and ultimately increasing crop yields.

Creating a value chain based on compost of appropriate quality and specifications is a win for farmers, the environment and for the community. Collecting organic waste via the city's green bins can close the loop on resources, help our soils and improve the sustainability of Sydney's food production systems.

[1] http://www.epa.nsw.gov.au/wasteregulation/waste-levy.htm

[2] http://www.epa.nsw.gov.au/wastestrategy/waste-less-recycle-more.htm

[3] This analysis used data from the *Modeling Sydney's Potential Foodsheds* project (ISF 2016a) and Edge Land Planning (2015).

[4] http://www.foodwise.com.au/foodwaste/food-waste-fast-facts/

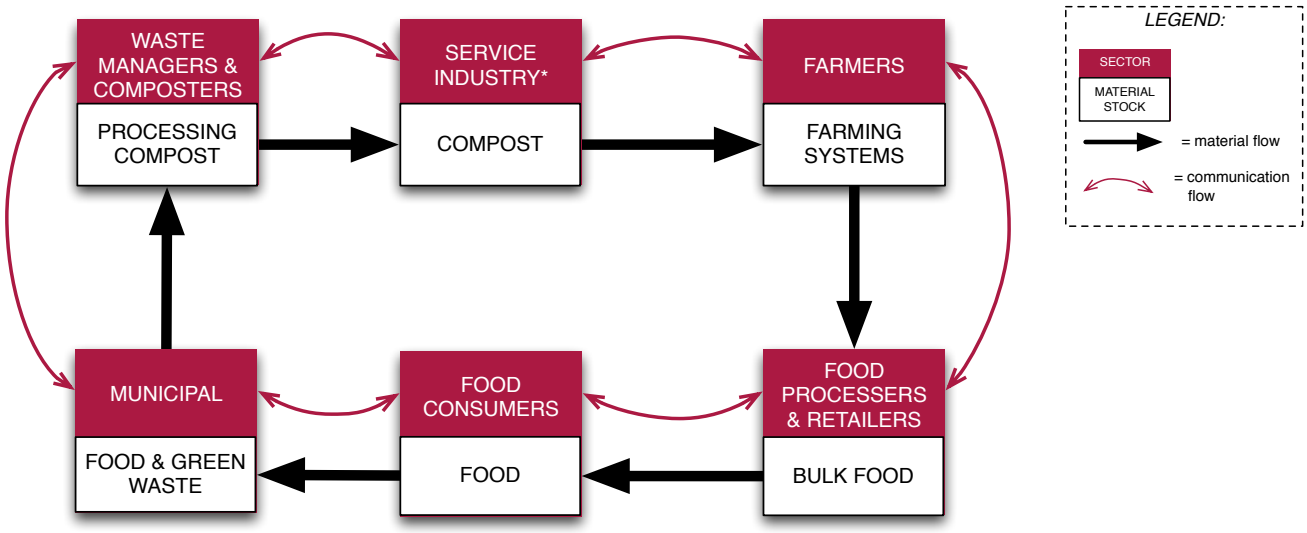
[5] This analysis used data from the *Modeling Sydney's Potential Foodsheds* project (ISF 2016a).

2.2 Stakeholders in Sydney's compost value chain

Sydney's compost value chain has a number of key sectors and interrelated components (Figure 1). Relatively few large waste managers and compost producers process the city's organic waste (typically garden organics and other green waste like food and landscaping waste[6]), producing a wide range of products. These producers typically have long-term contracts, are highly competitive, are motivated by capturing 'gate-fees' for garden organics and are increasingly seeking regional markets (TRM, 2014).

The compost products are either sold or delivered to farmers, in some cases via third parties in the compost service industry such as fertiliser companies, spreading contractors and supported by advice from agronomic advisors. Currently, the main end-use markets for compost in NSW are urban amenity, followed by intensive agriculture, extensive agriculture and rehabilitation. The agricultural market has been identified as a priority area for EPA and compost processors (TRM, 2014), and this project focuses specifically on compost use in the vegetable market (for reasons outlined above). Vegetables grown in Sydney are mostly perishable, including: Asian vegetables, herbs, capsicums and chillies, cabbages, celery, cucumbers, eggplant, leeks, lettuce, mushrooms, radish, silverbeet and spinach, spring onions and fresh tomatoes (Sinclair, 2015). The Sydney vegetable market is relatively small and dominated by small growers of diverse ethnicities, including Cambodian, Maltese, Vietnamese and Chinese. While awareness and use of compost is currently low, those who do use it tend to believe in its effectiveness.

Figure 1: Sectors and components in Sydney's compost value chain.



* e.g. Spreading contractors, agricultural advisors, fertiliser companies, transport logistics

Sydney's vegetable growers sell their produce to food retailers via a number of channels, such as third-party wholesalers and Flemington Markets (see Section 3.2.2). These food retailers are diverse ranging from conventional supermarkets to farmers markets and local box delivery services that identify as social enterprises[7]. The core drivers, values, business models and supplier coverage of several key retailers are indicated in Section 3. Their customers, food consumers, are equally diverse in their values and food choice motivations (Section 4 reports on a sub-group surveyed for this project). They are also the same stakeholder group disposing or recycling their organic waste via household or away-from-home bins. And thus the circular value chain continues.

[6] However the use of biosolids and AWT composts have strongly increased over last few years (TRM, 2014).

[7] Social enterprises are businesses that 'trade to intentionally tackle social problems, improve communities, provide people access to employment and training, or help the environment', see Social Traders: http://www.socialtraders.com.au/about-social-enterprise/what-is-a-social-enterprise/social-enterprise-definition/

3 Retailer views

3.1 Method

Fresh vegetable retailers are a key part of the value chain linking farmers with consumers and can drive consumer demand. Interviews were undertaken with a range of vegetable retailers to determine the likelihood of a market for compost grown vegetables. The objectives of undertaking the interviews were to:

- Elicit the decision making criteria that underpin retailers' business decisions, with regards to values (such organic/biodynamic, chemical/pesticide free, from local farmers, high quality) and other criteria (volumes, variety of range, logistics)
- Gain a better understanding of the value chain for food grown and sold in the Sydney region
- Gauge retailers' potential interest in compost grown vegetables and the potential barriers and opportunities for the market
- Understand how compost grown vegetables could fit into the retailers' businesses and how they might message the produce for consumers

Semi-structured interviews were undertaken either face-to-face or by telephone. The participants were identified through a stakeholder mapping database begun with initial searches and expanded from information provided by the retailers (snow ball sampling). Co-ops and box delivery companies that currently supply local or sustainability-oriented produce were the first retailers selected for interviews, as these were considered to be potential retailers for compost grown vegetables. Approximately twenty businesses were contacted via email and phone. Following the initial interviews the scope was expanded to include supermarkets and a wholesaler (recommended by one of the co-ops).

In total seven in-depth interviews were undertaken, including two co-ops, two box delivery companies (social enterprises), two supermarkets and one organic wholesaler. These retailers encompass three types of business models: co-operative (non-profit/ community managed), social enterprise (profit for purpose) and commercial business (wholesaler and supermarket), shown in Table 1. An additional interview was also undertaken with an environmental educator that works to promote local food in the Sydney region, but as this participant is not a retailer they have been excluded from the synthesis and findings have been noted as personal communications.

Table 1: Profile of Sydney vegetable retailers interviewed

Business type	Brief description
Box Retailer 1 (Social enterprise)	Fruit and vegetable box delivery company that sells mainly local non-certified organic vegetables sourced direct from 7-14 growers and supplies 500-600 customers
Box Retailer 2 (Social enterprise)	Fruit and vegetable box delivery company that sells mainly local non-certified organic vegetables sourced direct from 30-40 growers and supplies 600-700 customers
Co-op 1	Large food co-operative with 4,000 members that sells mainly local certified organic vegetables sourced direct and from wholesalers (including the organic wholesaler interview participant) and other organic grocery items

Co-op 2	Small food co-operative that sells a weekly fruit and vegetable box sourced from a box retailer (interview participant Box Retailer 2) and other organic grocery items
Supermarket 1	Medium size supermarket that sells mainly conventional vegetables (sourced from wholesale markets) and grocery items
Supermarket 2	Medium size supermarket that sells mainly conventional vegetables (sourced 30% from direct sales and 70% from wholesale markets) and grocery items
Organic wholesaler	Large organic wholesaler that supplies certified organic produce to supermarkets, co-ops and online companies, sourced direct from farmers

3.2 Findings

3.2.1 Overall findings:

The in-depth retailer interviews revealed a range of insights. All retailers interviewed were hypothetically interested in selling vegetables grown with compost. However, there were a number of practical barriers and opportunities that would need to be addressed, including:

- Barriers:
  - Need for a clear market, many smaller retailers thought compost grown vegetables couldn't be marketed alone
  - Need for clear value proposition
  - Need assurance of quality (contamination-free)
  - Retailers may have other pertinent issues that are higher priority (e.g reducing food waste)
  - Compost-grown vegetables might not be 'organic' and hence can't be sold by certified organic retailers
  - For one larger retailer (a supermarket), would need some sort of industry-standard for compost grown vegetables. However this might be prohibitive for smaller producers/retailers due to costs associated with certification.
- Opportunities:
  - For supermarkets, could fill a market gap between organic and conventional produce, meeting the growing demand for more 'sustainable' produce
  - As farm input prices increase (e.g. fertilisers), this could incentivise compost-use
  - Smaller retailers thought compost grown vegetables could be an additional attribute to organic produce, or 'co-marketed' with other sustainability attributes for those less concerned with organic certification
  - Supporting compost-grown vegetables could potentially contribute to larger retailer targets for reducing food waste

Retailers revealed a wide range of values that driver their decisions. For the small-scale retailers and co-ops, social values like supporting farmers appear to be more important than other criteria (e.g. logistics of value chain). For example, one co-op was very flexible in order to obtain produce from two suppliers that they want to support. This implies the value of compost should be promoted as benefiting farmers, among other beneficiaries.

The retailers interviewed varied widely not only in their values, but their key pressures/drivers, business models, geographical coverage, size, sourcing mechanisms.

In the absence of standards and certification, the smaller-scale retailers rely extensively on trust in farmers' claims about their type of produce (e.g. non-certified organic). For instance, Box Retailer 2 trusts that their farmers are not using chemical sprays on the produce but as they have 30-40 suppliers, they have not visited them all to verify these practices.

The local food system is far more complex than first anticipated, with multiple actors between farm and consumer. While the smaller-scale co-ops and social enterprises stated they sell "local veggies", the value chains are longer and have more players than is immediately obvious. For example, the box retailers supplement their direct farmer purchases with wholesale suppliers when necessary, but the wholesalers purchase food from all around Australia, creating some uncertainty around provenance of produce. Further, the co-ops, while promoting themselves as local and ethical, mainly source their produce from wholesalers and the box retailers.

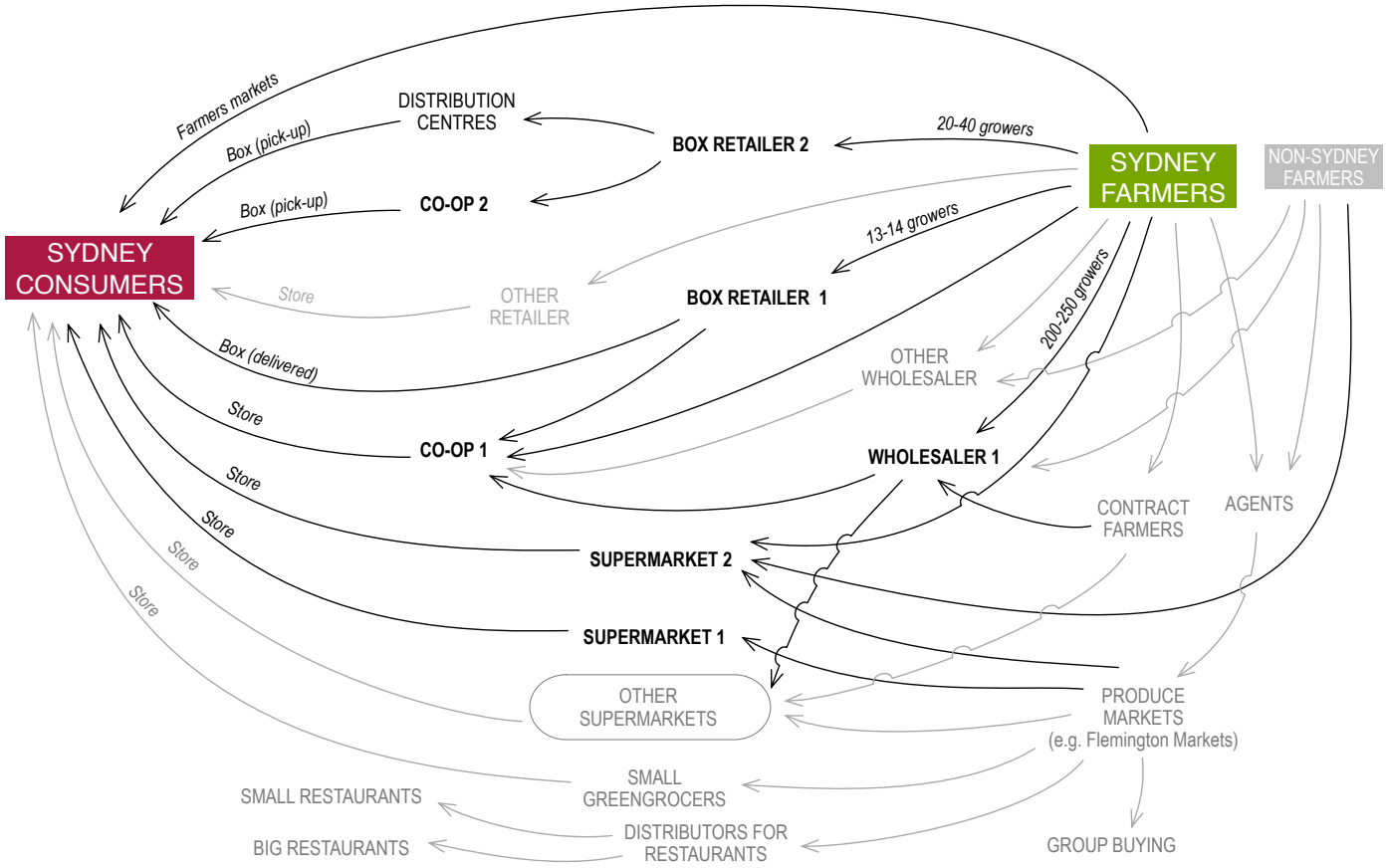
Figure 2 indicates Sydney's local food value chains as identified by those retailers that were interviewed. The implications of a relatively more complex local value chain for this research are that more complex communication, engagement and marketing routes may be required. Further, the drivers, barriers and opportunities need to be understood for all key players, in order to determine key leverage points in the value chain to create or 'unlock' demand for compost.

Finally, the smaller retailers appeared to have limited knowledge of other parts of their value chain, including the farming practices of their suppliers, but most suggested that farming has many hardships. All assume that farmers are already using compost, as they believe it is essential to support and enhance soil and produce quality. However, these retailers had limited direct knowledge or experience of farming practices. This means any messaging would need to clarify assumptions.

3.2.2 Profile of retailers

Interview participants were asked about the profile of their businesses, particularly how and where they source produce, the number of suppliers and their retail or delivery model. The range of methods for sourcing produce reported by the interview participants revealed a complex value chain for vegetables. The box retailers source their produce direct from small-scale farmers in the Sydney basin and the organic wholesaler sources direct from large-scale farmers around the country. The co-ops source mainly through distributors (including organic wholesalers and box retailers who participated in interviews). Both supermarkets source from the wholesale market, but one also sources one third of their produce directly from farmers. Appendix B describes the profile of these retailers in more detail.

Figure 2: From farm to consumer: the complex network of the Sydney local food value chain[8]



[8] Retailers interviewed are indicated in black text/arrows. Some key conventional value chain players and routes are also indicated in grey arrows/text. Note, the latter group were not interviewed, and are by no means exhaustive, but rather indicative of alternate routes in the value chains. The final purchasing route by consumers is indicated in brackets next to the arrows leading to the 'consumer' box on the left hand-side (e.g. farmer markets, box delivery). 'Sydney farmers' generally implies being located approximately within a 100km radius of the CBD. Non-Sydney farmers' are typically still within NSW.

3.2.3 Proportion of food grown in the Sydney Basin

To understand of how local their food supply is, interview participants were asked how much of the vegetables are grown in the Sydney basin. The two box retailers, who both source direct from farmers, are the only retailers that focus on obtaining produce locally within the Sydney basin, and source 80 to 90% of their produce locally. The co-ops are both dependent on their suppliers. The co-op that sources from distributors and directly from growers reported that "very little" of their food is grown in the Basin since the loss of one major direct farmer to a mid-sized supermarket which left their business exposed. The second co-op, which obtains produce from Box Retailer 2, expects that almost all vegetables supplied are locally grown.

The wholesaler and supermarkets source nationally with only a very small proportion grown locally. The wholesaler reported that they do not source produce locally, however, they will prioritise produce to stay within the state to reduce costs. Nearly all the fresh produce (99%) is Australian and they only look elsewhere if there is a shortage or where a gap occurs, such as NZ blueberries or kiwifruit. They noted that it is not worth importing fruit and vegetables as people want Australian produce and import regulations can be tricky to negotiate.

One supermarket reported that 70-80% of food sold in each state is grown in each state. In the past they had separate produce streams based in each state, but the sourcing has now become more centralised as it is ordered and managed centrally for Australia. Some produce comes to centralised national warehouses, however, there is still different produce sourced for different states where it makes sense.

The second supermarket reported that the percentage of vegetables obtained locally was around 5% and has declined over time. The main vegetables sourced locally are cucumbers, spring onions and Asian vegetables. The Asian vegetables from their main supplier are sold in the store the same day they are picked – *"the beautiful thing about local producers"*.

They noted that in the past they purchased tomatoes locally at certain times of the season, but with the increase of tomato production in large hothouses, tomato production in the Sydney Basin has all but ceased. They reported that certain produce, particularly tomatoes, can be grown in New Zealand and flown over for a cheaper price than local producers. They perceive that this makes it challenging for growers in Sydney, particularly when compared to their asset price, which puts pressure on them to sell their farms. It is their opinion that *"they're unfortunately all going to continue to go"*.

3.2.4 Values for sourcing produce

To understand the values that influence retailers' sourcing of produce (and hence any potential barriers to sourcing compost grown vegetables in addition to framing messaging), the retailers were asked to nominate the most important values that drive their decision making criteria. They reported health, social and environmental values, including:

- **Social (sustainability of farmers):** supporting small scale farmers, providing a fair price, buying food that would otherwise go to waste
- **Social (supporting community):** affordable, convenient, fair to staff and consumers, food security, educating consumers, fostering community
- **Health:** certified organic/biodynamic, chemical and pesticide free
- **Environment:** sourcing locally, reducing distance travelled, preventing food waste, organic production

The box retailers and co-ops all have a large number of values that drive their business; **social values for the community and farmers** were considered highest, followed by health and the environment. They consider all these values when making trade-offs in decisions about how they source produce (for example whether to prioritise sourcing from a small local non-certified organic farmer compared to a larger organic farmer which is further away).

The organic wholesaler is driven by the perceived **health value of organic produce**, which they prioritise over all other values. For one supermarket the main value is improving the **quality perception of produce** (the size, weight and visual appearance) while providing it at a competitive price. For the other it is valuing **taste over the look** of produce, by looking for **produce that may not fit the supermarket specifications**. Their main driver in sourcing this produce is **preventing food waste**, which integrates several social and environmental values particularly supporting farmers, providing affordable food and environmental benefits, but also has an economic benefit for the supermarket.

Generally the smaller sized retailers have more defined social and environmental values, which are often a reason for establishing their enterprise. For example, both box retailers commented on "changing the system" to be fairer to farmers, consumers and the environment, and one to provide an affordable alternative to supermarkets as most of their customers are "anti-supermarket". The larger retailers (supermarkets and wholesaler) tend to focus on one or two main values. This is in part due to the logistics of managing a large business but also the need to remain profitable, compared to the social enterprise or co-operative model of the smaller retailers. For example, the organic wholesaler commented that they also have a **business motive** to dominate the market for organic produce.

Social sustainability for farmers:

The social sustainability of farmers was considered very important by both box retailers, both co-ops, one of the supermarkets and the wholesaler (6/7 participants).

All of the participants who consider social sustainability of farmers as important (that is all participants excluding one supermarket) mention the **fair pricing of produce** as a key part of this. For one box retailer this means promoting fairness and transparency to their suppliers. They do not have set prices for produce but negotiate with farmers dependent on circumstances, as for example they consider a farm growing only one type of produce is more efficient. The other box retailer has a different approach and sets weekly prices for vegetables and will absorb any price difference. The supermarket negotiates the price with its direct farmers and shares the savings from the difference in cost that would have gone into an agent's fee. The wholesaler considers that they set a price for produce that is *"fair, loyal and trustworthy"*.

The box retailers and co-ops also reported wanting to **support small-scale farmers**. One of the box retailers commented that because they value fairness and transparency *"it is not always convenient but they are able to work with small providers"*. The other box retailer commented that they often buy non-certified organic as *"most small farmers couldn't afford to be certified organic"*. One of the co-ops noted that they prefer not to source from a particular grower because the produce is so cheap that it undermines other small players who cannot produce for the same price.

One box retailer, one co-op and one supermarket report that they **buy food that might otherwise go to waste**, to support farmers, as well as for environmental reasons (3/7 participants). The box retailer mentioned that farmers that have been rejected by supermarkets approach them to sell their produce. The co-op commented that they sometimes buy seconds from distributors (e.g. food that fails to meet specifications and will be difficult to sell in the regular market). The supermarket is focused on buying produce that is not within the traditional specifications of supermarket produce, for example damaged or the wrong size or shape, and has a particular section of their stores specifically for this produce. They feel this is *"giving back to the farmer"* as well as preventing food waste.

Social values of supporting community:

All the box retailers and co-ops consider it important to support consumers and the community (4/7 participants). All four retailers mention wanting to **provide affordable food for consumers**. One box retailer mentioned that providing sustainable food to consumers should be **convenient** and show **fairness to staff and consumers** (as well as farmers). The other box retailer values **food security** and provide boxes to working poor when they can't afford it. They also mentioned the value they place on **educating consumers** and working in co-operation with many networks. Both the co-ops mentioned that they value **fostering a community**, and one mentioned the co-op was run *"based on the needs of members"*. The other co-op

mentioned that people want to know where their food comes from, which has seen the rise in popularity of alternative food retailers including co-ops and farmers markets.

Health:

The box retailers, co-ops and wholesaler consider health to be very important; however, this is not a major driver for the supermarkets. The wholesaler only supplies **certified organic** or biodynamic produce, and perceives that the main reasons their customers seek out certified organic produce is to be **chemical and pesticide free**.

The box retailers and co-ops sell both certified and non-certified organic produce, but other social values, described above, are more important. For example one of the co-ops focuses on organic and chemical free produce, but would prefer to source local chemical free over certified organic. Likewise the other box retailer prefers to source from small scale non-certified rather than certified organic, and also sources from hothouses or farms based on permaculture principles. This box retailer also perceives that certified organic is not necessarily the most sustainable produce as there are many certifiers that allow a range of farming practices.

One supermarket reported that health is not a high value in their sourcing as they believe their customers have the perception that food grown in Australia is already healthy and mostly low in chemicals. They commented that they don't "feel the heat" in our customer range for organic or sustainable food. The other supermarket did not mention health values but commented that they felt the market was "moving away from organics" towards a focus on sustainability.

Environment:

Environmental values were considered important for the box retailers, co-ops, one supermarket and the wholesaler. The main example of this was **sourcing locally**, mentioned as important by the box retailers and co-ops. One box retailer mentioned that their business model **reduces distance travelled** of the produce from the farmer (as one farmer will collect from neighbours and bring it in), and for distribution. For the wholesaler, sourcing locally is not considered of high importance, but they did consider that **organic production** is better for the environment. For one supermarket and one box retailer the environmental impact of **preventing food waste** is considered of high importance.

3.2.5 Other decision-making criteria for sourcing produce

The interview participants were asked how important other criteria were in sourcing produce in addition to their values, for example having particular volumes from each grower or a large variety of produce.

For the box retailers and co-ops other criteria, such as the size and range of individual growers, are less important than their values. For example, both box retailers source produce from many small-scale farmers that may only grow a small volume of one type of produce. The supermarket and wholesaler instead place a high importance on having a large range of produce. The wholesaler considers this important as they believe this is why their customers (other retailers) choose them. Their growers each supply between 3-10 types of fruit and vegetables and are medium to large in size. One supermarket commented that variety was very important and one of the key differentiators for their store, particularly to give consumers choice at a range of price points. Table 2 indicates the importance of other decision-making criteria as reported by the participants.

Table 2: Importance of other decision-making criteria to retailers

Criteria	Box retailer	Co-ops	Supermarkets	Wholesaler
Range of produce they supply	Lower importance, both source produce seasonally from local growers One box deliverer confirms produce with growers weekly	Medium importance, one noted they source from distributors which have large range as not local	High importance to one supermarket which noted they aim to have variety of types and prices within a produce type	High importance to have a large range of produce, feel this is why their customers choose them
Size and range of individual growers	Small-scale growers are main suppliers, some may only supply one type of fruit or vegetables	Small-scale growers (for direct), one noted difficult to balance needs of farmers, i.e. spreading to thin and only sourcing a small amount of produce from each	Large growers and agents for one supermarket which sources from wholesale markets, other did not comment	Large growers of organic produce, most growers supply at least 3 types of fruit and veg, some up to 10 types
Quality	Quality based on values (see section 3.2.4), one box retailer also buys food that would go to waste (rejected by supermarkets)	Quality based on values (see section 3.2.4), one co-op also sometimes buys seconds from distributors	Quality criteria are size, weight and visual appearance for one supermarket, Taste is more important than typical supermarket criteria for the other supermarket, also buy food that would go to waste	Supply only certified organic, did not comment on other criteria
Logistics	Flexible logistics, one commented they make orders and do daily pick-ups and farmers also share transport	Flexible logistics, one co-op is happy to be flexible in their systems to work with particular farmers they want to support	One supermarket has centralised ordering across stores	Did not comment

3.2.6 Views on vegetables grown with recycled organic compost

In order to determine the market potential for compost grown vegetables interview participants were asked their views on vegetables grown with compost. Specifically, they were provided with a short description of recycled organic compost and the environmental and soil health benefits of compost in farming.

All the participants considered that using compost to grow vegetables is important, but only alongside other factors. All participants were hypothetically interested in selling vegetables grown with compost, but there was no consensus as to whether compost grown vegetables could be sold as a separate product. The box retailers, co-ops and wholesalers perceived that it

would be important to consumers but only alongside other factors such as chemical free production. They felt it could be marketed as an additional attribute to organic or local produce or for those less concerned with organic certification could be 'co-marketed' with other sustainability attributes. The supermarkets were more likely to be interested in selling compost grown vegetables as a new 'sustainable' product. One supermarket felt that there is market potential for 'sustainable' or 'compost grown vegetables' to fill a gap between certified organic and conventional produce, however this would need to be accredited.

Retailer perspectives of importance of recycled organic compost

All participants considered **using compost as important if it supports their other values**. One box deliverer and the wholesaler considered that compost use was important, but when integrated as a part of organic farming. One co-op considered this integration important but alongside other factors such as affordability. The two supermarkets considered compost use important but put more emphasis on the need to manage their own food waste, rather than on supplying vegetables grown with compost.

There is a perception from one of the box deliverers, one co-op and the wholesaler that the **farmers they source from are already using compost** (3/7 participants). For example one co-op mentioned that this is because farmers know that they won't have good vegetables unless they have healthy soil, and hence the understand the importance of compost. The wholesaler mentioned that most farmers they source from generate and use their own compost (within the organic certification). One supermarket had a different view that **consumers would expect that farmers are already using compost** and would be surprised to know that it is not common, and that many consumers have an unrealistic expectation of farmers. Their perception is that **farmers are unlikely to use compost currently**, because as many small farmers are struggling to be profitable they will seek to do the easiest and most economical option. However they perceived that some of the better and larger growers are starting to realise the benefits.

There was a **lack of consensus as to whether customers would consider compost use was important**. One co-op noted that there is a misconception and misunderstanding about the importance of compost and reusing organic waste in the community, however people want to know where food comes from. One supermarket noted that their market research shows product safety comes first, followed by health and nutrition, then ethical sourcing. They think that customers in Australia have the perception that the Australian food chain is mostly low chemicals already, and they do not feel market pressure for "sustainable food". The other supermarket commented that **consumers would have no problem with it**.

Retailer perspectives on selling compost grown vegetables

All participants were hypothetically **interested in selling vegetables grown with compost**, but there was a **lack of consensus if "compost grown vegetables" could be marketed as a separate product**. The supermarkets were more likely to be interested in selling compost grown vegetables as a separate product, as they do not perceive a conflict for their customers with organic produce, as reported by the retailers who currently focus on organic.

The box retailers, co-ops and wholesalers who sell mainly organic produce (certified and uncertified) see compost grown vegetables as more likely **in addition to organic produce, rather than a separate product** (5/7 participants). The overall perception from this group is that recycled organic is not enough to create a new market in terms of its size or importance. There is the perception that it **may further complicate the market**, as any product needs to be easy for people to understand and make decisions about. The wholesaler reported that they perceive compost grown vegetables would not be big enough to create a new market, as **people would still want certified organic produce** and are buying it because it is pesticide- and chemical-free. People are worried about where waste is going but are also health conscious. One box retailer commented that people firstly choose organic because it is chemical free, and then quality, taste and nutrition are considered important. The other box retailer also agreed with this perception and thought that there could be a conflict between supporters of organic compared to compost grown vegetables.

The wholesaler considered that it could **potentially be a niche for a grower in addition to organic**, for example if farmers could sell their produce by being able to say they are not only certified organic but also using recycled organic compost.

One co-op stated “Growing in compost isn’t enough... it has to be something additional to this”. They stated that there would need to be consideration of **what value has been added and how it is different to other options**. If the produce was a higher cost than conventional produce they would need to see what this is achieving, for example a reduction in greenhouse gas emissions.

The supermarkets interviewed were **both potentially interested in selling vegetables grown with compost**, but expressed a greater interest in reducing their own food waste. One supermarket stated they would be interested if they could see a market for it, but did not have a strong perception if there was one. They reported that they have a **massive incentive to manage food waste** to reduce waste management costs, as then the waste fees would be lower due to the lower weight, which would help in convincing management of the business case[9]. They have undertaken a trial of onsite composting in a regional store but it was not considered viable. For this supermarket, changing the perception of the quality of fresh produce was still the main priority.

The other supermarket felt very positively that compost grown vegetables could be marketed as a product. They have they perception that the **market is not moving towards organics, but instead to a focus on sustainability**. They noted that there is biodynamic and organic produce available, but nothing the “next step down” from this. They feel that the problem with the organic market is the high labour costs, and there would be consumer interest for produce that is sustainable and has a low impact on the environment. They consider that using compost would be an important part of that, and think this will continue to be important as the price for fertilizers and other inputs increase.

Retailer questions or concerns on compost grown vegetables

The interview participants were further probed to determine what information they would need about compost grown vegetables. Two box retailers and the organic wholesaler commented they would have **concerns about contamination and the transparency of compost quality**. One box retailer mentioned that it could be a “conflict” for farmers as they don’t know what is going into the compost and they would need to see that proper recycling was in place. The other box retailer mentioned that would need to look at heavy metal levels and that farmers would need to know how to use it properly.

The organic wholesaler (the only retailer who sells exclusively certified organic produce) had **concern about the process for organic growers to use compost**. Their understanding was that if growers were to use compost that is not from certified organic produce they would need to let it sit for a year to be suitable to use on the organic farm as the garden and food waste could have chemicals in it. To be acceptable farmers would need to follow those rules then do a soil test to make sure they are chemical free. Another stakeholder interviewed in addition to the retailers commented that the organic standard is broad enough to include compost (from recycled organics), but needs to be more “open-minded” and it can be a barrier (E Brocken, 2016 pers comm).

The supermarket that was supportive of the idea of a market for sustainable and compost grown vegetables felt there would **need to be standardisation through an industry-wide system for accreditation**. Each farm involved in supplying sustainable compost grown vegetables would need to be accredited. They felt that **eventually it will need to be more economical** to farm this way.

Retailer perspectives on messaging for consumers

Finally retailers were asked how they might communicate or market compost grown vegetables to their customers. Almost all the retailers were unsure how compost grown vegetables could be messaged and, as discussed above, the organic retailers would market this as part of organic

[9] The Federal Government has now established at National Food Waste strategy. This could potentially be an incentive in the future to reduce, divert or compost organic waste.

farming. One box retailer commented that messaging should focus on **communicating the greater good** and one co-op commented that messaging should focus on **local sustainability impacts**.

One supermarket noted that it would **not be difficult to market if there was a recognisable industry-wide benchmark or standard**. However they noted that getting messages to consumers is “extremely hard”. They commented that it is hard to do in store or over email, but the **best way is sensationalising the message through social media**.

Another stakeholder interviewed in addition to the retailers commented that some people could be sceptical, however consumers are getting more educated and thinking about closing the loop. They feel there is a need to shift the perception from waste to resource, but reducing waste is a sideline. Marketing focus should be on **quality food with higher nutrients**. At the same time consumers would need to have trust in the food chain.They also felt that it could be marketed by a **focus on local produce rather than building a new brand**. This would bring consumers and farmers together, to build trust and create belief that the product is worth it. This could be done with direct marketing for local regions in the Sydney basin and it could be possible to get a high price for marketing this (E Brocken, 2017 pers comm).

Retailer perspectives on messaging for farmers

In addition to the interview questions, one box retailer gave their perspectives on how compost can be messaged to encourage use by farmers. They commented that farmers **need to understand the benefits of using compost**. Farmers come from many cultural backgrounds, which can make communication tricky, and they often do not share information among themselves. There could be potential for an event to engage farmers such as a compost conference or “composter of the year” awards for local growers.

Another stakeholder interviewed in addition to the retailers felt that **the organic industry could be a vehicle for promoting compost** as ultimate form of fertiliser, but there was a need to increase demand and demystify compost. To promote compost to farmers the quality concerns need to addressed, as farmers have ***“bad memories of contaminations”*** and are ***“hooked on”*** **chemical fertilizers**. Having a reasonably priced and quality compost product could give farmers assurance (E Brocken, 2016 pers comm).

Messaging for farmers would need to make an **economic argument of the benefits of reduced inputs and improved soil health**. To do this it is also important to have strong evidence that healthy soil leads to plants that are more resistant to a range of stresses. Farmers face a price premium for taking a risk, and farmers need flexibility as they face many challenges, including being price takers (E Brocken, 2016 pers comm).

3.3 Implications for messaging to retailers

To create messaging for compost grown veggies, there may be a need to communicate first to supply-chain stakeholders that only a small portion of farmers currently use compost, but there is significant potential to increase to increase this with significant associated benefits.

Compost grown vegetables may not have enough potential to market as a separate product for those who retail or consume certified organic produce, but could be a niche for organic growers. Alternatively for retailers and consumers who are less concerned about organic certification, it could be integrated into a sustainable package that includes growing locally and low chemical inputs. Small-scale retailers who source their vegetables based on trust (such as the box retailers) are an opportunity to find a market for compost grown vegetables within a sustainable package, however the lack of compliance checks in the value chain puts retailers at risk of misplaced trust.

For supermarkets and consumers that do not currently buy organic produce there is market potential for ‘sustainable’ or ‘compost grown vegetables’ that are a ‘step down’ from organic. This may need to be a recognisable industry-wide accreditation that includes compliance checks. The value-add of compost should be made clear to both retailers and their customers. The message needs to be clear and not complicate the market.

4 Consumer views

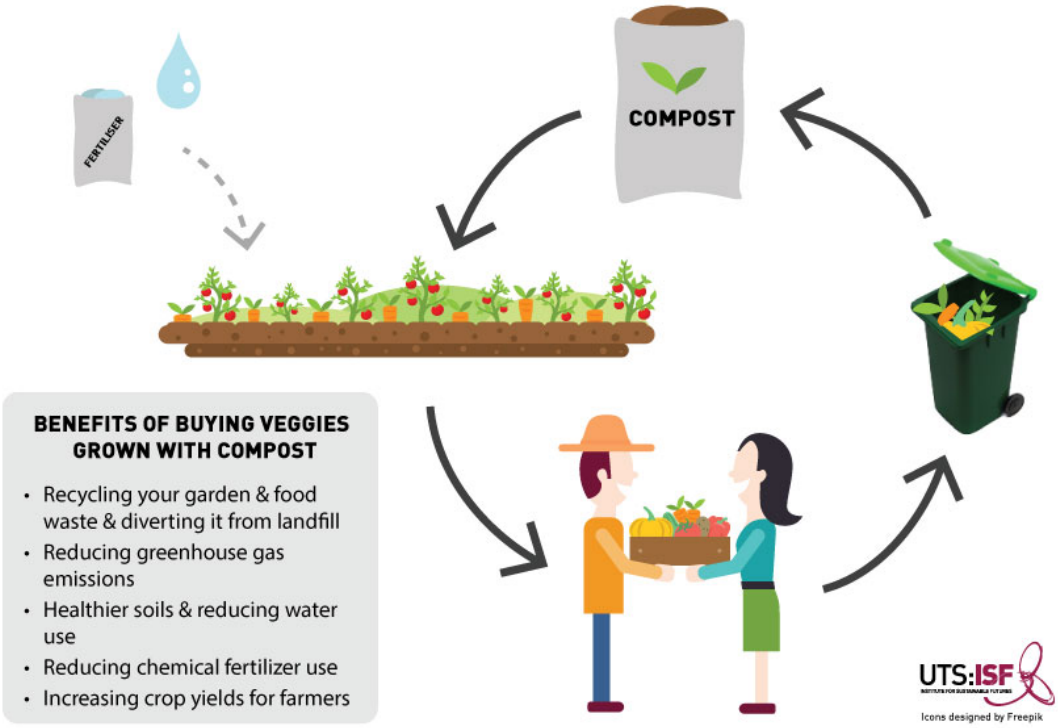
4.1 Method

To test the consumer demand for vegetables grown with recycled organic compost, surveys were undertaken with existing consumers of niche 'sustainable' vegetable produce (e.g. locally-grown, organic and/or seasonal). A series of 10-minute surveys was conducted face-to-face with consumers over three weekends between April and June 2016 at weekly farmers' markets in inner Sydney including Carriageworks (Redfern), Marrickville and Kings Cross farmers markets. The objective of the surveys was to better understand the level of awareness, interest and potential drivers to buy vegetables grown using recycled organic compost within this consumer group. Farmers markets were identified as a key 'point of sale' for fresh vegetables and an environment where consumers would be a likely target market for compost grown vegetables.

Surveys were conducted with shoppers selected at random from among those who had purchased vegetables at the markets. To collect the data, responses were entered into Survey Monkey on a tablet device by the researcher. Questions were designed to randomise the order of potential responses to each question for each respondent, to avoid response bias from the order of choices. Questions and information sheet are available at Appendix X.

The objective of the initial questions was to understand the current purchasing behaviours of consumers, specifically where they usually purchase vegetables and the values (social and environmental) that motivate their purchasing decisions. Consumers were then shown a diagram of the compost process and potential benefits (see Figure 3) and asked how important they considered using compost in growing vegetables. They were then asked to rank the likelihood that they would buy vegetables grown with compost if they were available and for what reason they would do this.

Figure 3: Benefits of buying veggies grown with compost (figure from consumer survey)



4.2 Findings

4.2.1 Demographic data

A total 101 surveys were completed by consumers at the farmers markets. Over half (60%) of respondents were from the 20 to 40 age range with the remainder over 40, and most (70%) were female respondents. There was a spread of household types including single person household, couples without children, family households and share houses (Table 3).

Table 3: Demographics of survey participants

Household type	% of respondents
Single person household	16%
Couple with no children	36%
Family	19%
Shared house	22%
Prefer not to answer	6%

4.2.2 Current vegetable purchasing behaviours

Main reasons for buying vegetables at farmers markets

Consumers were asked an introductory open-ended question regarding the main reason they purchased vegetables at farmers markets (Table 4). Half of respondents identified **taste, quality or freshness** of produce as the reason for buying from farmers markets, and over a third placed emphasis on buying from and **supporting farmers** and **local small businesses**. A quarter of respondents stated their reason for shopping at farmers markets was to purchase **organic or chemical free** produce or for **health or convenience** reasons.

A small number of respondents identified the social engagement aspects of farmers markets as a key reason, such as the 'experience' and 'having conversations with farmers' or stallholders.

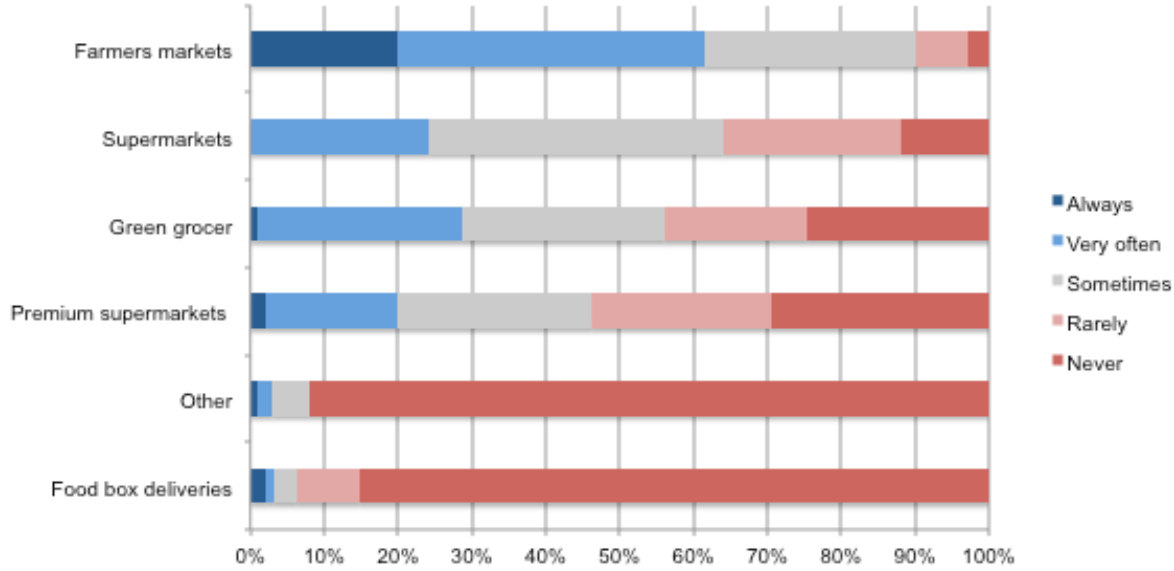
Table 4: Main reasons for buying vegetables at farmers markets

Taste/ quality/ freshness	Support farmers and local small business	Organic/ chemical free	Other e.g. social, health, convenience
50%	35%	21%	22%

Typical location of purchasing vegetables

Respondents were asked to rate how often they purchased vegetables from different locations in a typical month (Figure 4). Not surprisingly (given the location of the surveys), farmers markets were the nominated most commonly as the location of vegetable purchases (more than 60% always or very often). Respondents purchased vegetables less often from retailers such as supermarkets, green grocers or premium supermarkets (between 20% and 30% always or very often) and rarely from food box delivery schemes (less than 5% always or very often). Of the respondents who selected "other", two respondents purchased from food cooperatives and one commented on 'growing their own' vegetables.

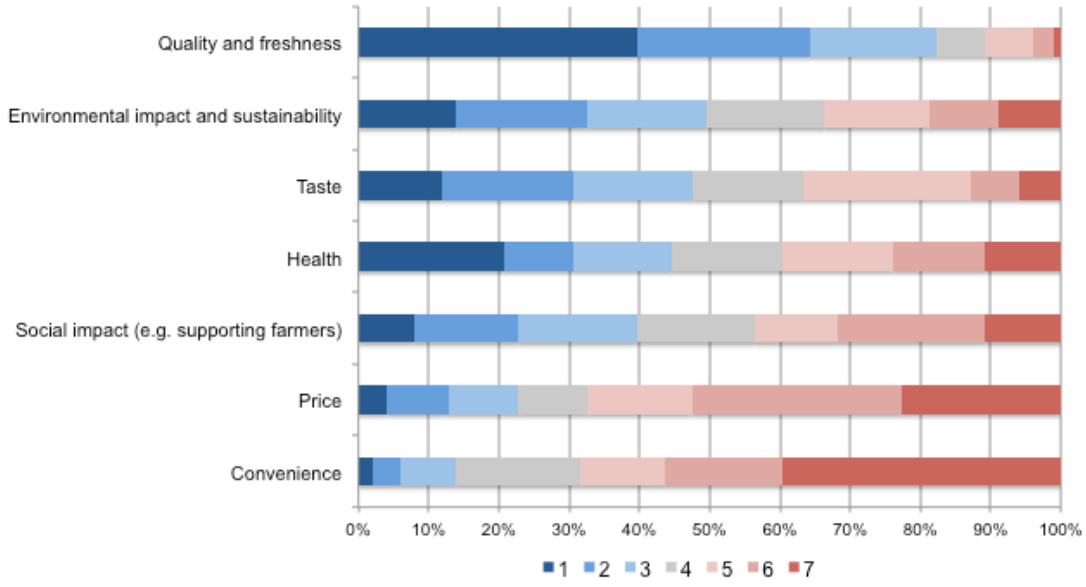
Figure 4: Vegetable purchasing behaviours – location (ordered from most to least common based on the weighted average of ratings)



Drivers and motivations when purchasing vegetables

Respondents were asked to rank from highest to lowest how important they considered a range of attributes when making decisions on purchasing fresh vegetables (where 1 is the highest importance and 7 is lowest importance). As illustrated in Figure 5, respondents placed the highest importance on **quality and freshness** (approximately 65% of respondents ranking it as 1 or 2). **Environmental impact and sustainability**, **taste** and **health** were also ranked highly (approximately 30% of respondents ranking these attribute as 1 or 2), followed by **social impact**. Convenience and price were the lowest reported priorities for consumers purchasing fresh vegetables.

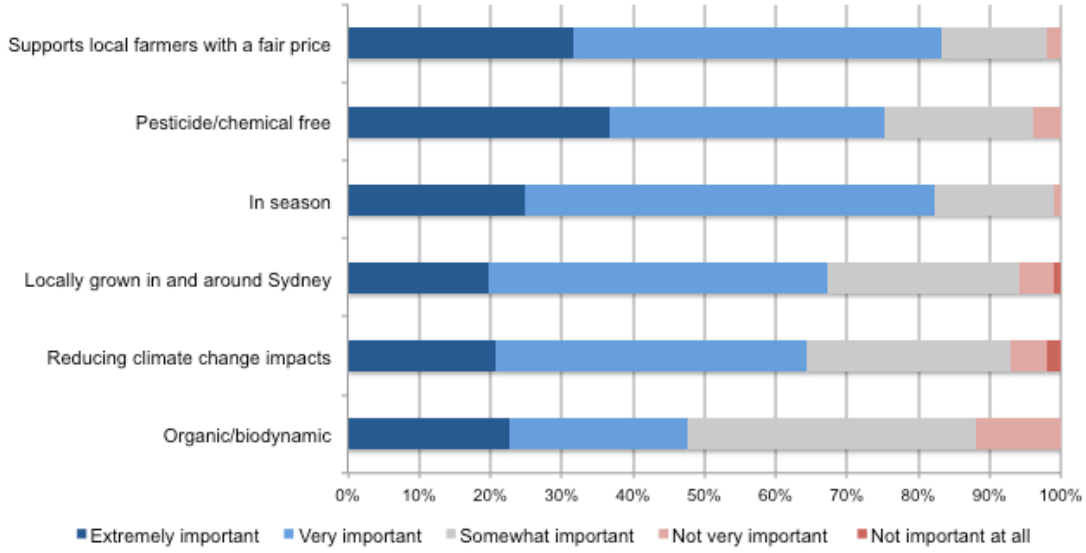
Figure 5: Vegetable purchasing behaviours – general drivers and motivations



Consumers were further probed to understand the types of social and environmental motivations they have for purchasing fresh vegetables. They were asked to rate the importance of a range of specific environmental and social attributes on a scale from “not important at all” to

"extremely important" (Figure 6). All options were considered important to respondents, with **supporting local farmers**, **pesticide/chemical free** and **in season** being marginally more important. More than 80% of respondents considered supporting local farmers and buying in season as either extremely or very important motivators of vegetable purchasing. Pesticide/chemical free vegetables was rated by 35% of respondents as extremely important. However, organic or biodynamic certified produce was considered extremely important by only about 20% of respondents.

Figure 6: Vegetable purchasing behaviours – social and environmental motivation



The results shown in Figure 6 illustrate the importance of specific environmental and social motivations because the design of this question allowed respondents to rate each attribute independently. For example if a respondent considered all of the attributes as "very important" they were able to select that rating for all attributes. This contrasts with the design of the previous question (Figure 6), which 'forced' them to rank attributes relative to one another from high to low, which shows the importance of social and environmental attributes relative to other attributes such as price, quality and convenience.

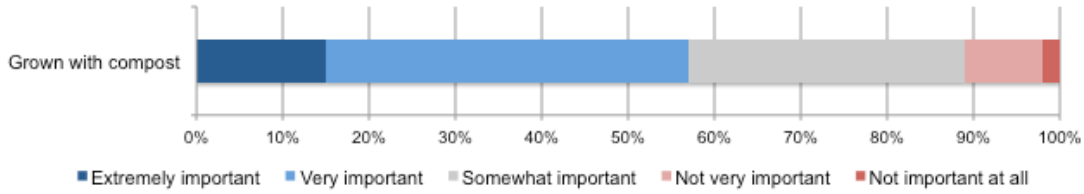
4.2.3 Purchasing vegetables grown in compost

After being shown a diagram of the compost process and benefits (see Figure 3) respondents were asked to rate how important they would consider vegetables being grown with compost when making purchasing decisions, in the same format as the previous question.

Respondents placed a strong importance on vegetables grown in compost, with 15% of respondents considering this extremely important, 42% very important and 32% somewhat important (Figure 7).

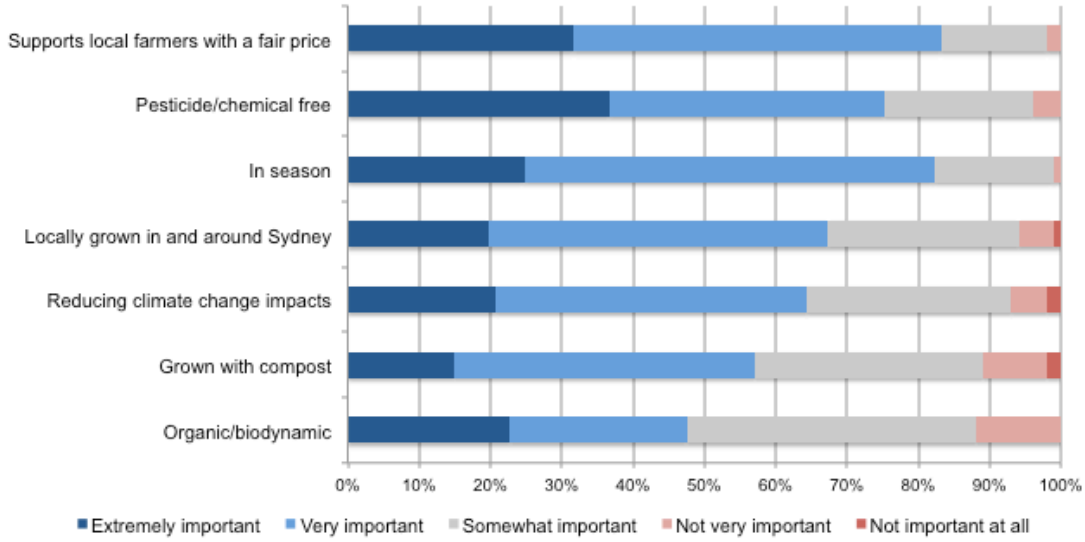
Note that this result shows the significance of information provision on potential benefits of compost to respondents. The use of the diagram overcame the high likelihood that respondents had low awareness of compost. The purpose of the survey was to understand the importance placed on positive attributes of compost-grown vegetables among the farmers-market consumer cohort rather than current levels of awareness.

Figure 7: Importance of vegetables grown with compost



In this question, the rating given by respondents to vegetables grown with compost is comparable to that of other social and environmental attributes. That is, around 57% of respondents felt that growing vegetables with compost was extremely or very important. They also rated other environmental and social attributes as similarly important, with all of them ranked by approximately 50 and 80% of respondents as extremely or very important (Figure 8).

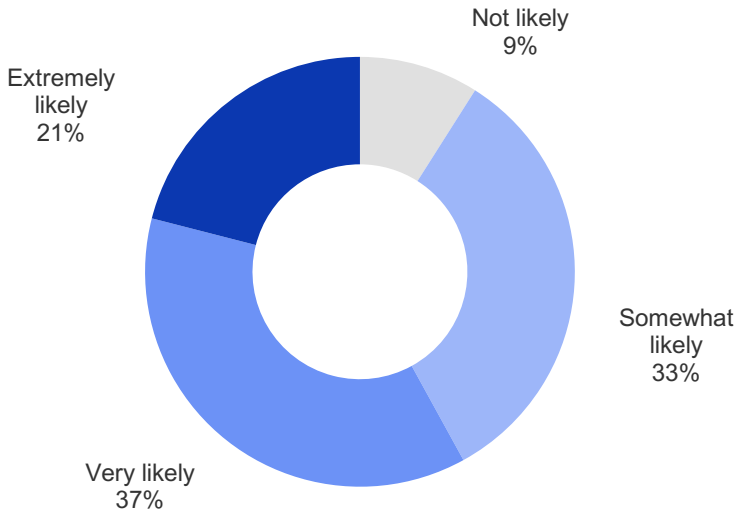
Figure 8: Social and environmental motivation including vegetables grown with compost[10]



When asked how likely they would be to purchase vegetables grown with compost over half (58%) of respondents said they would be either extremely or very likely to purchase vegetables grown in compost, compared with other vegetables (with all other attributes the same) (Figure 9).

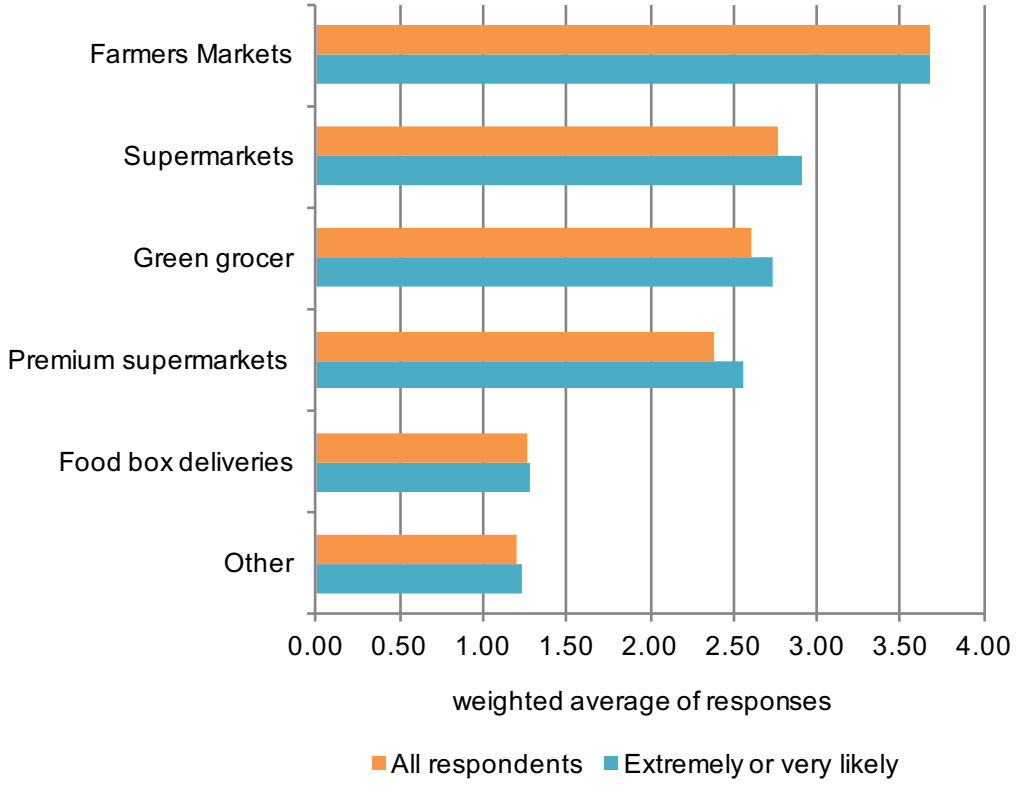
[10] Note this graph combines figures 4 and 5

Figure 9: How likely would consumers be to buy veggies grown with compost?



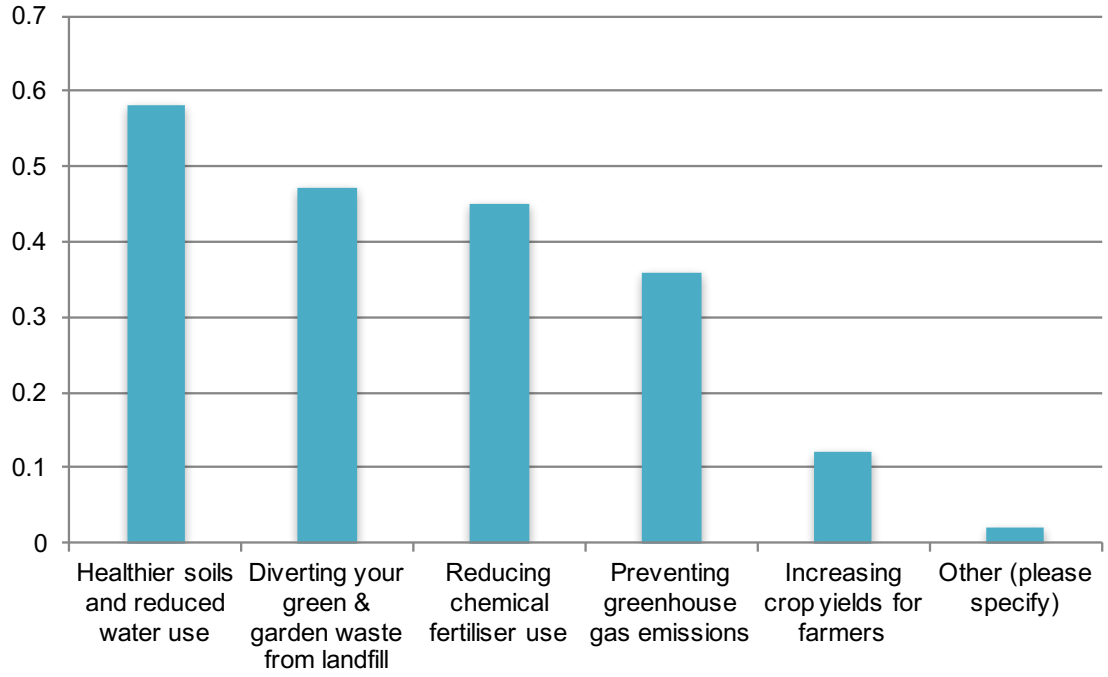
Of those respondents who reported they would be very or extremely likely to buy compost grown vegetables (58%), the majority shopped at farmers markets more often than other locations, and retailers (such as supermarkets, green grocers and premium supermarkets) less often (as illustrated in Figure 10). However, within each retail cohort, there was little difference between consumers regardless of where they shopped, indicating a general preference for compost-grown vegetables among all purchasers.

Figure 10: Shopping preference of those who reported they would be Extremely or Very likely to buy compost-grown vegetables compared to all respondents



Respondents were asked to choose their top two motivations for hypothetically purchasing vegetables grown with compost. Healthier farming practices were the top motivation, with 58% reporting they would be motivated by **healthier soils and reduced water use** and 45% motivated by **reducing chemical fertilizer use**. Environmental impacts of **diverting organic waste from landfill** were a top motivation for 47% of respondents and **preventing the associated greenhouse gas emissions** nominated by 35% (Figure 11). Respondents were less motivated by the benefits of increasing crop yields for farmers, although healthier soils also directly benefit farmers.

Figure 11: Purchasing vegetables grown in compost - motivation



4.3 Implications for marketing and messaging

The consumers surveyed were motivated to shop for vegetables at farmers markets by a wide range of drivers, predominantly quality and freshness. Environmental benefits and sustainability was also an important driver, and when further unpacked, a range of social and environmental motivations were identified as important (particularly supporting local farmers, pesticide/chemical free and in season). Importantly respondents considered growing vegetables with compost as being of similar importance to other social and environmental attributes, once they were made aware of the benefits.

The survey results, although on a small sample of a specific demographic (mostly young females shopping at inner city farmers markets), indicated that there is potential interest and demand for fresh vegetables grown with compost for this demographic. Consumers who buy at farmers markets are likely to be motivated by the social and environmental benefits of vegetables grown with compost. This could be leveraged in the marketing of vegetables grown with compost to local food consumers by emphasising that growing vegetables with compost will meet the environmental motivations of their purchasing decisions, leading to healthier soils. Emphasising that growing with compost can reduce chemical fertilizer use is of high importance to this target market, and messaging could suggest farmers are creating “healthy living soil with minimal chemical inputs”. The importance consumers place on reducing waste to landfill by recycling organics through the use of compost could also inform messaging, such as compost-grown vegetables “create a closed loop from the kitchen, to a local farmer, and back again”.

5 Farmer and other stakeholders perspectives on compost

5.1 Method

A series of 10-minute surveys were conducted from June 2016 to March 2017 with farmers and other stakeholders involved in the market for recycled organic compost. These were undertaken face-to-face at two CRED project field days and distributed to potential respondents through the email list of NSW Farmers and the AORA network (Table 5).

The key objectives of undertaking the farmer and stakeholder surveys were to:

- Understand barriers and opportunities to using compost
- Incorporate the EPA evaluation survey for projects funded under the Organics Market Development Grant
- Fill gap in the literature, in particular building on the EPA Right Mind survey (TRM, 2014)
- Develop a picture of the social network of the group and how information on compost is shared and sourced

Table 5: Survey collection method and respondents

	Date	Data collection method	Number of responses
CRED Field Day 1	June 2016	Face-to-face (on paper)	10
NSW farmers email list	August 2016	Online (Survey Monkey)	8
AORA email list	November 2016	Online (Survey Monkey)	18
CRED Field Day 2	November 2016	Face-to-face (on paper)	8
CRED Field Day 3	March 2017	Face-to-face (on paper)	4

The survey was based on an instrument produced by the EPA to evaluate the perceptions, experience and awareness of participants taking part in projects funded under the Organics Market Development Grant. The survey was modified and expanded for other stakeholders in the compost value chain beyond farmers, and to understand how information is sourced and shared on compost to enable an analysis of the social network.

At the field days, surveys were conducted face-to-face with farmers and other stakeholders. The responses to questions were recorded on paper forms by the researchers. The online surveys were made available to participants via Survey Monkey. The survey was piloted on the first field day with 10 respondents, and one of the questions was subsequently modified into two separate questions for clarity in the remaining surveys.

Note that the participants were self-selected and most likely interested in compost (based on their attendance at the field days or subscription to AORA email list). Therefore the survey is not representative of all farmers. While the survey explained that the definition of compost was specifically recycled green and garden waste, when answering questions the respondents sometimes also referred to other forms of compost (such as mushroom compost and biosolids).

5.2 Findings of survey

5.2.1 Profile of respondents

A total of 48 responses to the survey was received, including 27 from farmers and 21 from other stakeholders. The breakdown is shown in Table 6,

Table 6: Profile of farmer and other stakeholder survey respondents

	Number of responses	Number of farmers	Number of other stakeholders
CRED Field Day 1	10	10	0
CRED Field Day 2	8	6	2
CRED Field Day 3	4	0	4
NSW farmers email list	8	8	0
AORA email list	18	3	15
Total	48	27	21

Table 7 further indicates the breakdown of other stakeholders surveyed, including waste managers, compost producers, service providers, government and otherwise involved. Note that service providers were broadly defined to encompass spreading contractors, agricultural advisors, fertiliser companies/sellers and transport and logistics companies. 'Otherwise involved' includes two industry association representatives and two consultants. Although the survey was open to food distributors and retailers, no responses were received from these groups (however detailed perspectives are provided from retailer interviews in Chapter 3)..

Table 7: Profile of other stakeholder respondents

	Waste manager	Compost producer	Service provider	Government	Otherwise involved
AORA email list	2	3	3	3	4
CRED Field Day 2	0	0	2	0	0
CRED Field Day 3	0	4	0	0	0
Total	2	7	5	3	4

Farmer demographics

Of the 27 farmers surveyed, 20 were vegetable growers, 5 were fruit growers and 5 were other farmers, with some respondents selecting more than one option. Other farm produce reported (including by some vegetable farmers) included lucerne, cut-flowers, lambs and wool, cropping and grazing, cereal maize and cattle. All the farmers at Field Days 1 and 2 were vegetable farmers.

Farmers reported growing a range of vegetables including cabbage, cauliflower, spinach, corn, pumpkin, tomatoes, cucumber, snow peas, Asian greens and herbs. The majority of farms were sized between 10 and 70 hectares with a median size of 40 hectares, and located in the Hawkesbury region (Cattai, Upper Colo, and Mangrove Mountain) or in the Penrith/Liverpool

area (Kemps Creek). The exception to this includes an organic grower with around only 2 hectares cultivated, also in the Hawkesbury region. There were also four Chinese growers with properties between 2 and 3 hectares, located close to Richmond in semi-residential suburbs such as Berkshire Park, Shanes Park, Wilberforce and Llandilo. In addition there was one large grower with 500 hectares in the Bathurst region producing a range of produce other than vegetables.

The majority of farmers sold their produce at Sydney Markets at Flemington, but there were a range of other locations including to farmers markets and co-ops, directly to retail stores or from the farm gate (Table 8). Note that not all farmers responded to this question, hence the total responses are less than the 27 farmers surveyed.

Table 8: Sale point of farmers surveyed

Sale point	Number of responses
Flemington markets	10
Direct to stores or co-ops	3
Farmers markets	2
Agents	1
Farm gate	1
Other farmers (to on-sell)	1
Pack house	1

Case study: from farm to supermarket

One Cambodian farmer in business with his father sells his produce to an agent, who is also his brother. The agent also gets produce from 4-5 Cambodian farmers, and then takes it to Flemington Markets. His produce, such as cherry tomatoes, goes to large supermarkets like Coles. The price in the supermarket is $5 for a punnet of cherry tomatoes and as the grower they receive $1. They feel that this price is OK, but think that supermarkets should sell for a more reasonable price to move more stock and have less waste.

5.2.2 Perceptions and experience in using compost

In order to understand the barriers and opportunities to using compost, the survey asked a series of questions on the perceptions and experiences of farmers including their current use, interest and future plans and the volumes used. Farmers and non-farmers were then both asked about their awareness of compost products, and perception of compost benefits, barriers and costs.

Current use of compost by farmers

Over 60% of the respondent farmers had used compost on their properties in the last 12 months (13 out of 21 respondents), with a further ~20% reporting they had used compost in the past.

Many farmers commented that they had used compost in relation to a previous trial by the NSW Government. Around 20% had never used compost on their property, as shown in Table 9.[11]

Table 9: Current use of compost reported by farmers

I have never used compost on my property	19%
I have used compost on my property in the past, but do not currently use it (have not used compost for 12 months or more)	19%
I have used compost on my property in the past 12 months	62%

Interest and plans of farmers in using compost

Regarding their future interest and plans to use compost, approximately 50% of the farmers reported planning to use compost in the next 12 months (12 out of 23 respondents), with 17% interested but without future plans. Another 30% of farmers reported that they did not wish or plan to use compost in the next 12 months (Table 10).

Table 10: Interest and plans in using compost reported by farmers

I do not wish to use compost on my property and do not plan to use it in the next 12 months	30%
I am interested to use compost on my property at some point in the future, but have no plans to use it in the next 12 months	17%
I plan to use compost on my property in the next 12 months	52%

Number of tonnes used in the past 12 months

Farmers were asked to provide an estimate of how many tonnes were used in the previous 12-month period or how much they plan to use in the next year. All the respondents had used compost in the past 12 months, except for two who had used it in the past but did not currently use it or have future plans to do so. Therefore we have assumed these figures are based on actual current or past use, rather than future plans. The responses ranged widely from 10 to 900 tonnes, as shown in Table 11.

Table 11: Number of tonnes of compost reported by farmers

Compost volume	Number of responses
10-50 tonnes	5
51-100 tonnes	3
101-500 tonnes	5
501-900 tonnes	2

[11] Note that not all farmers answered this question as the original question was split into two following the pilot of the survey; hence there are only 21 respondents instead of 27.

Awareness of compost products

Seventy per cent of farmers (18 respondents) and 95% of other stakeholders (20) respectively were aware of available compost products (Table 12). When asked to list compost products that they were aware of, farmers mentioned products including screened pasteurised garden organics, bagged organic products, composted green waste, biosolids, green waste with 30% biosolids, nitro humus, mushroom compost and mulches/straw. They listed a range of producers including ANL, Suez, Remondis, and Moss Vale Resource Recovery Centre. Many respondents stated they were aware but did not name specific products.

Other stakeholders were aware of the same products as farmers but also provided further detail of products, including immature and mature compost and soil conditioners. They listed SoilCo, ANL, Suez and North West recycling centre as additional producers.

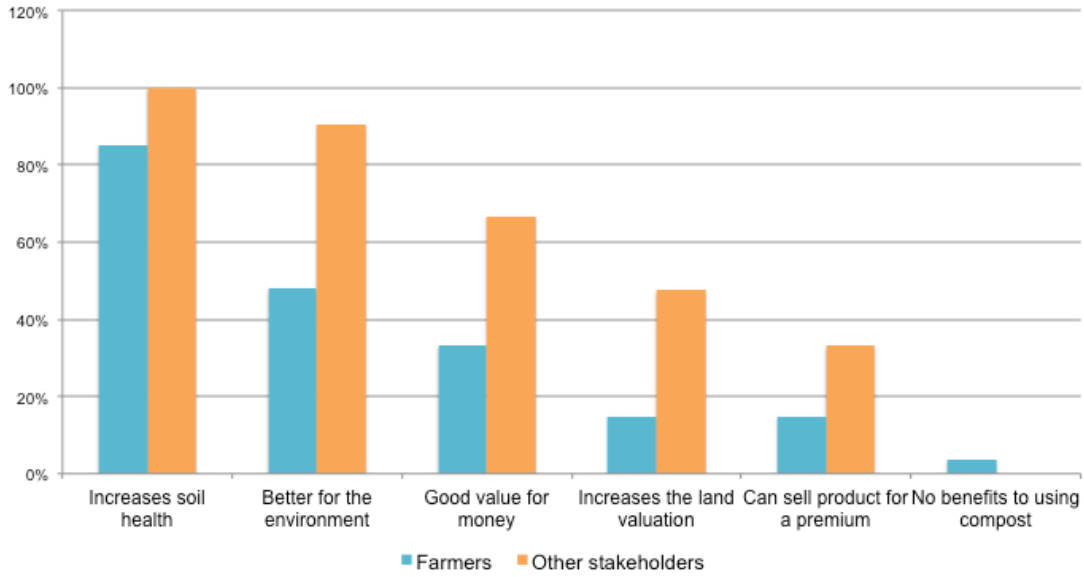
Table 12: Awareness of compost products by farmers and other stakeholders

	Farmer	Other stakeholders
Aware	69%	95%
Not aware	31%	5%

Benefits of using compost

Respondents were asked to select what they perceived as the benefits to using compost, and could select as many responses from the list as they wished. That using compost **increases soil health** was the highest perceived benefit by both farmers and other stakeholders (Figure 12). This figure is higher for other stakeholders (100%) compared to farmers (85%). Compost is **better for the environment** was the second highest perceived benefit for both groups, and this was considerably higher for other stakeholders (90%), compared to 48% for farmers. Other stakeholders had a higher perception of the benefits of compost across all the reasons in the survey.

Figure 12: Perceived benefits to using compost



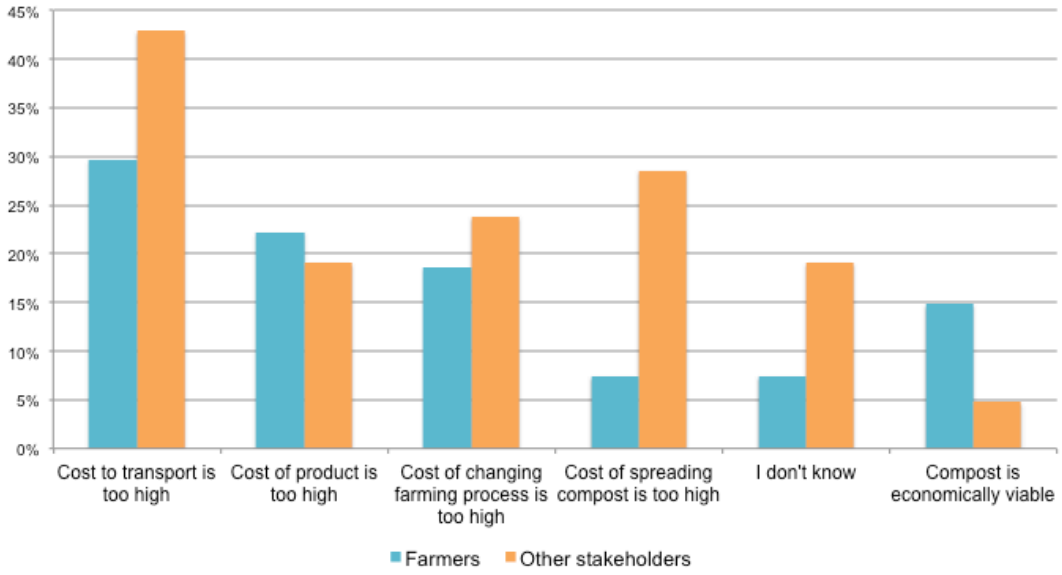
Costs that prevent/limit the use of compost

Respondents were asked to select the reasons they perceived were preventing or limiting the use of compost, and could select as many reasons from a list as they agreed with (Figure 13).

Compost was perceived as economically viable for 15% of farmers compared to only 5% of other stakeholders.

For the respondents who thought that the cost of compost prevented or limited its viability, the high **cost to transport** compost to a farming property was the main reason, selected by 30% of farmers and 43% of other stakeholders. Interestingly, 29% of other stakeholders considered that the **cost of spreading** compost on a farming property is too high compared to only 7% of farmers.

Figure 13: Costs that prevent/limit the use of compost



Thirty-seven percent of farmers and 29% of other stakeholders also selected reasons other than costs that prevent or limit the use of compost, in addition to the options given in the survey. These reasons provided by farmers included the **cost of investing in machinery** or equipment (2 respondents). They considered the capital cost of equipment as part of the overall **cost of changing the farming process**, with two farmers noting that it takes too much time and labour. One farmer also further noted on the **cost of the product**, stating that compost could cost $30 per cubic metre compared with only $4 for biosolids. However interestingly, one farmer noted that the cost of spreading was not as high as they had previously thought.

Other stakeholders noted that the problem was not so much the cost of compost, but a **lack of demonstrated value**. They noted that the cost of using compost as perceived by farmers was not matched by an adequate perception of benefit or return, and that compost was **competing with synthetic fertilizers**. They also noted that the industry needed to address the cost of transport to increase usage.

Respondents (both farmers and other stakeholders) also provided responses to this question that were unrelated to cost, and included quality and knowledge.

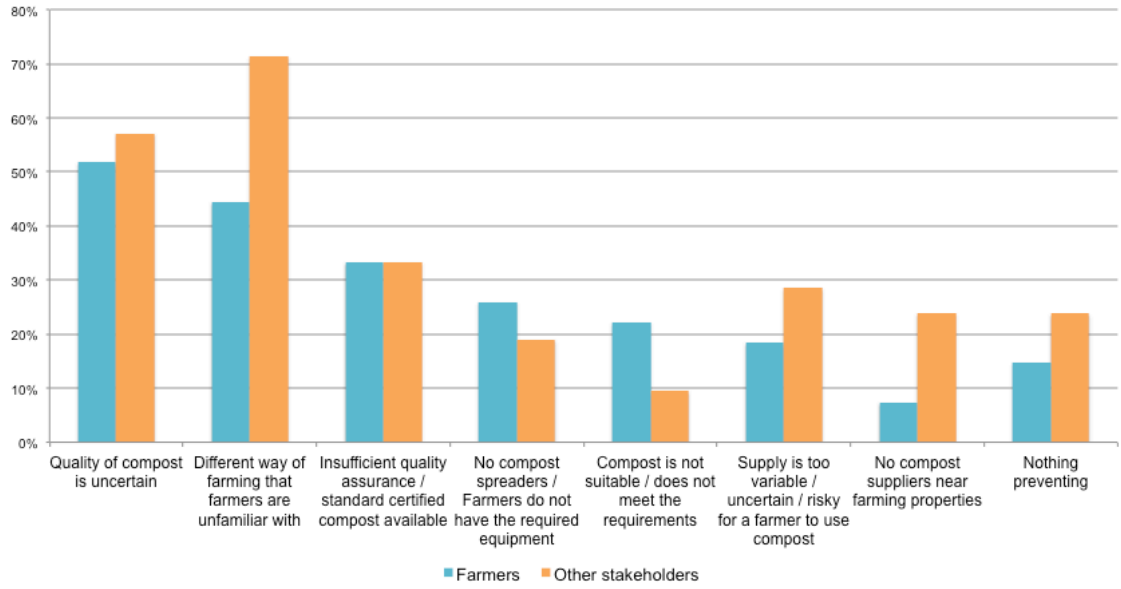
Other reasons that prevent/limit the use of compost

For both farmers and other stakeholders, the two major non-cost limitations perceived as preventing compost use were that farming with compost is **unfamiliar to farmers** and that the **quality of compost is uncertain**. Far more other stakeholders (71%) perceived that farmers were unfamiliar compared to farmers themselves (44%). A third reason for both groups was **insufficient quality assurance** processes or standard certified compost available for use on a farming property.

Figure 14 shows that 22% of farmers perceived that **compost is not suitable** or does not meet the requirements of a farming property or farming method compared to 10% of other

stakeholders. 15% of farmers and 24% of other stakeholders did not think there were any other reasons preventing farmers from using compost.

Figure 14: Other reasons that prevent/limit the use of compost



Nearly half of farmers (44%) provided additional reasons that prevent compost use, including most commonly, a **lack of benefits.** This was phrased by one farmer as a *"lack of compelling argument"* for using compost. One farmer noted that he was unable to see how compost can fit within his farming system and another that the long time period for benefits to be realised compared to their short-term nutrient needs was a barrier. Another farmer indicated that they had trialled compost for a short time but had experienced poor yields. The lack of farmers' **knowledge** about compost was also mentioned, as well as a lack of **marketing** for composting, noting that *"the returns are not well represented"*.

Farmers also noted that the **volumes** of compost required to produce a benefit prevented its use, as one noted they only want small tonnages. One farmer suggested that many farmers didn't know that compost could be bought in larger volumes that make it significantly cheaper.

Several farmers also provided details on the issue of the **quality** of compost, with two farmers noting that in the past compost was found to be contaminated (e.g. with plastic and sharps). One noted that much of the compost currently available is not completely composted and also usually is **not certified organic**. They commented that produce can be sold at a premium only if it is certified organic, which requires compost inputs to be also certified.

Several farmers commented on the **suitability** of compost for intensive farming or use in greenhouses. One commented that in highly intensive farms the turnaround time between crop cycles (harvest to sowing) is very short, which limits the potential use of compost in the farming program. One farmer noted that using compost was **laborious**, as on intensive farms spreading has to be done manually.

A similar proportion (43%) of other stakeholders group identified non-cost reasons as preventing compost use. More than half of these responses were around the **lack of awareness** of farmers on the uses and benefits of compost. Their comments included that farmers have a lack of understanding of the value and benefits, particularly that compost is a soil conditioner not a fertilizer and that the value is not always immediate but long-term. One stakeholder commented that farmers often do not understand soil health, so they would be unlikely to use it. The other stakeholders group also commented on the **unfamiliarity of farmers** with compost, one suggested that farmers are set in their ways, and another that farmers do not like change, and hence there is a **need to have trials** to validate and demonstrate the value proposition. One stakeholder commented:

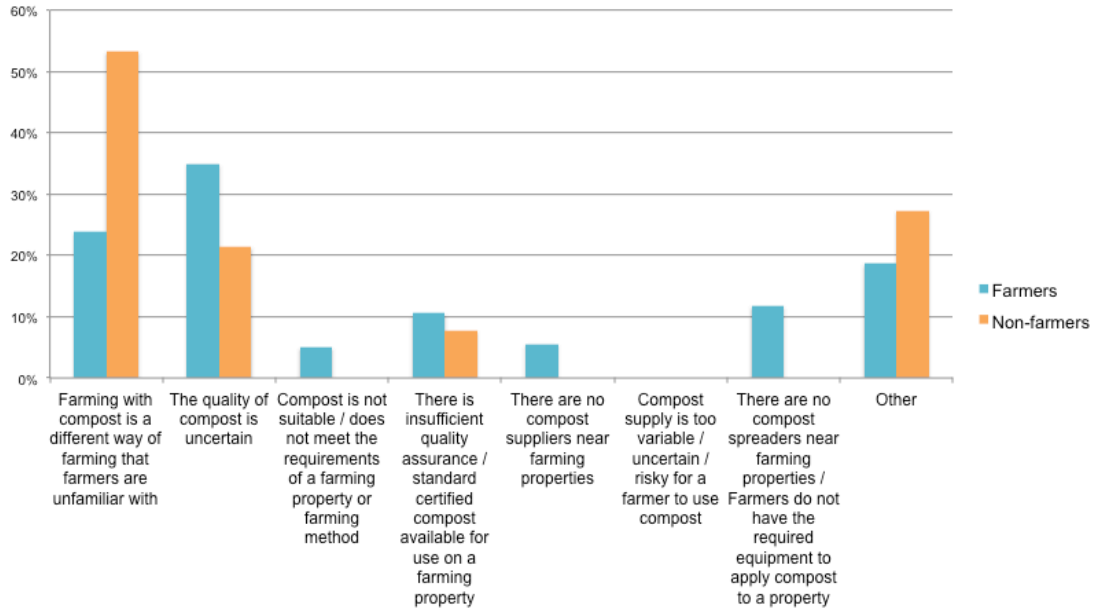
"The unfamiliarity is complicated by the cost of product, delivery and spreading. Farmers don't mind trying new things if it doesn't cost too much and isn't too much trouble to organise."

The other stakeholders group also identified product **suitability** as a barrier; specifically that compost made from city green waste tends to be too high in carbon and low in nitrogen. The quality and **lack of quality assurance** was also mentioned, in particular the need for certification or demarcation of different levels of compost quality and assurance on the source of materials.

Biggest hurdle to the use of compost

Respondents were asked to select which of the reasons in the previous question they considered the biggest hurdle to the use of compost (Figure 15). Farmers nominated the uncertain **quality** of compost and the other stakeholders **farmer unfamiliarity** with compost as the biggest hurdles to use respectively.

Figure 15: Biggest hurdle to using compost



5.3 Implications for marketing and messaging

Soil health and environmental benefits were the greatest perceived benefits of compost. However there was a range of perceived barriers including the cost of transport and spreading and the cost of the product. Interestingly more farmers than non-farmers though that compost was currently economically viable.

The main perceived non-cost barriers include farmers' unfamiliarity[12] with using compost, the uncertain quality of compost and the lack of sufficient quality assurance of the product. There was a perception that compost was not suitable or 'fit for purpose' in farming systems, and that the benefits of compost use for farming systems had not been well disseminated.

The implications for messaging targeted at farmers is that it should focus on demonstrating the value of using compost and provide evidence of its effectiveness. Information should explain the role of compost, not as a direct replacement for fertilizer, but in creating long-term benefits for soil health, leading to lower fertilizer and water inputs and potential increased yields, and therefore improved productivity. Messaging should also address existing concerns (e.g. with contamination), however a prerequisite for this is that a quality assured or certified product with standardised attributes is implemented.

[12] By the other stakeholder respondents.

5.4 Information networks

A social network analysis (SNA) was undertaken to develop a picture of the communication channels through the compost value chain social network, specifically the flow of information (Cunningham et al, 2015). This process allows for a better understanding of how information on compost is shared and sourced (Bodin and Crona, 2009; Crona and Bodin, 2006). The data were collected through the farmer survey face-to-face at the three field days and online distribution through the AORA and NSW Farmers networks between June 2016 and March 2017. Twenty-six farmers responded, while 19 other stakeholders responded. This information provides useful insight including key points in the network that can be targeted in any future initiative designed to access or share information on compost.

Respondents to the survey were asked to select from a range of categories (e.g. other farmers, compost producers and industry networks) where they **access information** about compost, and were then asked to identify a specific individual or organisation. They were then asked the same question about whom and where they **share information**. Due to the nature of the data (many people may not have felt comfortable naming specific individuals or organisations), a simplified format for social network analysis was adopted. For the purposes of this analysis, a set of high level categories were composed and analysed to construct social network matrices. However, the detailed responses are discussed qualitatively for each network.

5.4.1 Accessing information

Respondents access their information mainly from **industry networks** (22), **online resources or websites** (20), followed by **government staff or resources** (19), **other farmers** (19) and **compost producers/ landscapers** (18) (Table 13). These categories are visualized as nodes in the 'access' network diagram shown in Figure 16.

Table 13: Total responses for categories

Categories	Access information	Share information
Industry networks	22	16
Online resources or websites	20	5
Other farmers	19	27
Government staff or resources	19	10
Compost producers/ landscapers	18	7
Service providers	12	10
Public events or programs	9	10
People within my organisation	9	13
Waste managers	8	4
Other	6	3
Food distributors or retailer	1	1

Industry networks were most frequently identified as a source of information on compost. Within this category, participants identified the Australian Organics Recycling Association (AORA) (5),

the Llandilo Chinese growers group (4), AusVeg (3) and Horticulture Innovation Australia (HIA) (1) as sources of information. For online resources or websites (the second most common source of information), respondents identified eight websites, including from social media platforms as information sources. Local Land Services (LLS) and the Department of Primary Industries (DPI) were the most common government sources of information (13), followed by EPA (4). While 'other farmers' were important, most respondents did not identify specific farmers from whom they source information.

Respondents specified seven different service providers in the information access network including agronomists, four compost producers and three waste managers. For public events, respondents noted field days and AORA events. For the category of 'other', respondents accessed information from experts and/or researchers (3), magazines/ newspapers and/or books (3) and compost trials (2).

An Industry Association respondent had the most diverse network of information sources (accessing information from 8 nodes); this respondent is seen as a key node because they are connected to all of the most frequently identified sources of information, and are placed in the centre of the network diagram (IA1 in Figure 16).

5.4.2 Sharing information

Information about compost was shared most commonly with **other farmers** (identified 27 times, Table 13), followed by **industry networks** (16) and **people within their organisation** (13). The information 'share' network is shown in Figure 17. Service providers, government and public events (each identified 10 times) were the next most commonly reported categories for sharing information. Respondents were less likely to share information with compost producers and waste managers than they were to source information from them.

As in the information access network, the AORA network and Llandilo Chinese growers group were identified in the sharing network (3 times each), and HIA was nominated once as sharing information. Other industry networks were the Cambodian Growers Association, Waste Management Association of Australia (WMAA), NSW Farmers and local horticulture networks (1 each). Respondents identified six specific service providers with whom they shared information, four of which are also nodes in the access network. Government organisations nominated as nodes with whom information was shared, were the same as those identified in the access network, with LLS and EPA (3 each) featuring. Public events, such as field days, and AORA events were also identified as places information is shared. In the 'other category', field trials, clients and family members (1 each) were also identified.

Key information sharing nodes with the most diverse networks (7 connections each) included a compost producer, a consultant and a service provider CP2, C1, and SP2 respectively in Figure 17.

A note on interpreting the social network diagrams:

When completing the survey the respondents selected themselves from categories, shown as "Respondent categories" in Table 14. Three respondents categorised themselves as other, two were from industry associations and one was a consultant, so these became individual categories and were assigned a code ('Respondent codes' in the table). The category of farmers was split into growers of vegetables (FVeg) and other produce (FO). Each respondent appears in the network diagrams and is linked by arrows to the node categories they selected (i.e. the arrow direction indicates who they nominated as accessing/sharing information, not the directional flow of information).

The categories from which respondents could select to identify where they access or share information are similar to the respondent categories, shown in Table 14 as "Node categories", but with some additional categories. The category of "other farmers" does not discriminate between farmers of vegetables or other produce.

The categories appear in the diagrams as nodes of varying size, determined by the number of respondents who selected this category. For example in Figure 17 the node "Other famers" appears much larger than the other nodes as it was the most commonly reported category for information sharing.

Table 14: Legend for social network analysis

Colour in network	Node categories	Respondent categories	Respondent code	Number of respondents
	Service providers	Service provider	SP	4
	Waste managers	Waste manager	WM	2
	Compost producers/ landscapers	Compost producer/ landscaper	CP	6
	Government staff or resources	Government staff	G	4
	Industry networks	Industry association	IA	2
	Other	Consultant	C	1
	Other farmers (vegetable and other)	Farmer – vegetable	FVeg	19
	-	Farmer – others	FO	7
	Food distributors or retailers	-	-	-
	Online resources or websites	-	-	-
	Public events or programs	-	-	-
	People within my organisation	-	-	-

Figure 16: Network of where respondents reported to access information.

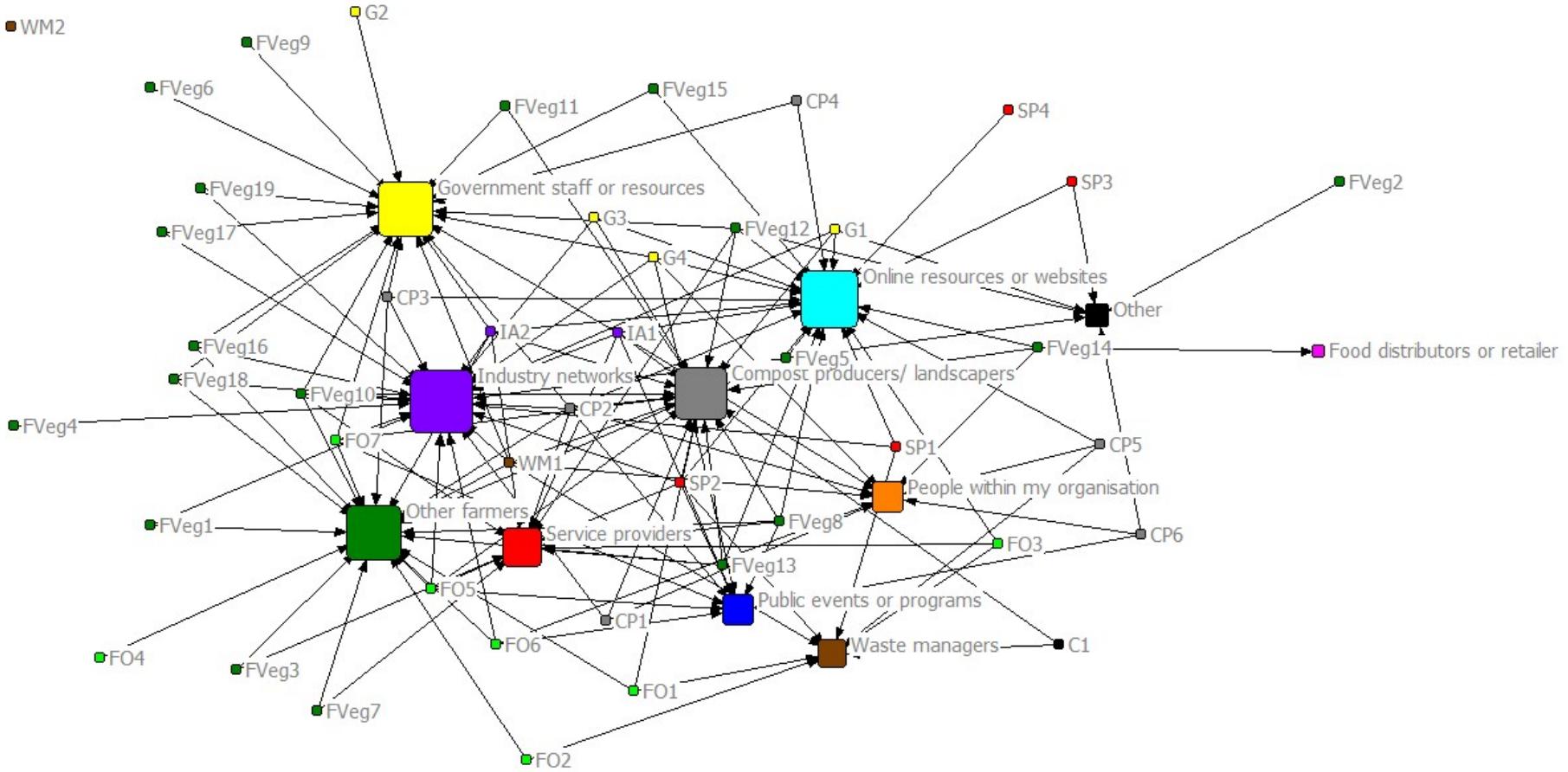
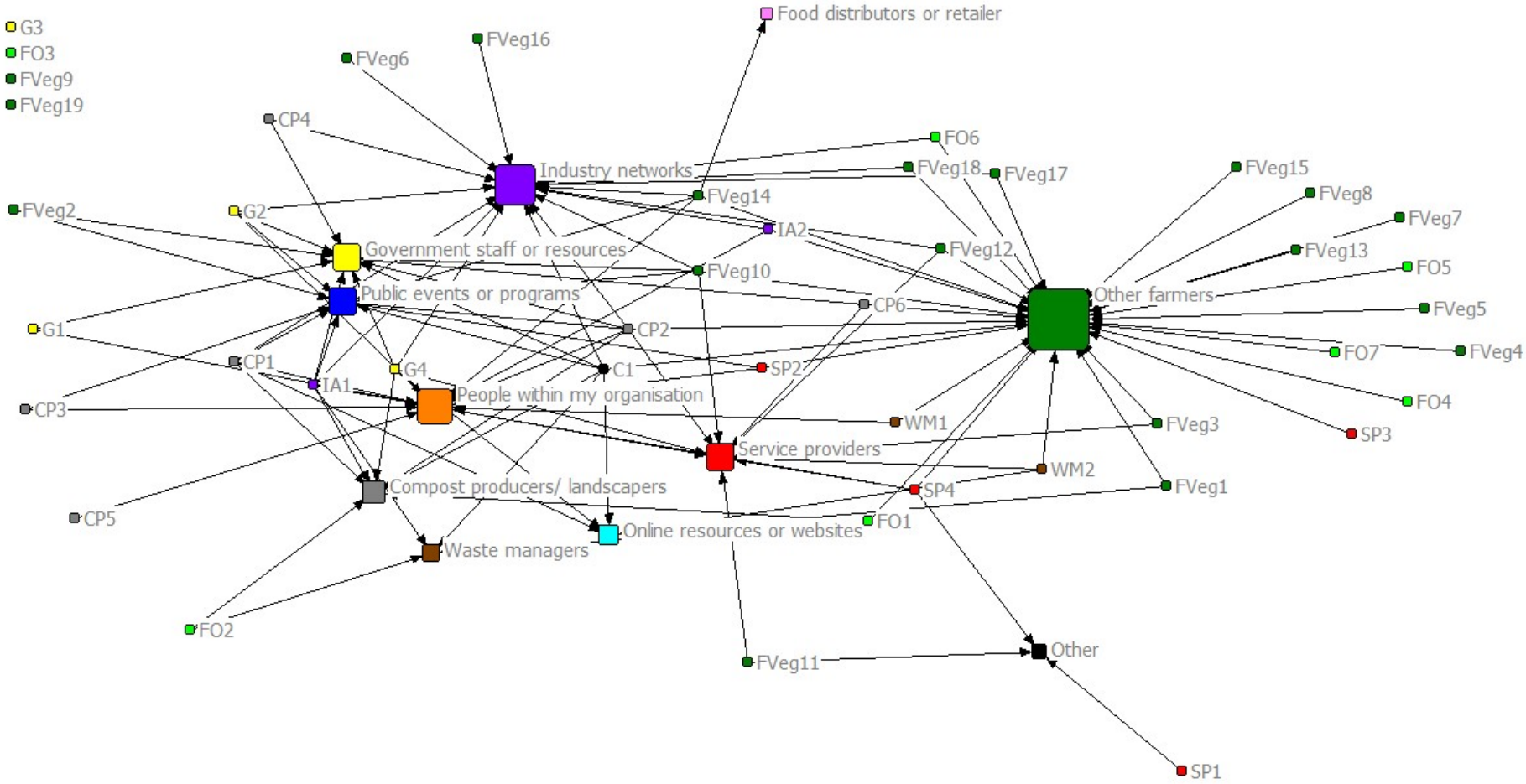


Figure 17: Network of where respondents reported to share information.



5.4.3 Implications

By examining the information access and share networks together Figure 16 and Figure 17) a knowledge network for compost emerges. Four key sources of information included NSW government agencies (Local Land Services and EPA), industry networks, online resources/websites and compost producers and landscapers. It is likely that the latter three categories are re-distributing and enhancing much of the technical information provided by government sources in addition to collating information from interstate and overseas. It is therefore important that the NSW Government:

1. disseminates through communication channels any new information on compost to these other key sources to ensure compost users can access the most up to date knowledge; and,
2. ensures that information provided from 'commercial' sources, such as compost producers, is accurate and unbiased.

A single node, industry advisor IA1, was a central repository of compost knowledge in the access network because they sourced knowledge from the main information providers. For the knowledge system to function effectively it is important that this individual is also a key information 'sharer' with compost users. This survey outlined that this respondent shared information with service providers, waste managers, compost producers, government staff, industry, people in their organization and at public events or programs. However, due to the nature of the data provided, there is no indication that single nodes in the access and share nodes represent the same individuals. If the nodes in each network are different people then information flow could potentially be stemmed or disrupted. Social networks are dynamic and small networks, such as the recycled organic compost network, are particularly vulnerable to the loss of key nodes as people move or change roles. Because industry advisor IA1 represents a single person, their loss from the network could also significantly disrupt knowledge flow through the network. For a network to be robust, multiple individuals need to share some of the same knowledge pathways.

Peer-to-peer learning among farmers is recognised as an important component of information sharing for agricultural producers (Pannel et al, 2006; Pelling et al, 2008). The compost knowledge network identifies a clear information flow from information sources (government, online sources and industry networks) to other farmers, who then share information with each other. In addition, three key nodes in the share network (CP2, C1, and SP2) effectively 'close the loop' on knowledge flow by feeding back information from farmer networks to some of the most important information providers (especially industry networks, government and other organisations). Provided effective communication channels are in place within industry and government organisations to connect farmer engagement staff with the providers of technical information about compost use, the knowledge network should function effectively. However, the loss of any or all of these three feedback connections between farmers and information providers could be disruptive to information flow.

6 Synthesis and recommendations

This social research has engaged key demand-side stakeholders in the compost value chain, to investigate the existing demand potential for compost grown vegetables, and how future demand could be created through messaging and broader enablers.

6.1 Readiness of the market for compost grown vegetables

This section synthesises and discusses the demand potential for compost grown vegetables, based on the findings of the social research with consumers, farmers and retailers.

To create a circular economy for organic waste, where organic waste is recycled and its value can be captured, requires a 'reverse logistics' value chain and demand for compost from farmers and for compost grown vegetables from retailers and consumers. For a new or expanded circular economy for recycled organic compost to operate effectively, all key actors in the value chain need to be aware of the benefits of compost use and be supported by communication of relevant information. This research has found that both retailers and consumers consider using compost as important – but crucially, alongside other social and environmental attributes like improving soil health and reduced pesticide use. While the farmers surveyed were aware of compost's benefits, they perceive a range of limitations that prevent them from using compost. These related predominantly to cost of compost products, their transport and spreading; concerns regarding product quality, and a lack of familiarity with the use of compost products.

The benefits of growing vegetables with compost are wide-ranging, and extend to a range of stakeholders, as indicated in Table 15. This information is important for developing targeted messaging. However, it emerged through this research that in some cases one stakeholder group may value an attribute of compost that is only indirectly beneficial to them, such as consumers that valued healthier soils and diversion of waste from landfill. This suggests that marketing messages may also need to account for indirect benefits to stakeholder groups.

Table 15: Potential benefits associated with recycled organic compost, and the stakeholders most likely to directly benefit.

	Who benefits?				
Benefits of Recycled Organic Compost	**Farmers**	**Environment (EPA)**	**Other govt agencies**	**Consumers**	**Waste managers**
Diverts waste from landfill: • **Reduce GHG generation** • **Saves land, cost**	✓	✓	✓		✓
Increases water-holding capacity of soil, hence increased water use efficiency	✓	✓			
Improved soil microbes	✓				

Fertiliser/nutrient value – NPK and micro-nutrients	✓				
Increases soil carbon	✓	✓			
Buffers against P scarcity, price spikes & supply disruptions	✓		✓		
Close resource loops		✓			✓
Job creation for 3rd party service providers and composers			✓	✓	✓
'Sustainable' food, i.e. local, reduced inputs				✓	

Further, the local food value chain is complex with many intermediaries. Many small retailers and enterprises purchase vegetables through wholesalers and buy/sell from each other, in addition to direct purchasing from farms. This means it is important to identify and target these key intermediaries in addition to the potential retailers of compost-grown produce.

All retailers interviewed were hypothetically interested in selling vegetables grown with compost, but there was a lack of consensus whether compost grown vegetables could be marketed as a separate product. Furthermore, some retailers felt that the market for fresh produce is crowded and somewhat confused, whereas one supermarket in particular felt there was a market gap (and hence opportunity) for sustainable produce like compost grown vegetables. The retailers' perspectives on the likely future market potential and constraints for compost grown vegetables are shown in Table 16.

Table 16: Future market potential for compost grown vegetables as perceived by respondents.

Current market	Future market potential	Constraints
Certified organic (wholesaler, co-ops)	Additional attribute for organic produce	Organic certification restrictive for diverse characteristics of recycled organic compost
Local uncertified organic (box retailers, co-ops)	'Co-marketed' as part of a sustainable package for those retailers who source based on trust rather than organic certification	Lack of compliance checks in the value chain puts retailers at risk of misplaced trust, potential conflict with pesticide/chemical free requirements of consumers
Conventional produce (supermarkets)	New sustainable product to fill market gap between organic and conventional produce	Supermarkets would require recognisable industry-wide accreditation, adding costs for growers

While one supermarket suggested that with proper accreditation, a market for compost grown vegetables could be a possibility, this research suggests that it may be challenging to establish a market for non-accredited compost grown vegetables as a stand-alone product because they currently fit in an ambiguous or 'fuzzy' zone between certified organic and conventional produce. This creates confusion and a unique set of challenges to be overcome, specifically regarding:

- **Regulation, compliance & assurance**: While organic produce has 'certified trust' associated with strict standards and accreditation, currently compost grown vegetables have a largely informal and relatively undefined marketing chain. While such an arrangement has benefits in terms of flexibility and viability for smaller producers, it also means quality standards or assurance are not in place, and stakeholders must rely on trust in suppliers up-stream in the chain. For one supermarket this would need to be addressed through recognised industry-wide accreditation.
- **Product identify crisis**: Purchasing of conventionally grown vegetables by retailers and consumers is largely driven by price and appearance with the system of production of lesser interest. For organic systems, production techniques are defined through formal certification, accepted by retailers and consumers. However, compost grown vegetable production systems draw on a wide range of sources and formulations of organic/compost products each with different quality and sustainability attributes and carrying different risks for farmers and consumers. Products range from mature compost, to composted materials with specified formulation (e.g. ANL) and animal manures largely from the poultry industry. These products generally compete for market share among farmers and this leads to an identity crisis for compost grown vegetables in the market place.
- **Values**: Compost grown vegetables fall between organic and conventional produce in terms of the value requirements of vegetable consumers and retailers. Compost grown vegetable production systems can demonstrate significant improvements in sustainability over conventional systems and could be marketed as a greener alternative; however, they fail to satisfy all of the values espoused by consumers of organic produce, particularly in relation to the use of fertilisers and pesticides. There is also a risk that they may not meet the health values of organic produce, particularly if there is a perception that compost could be contaminated.
- **Premiums**: The marketing chains for organic and conventionally grown produce are well defined, and their consumers relatively well differentiated. Purchasers of organic produce expect and are generally willing to pay a premium on the market price of vegetables. However, given compost-grown produce is not 'organic' it would be difficult to gain acceptance for another premium priced fresh product on the basis of potentially improved sustainability alone, and one supermarket noted that compost grown vegetables would need to be economical for farmers. Without premium pricing market-pull through for compost grown vegetable production is difficult to promote to farmers.

6.2 Key enablers

The nature of current demand for recycled organic compost is somewhat limited, however with careful planning and messaging, there is potential for the future for expanding the market. However messaging alone will not be sufficient. There are key institutional and social structures or 'enablers' that need to be in place before a circular economy compost market can be created or flourish. Some of these include:

- **Reliability of supply**: that is, the market is agile and ready to respond to potential demand for recycled organic compost.
- **Demonstrated effectiveness**: farmers in particular need evidence to assure them the product is proven and tested, and works in a commercial farm setting, not just plot trials. This is particularly so in regards to improving soil quality, the most promising benefit perceived by farmers but where the benefits to production are not accrued in the short-term.

- **Quality**: the compost available on the market must be of a minimum and reliable quality standard, free from contaminant such as plastic and glass, but also pathogens etc. Given this has been a concern of farmers in the past and is a crucial element of an organics circular economy.
- **Trust:** that farmers, food consumers, retailers and other stakeholders can trust each other regarding key attributes such as quality, production processes.
- **Transparency**: related to trust, that consumers can know how their food is being produced, that farmers know what went into the compost they are using, etc.
- **Consumer readiness**: consumers need to be aware and willing to purchase compost grown vegetables; however, consumer literacy around the benefits of sustainability-enhanced production systems is relatively poor. Marketing to consumers needs to be synchronised with drivers of demand from farmers to ensure any growth in consumption can be met in the market-place.
- **Retailer readiness**: similar to consumers, there was a substantial degree of uncertainty or lack of awareness amongst retailers regarding the current use of compost by their suppliers, hence increasing awareness as per 6.3.3 below should also be undertaken in conjunction with farmer and consumer marketing. There is evidence that retailers can and do differentiate among types of fresh produce in-store, for example in relation to consumer demand for 'locally-sourced' products. This could be potentially extended to sustainably grown vegetables.

6.3 Recommendations for marketing and messaging

Based on the findings from this social research, recommendations for messaging and generally communicating to the three key demand-side compost value chain stakeholders are outlined below.

6.3.1 Marketing and messaging recommendations for consumers

Recommendations for marketing compost grown vegetables to consumers, in terms of how and what, include:

- **Compost grown vegetables may not have enough potential to be marketed as a separate product** due to the strength of the existing market for organic food and consumer motivations for pesticide and chemical free produce.
- For consumers who are motivated by buying locally and supporting farmers (and less concerned by organic certification) compost grown vegetables could be '**co-marketed' into a sustainable package**; for example this could be "locally grown with compost" or "organically grown with compost".
- Vegetables that are 'co-marketed' as local and compost grown could be marketed through focusing on bringing farmers from local farming regions in the Sydney Basin and consumers together, as well as on quality and freshness.
- Marketing and messaging should show how **compost contributes to the environmental motivations of consumers**, including healthier soils, reduced chemical/fertiliser inputs and diversion of waste from landfill. Marketing can emphasis how compost contributes to greater sustainability issues by focusing on local impacts.
- Ensure that while communicating **a clear value add** of compost (to existing sustainability attributes), the **message is still simple** and not overwhelming to consumers. However, it will rely on a general improvement in consumer literacy regarding sustainable agricultural production systems, which is currently lacking.

6.3.2 Marketing and messaging recommendations for retailers

Recommendations for marketing compost grown vegetables to retailers and other demand-side value chain stakeholders, in terms of when, what, and to whom, include:

- To create messaging for compost grown veggies, there is a need to first **communicate to value chain stakeholders** (including retailers, distributors and wholesalers) that only a small portion of farmers currently use compost, but there is significant potential to increase — and significant benefits associated with this.
- In terms of which benefits to highlight, these local retailers and distributors held a wide range of social and environmental values. Social values, such as **supporting local farmers**, are more important to the smaller retailers. Importantly, the social value of **providing affordable food** to consumers is also important; meaning charging a premium may not be desirable to these retailers. Health-related values, such as **pesticide/chemical-free production,** are also important to some wholesalers/distributors. For the supermarkets interviewed, reducing food waste was a key priority, hence linking to compost as a waste-diversion strategy.
- As with consumers, **integrate 'compost grown' vegetables into a sustainable package,** as it may not have enough potential to be marketed as a separate product (due to the existing market for organic food).
- **Small-scale retailers who source their veggies based on trust (e.g. non-certified organic) are an opportunity** to find a market for compost grown veggies (within a sustainable package), however the lack of compliance checks in the value chain puts retailers at risk of misplaced trust. For many retailers interviewed, **quality assurance** (with respect to contaminants) is a key attribute. For one supermarket they would also require recognisable industry-wide accreditation for compost grown vegetables.
- Similarly, ensure that while communicating **a clear value add** of compost (to existing sustainability attributes), the **message is still simple** and not overwhelming to consumers.
- Due to the complexity of the value chain, **ensure key intermediaries are targeted** for messaging, in addition to the retailers (i.e. the agents and distributors).

6.3.3 Marketing and messaging recommendations for farmers

Recommendations for marketing compost to vegetable growers include:

- Farmers' lack of familiarity in using compost (perceived as the biggest hurdle to using compost by other stakeholders) stresses the importance of marketing and messaging compost to farmers.
- Messaging to farmers should focus on **evidence-based** benefits and **value proposition**: improvements to **soil health**, **value for money** and importantly, is a **quality assured product** (if this claim can be met). Because the costs of transport and spreading (in addition to the product cost) were a significant barrier for farmers, marketing needs to address and clarify perceptions of cost versus value through 'service' marketing, however the value is difficult to demonstrate. Benefits are not always immediate (may take several years), but can save on water, fertilisers and other inputs, in addition to increasing yields and hence productivity.
- Need to create (or better clarify) the **product identity of 'compost'**, which has a stigma associated with contamination in the past, different product types, characteristics etc.
- Clarify how farmers can access appropriate **agronomic advice/support for transitioning** to compost.
- The Social Network Analysis (SNA) identified the vulnerability in the information networks for the compost value chain, associated with a small number of key individuals. The network also emphasises the importance of peer-to-peer learning among farmers. Continuing field trials and demonstrations, such as that conducted by LLS for this project, and case studies of successful incorporation of organics into real farming systems, will assist the development of an organics network among the farming community.

6.3.4 General recommendations

In addition to the stakeholder-specific recommendations in 6.3.1-6.3.3, general recommendations include:

- **Leverage community interest in food waste**: The current community interest and awareness in reducing food waste could be leveraged to drive interest in and demand for compost grown vegetables. That is, within the waste hierarchy framework, avoiding food waste in the first place is a priority (through preventing generation or food rescue), followed by using the unavoidable food waste as a resource (for compost, energy, or animal feed). See ISF (2016c)

7 References

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Appendices

A Food retailer interview questions

1. What are the most important **values** when selecting the produce in your business? (This could include organic/biodynamic, chemical/pesticide free, sustainability, supporting local farmers, quality criteria and/or specialty produce.) Why are these important?

2. What **other criteria** do you require to purchase produce (e.g. need a certain volume, need to know produce types in advance, need a big variety of produce, trust in producer, location.)

3. To get a broad understanding of the supply chain we would like to ask a few questions about your business, if you are happy to share. Could you estimate:

    a. the total amount of produce you purchase each week
    b. types and share of produce (e.g. 70% veggies, 30% fruit)
    c. where you purchase produce (e.g. directly from farms, produce markets) and number of suppliers
    d. number of customers
    e. spread of store or delivery locations

4. Do you know if/how much of this food is grown in the Sydney basin, and within NSW?

5. If vegetables grown with recycled organics / compost were available for your business, would you be interested?

    a. What would you need to know about it? (Would you have any concerns or questions?)
    b. Do you think your consumers would consider compost as important?
    c. Would you communicate this specifically to your customers as a separate product (or as part of another type of produce such as sustainable or local produce)?

6. Would you be interested in being involved in further research?

B Profile of food retailers

Box retailers:

Both box retailers obtain their produce directly from farmers, based on individual relationships. One of the box retailers obtains produce from an average of seven growers at any one time, and around 13-14 over the year, some of which only supply one variety of vegetable. They approach new growers to become suppliers through farmers markets. The other box retailer reported they obtain produce from 30-40 small growers. Often one of the farmers who supplies to them will collect produce from neighbouring farms and transport it to the box retailer.

The box retailers are both large players in this market and distribute across Sydney. One delivers boxes to up to 600 homes and offices across Sydney, mainly in the inner west and eastern suburbs but also as far as Palm Beach to Penrith and Cronulla. The other has up to 800 customers and delivers to around 100 centralised local points for pick-up all over Sydney.

Co-ops:

One of the co-ops sources the majority of their produce through distributors but also obtains a small amount directly from farmers. Their distributors include two organic wholesalers, one of which sources directly from farmers (also an interview participant) and one who sources via the produce market. They also obtain a small amount of produce from Box Retailer 1, acting as a distributor. The co-op goes to a large effort to source directly from local or sustainable farmers that they want to support, including from one farmer from the NSW mid-North coast who drives the produce to the nearest major town so it can be couriered to Sydney. This co-op has 4,000 members and a twice-weekly vegetable box, but most customers purchase specific produce rather than the boxes. The other co-op does not source their own produce, but acts as a distribution point for weekly boxes from Box Retailer 2.

Supermarkets:

Both supermarkets obtain vegetables from produce markets, one exclusively and the other in addition to direct purchases. One reported that their produce managers buy from the wholesale market as they do not have the direct contracts of the major supermarket chains. The other supermarket reported that they source 70% of fruit and vegetables from the wholesale market and 30% direct from farms. This direct purchase includes the major categories such as bananas, mangoes, tomatoes and avocadoes. The direct purchases are done through an open negotiated contract where the supermarket does the grading of produce, and negotiates a price with growers, sharing the savings that accrue from not using an agent. This is different to the standard practice of major supermarkets, where they buy according to a market specification and the grower (or packing house) does the grading before sending the produce to the supermarket (the grower would typically be left to manage the un-spec produce). The local vegetables also tend to be sourced directly (see more in Section 3.2.3). This supermarket has a close relationship with their main supplier of Asian vegetables in the Sydney basin, which supplies 100% of their farm's production to this supermarket. In return for exclusivity of supply, the supermarket has provided support to the farmer, for example with finding farm labour, which means the produce is able to be picked in the morning and in the store on the same day.

Organic wholesaler:

This wholesaler sources directly from large farms across Australia and delivers it to warehouse sites and to wholesale customers. They have buyers located in each Australian state who manage the growers within their state. They have between 200 and 250 suppliers nationally. Around 25% of the farmers they source from only supply to the wholesaler, whereas the remainder also sell elsewhere. The wholesaler supplies produce to supermarkets (large and small), co-ops and online companies.

C Consumer survey questions

SUSTAINABLE FOOD SYSTEMS: CONSUMER PREFERENCES FOR VEGGIES GROWN WITH COMPOST

Introduction

We are interested in how you make choices in buying fresh vegetables and why this is important to you.

This survey is part of a broader research project looking at local and sustainable food systems in and around Sydney. This includes the social and environmental benefits of purchasing vegetables produced locally and grown with compost made from your green & garden waste, in addition to other attributes such as convenience and freshness.

Your participation will involve taking part in a short survey and will take approximately 5-10 minutes. Your participation is completely anonymous and you will not be able to be identified.

This survey is being undertaken by the Institute for Sustainable Futures (ISF) at the University of Technology Sydney. It is part of the Creating Demand for Recycled Organics project, a joint project with Greater Sydney Local Land Services and NSW Farmers, and funded by NSW EPA. The information gathered from these surveys will be used to better understand the barriers and opportunities in the food supply chain to the demand for vegetables produced using local compost.

You are free to withdraw your participation from this research project at any time without giving a reason.

If you have any concerns or questions about the research you can contact Dr Dana Cordell (dana.cordell@uts.edu.au) or Elsa Dominish (elsa.dominish@uts.edu.au) at the Institute for Sustainable Futures, UTS.

Research ethics

Studies undertaken by the Institute for Sustainable Futures have been approved in principle by the University of Technology Sydney, Human Research Ethics Committee. If you have any complaints or reservations about any aspect of your participation in this research you may contact the ISF Ethics Coordinator, Dr Keren Winterford (02 9514 4972) or the ISF Deputy Director, Professor Cynthia Mitchell (02 9514 4953).

You may also contact the UTS Ethics Committee through the Research Ethics Officer (02 9514 9615). Any complaint you make will be treated in confidence and investigated fully and you will be informed of the outcome.

SUSTAINABLE FOOD SYSTEMS: CONSUMER PREFERENCES FOR VEGGIES GROWN WITH COMPOST

Part A: Questions about your values in buying fresh vegetables

1. What is the top reason you buy **fresh vegetables** from the farmers markets?

* 2. In a typical month, where do you buy your fresh vegetables from:

	Never	Rarely	Sometimes	Very often	Always
Farmers markets	○	○	○	○	○
Food box deliveries	○	○	○	○	○
Supermarkets (e.g. Coles, Woolworths, Aldi)	○	○	○	○	○
Green grocer (e.g. local fruit and veg shop)	○	○	○	○	○
Premium supermarkets (e.g. Harris Farm, Thomas Dux, About Life, Maloneys etc.)	○	○	○	○	○
Other (please specify below)	○	○	○	○	○

If you selected other, please specify here:

* 3. When making decisions about purchasing **fresh vegetables**, which are the most important attributes to you? Please rank from most important (1) to least important (7).

- Health
- Quality and freshness
- Taste
- Price
- Convenience
- Social impact (e.g. supporting farmers)
- Environmental impact and sustainability

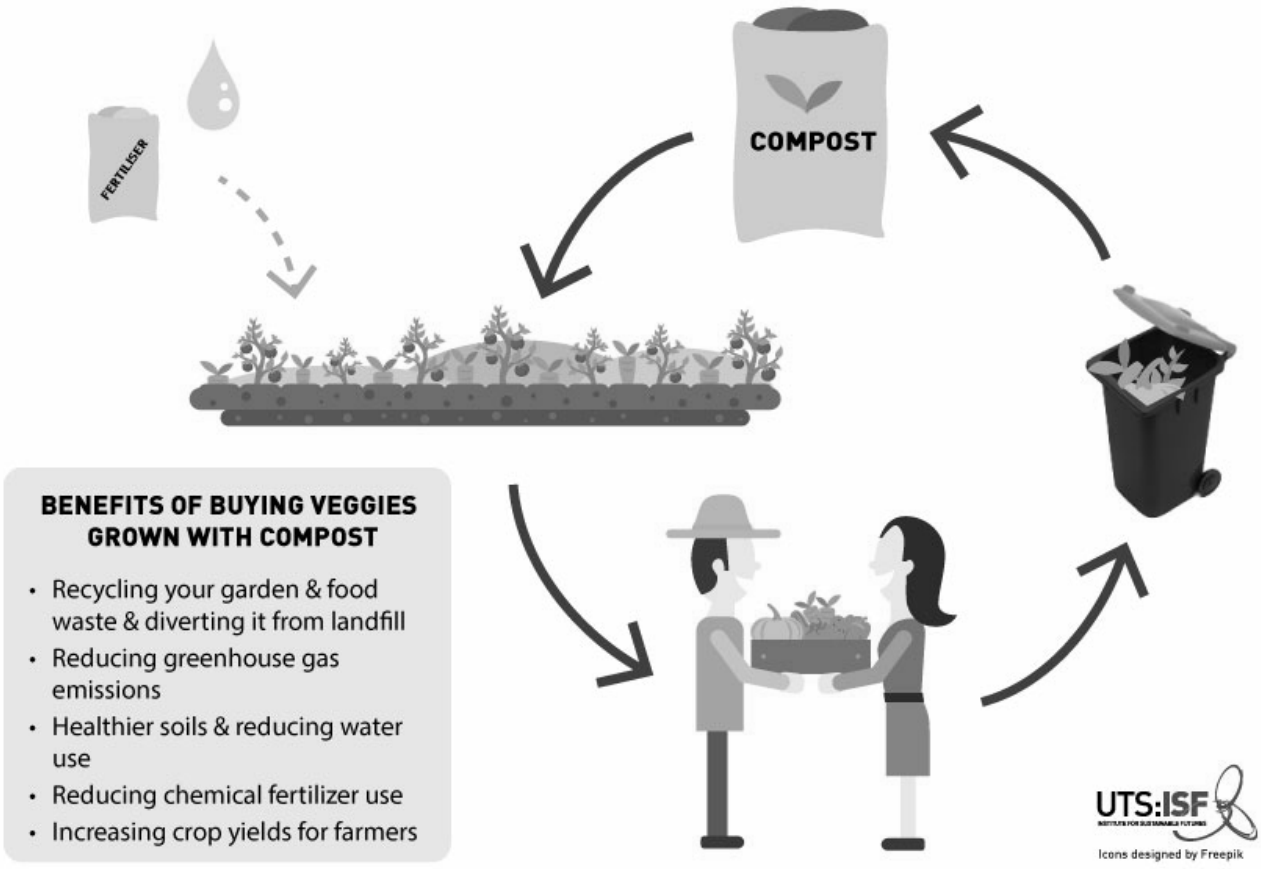
* 4. How important do you consider these social and environmental sustainability benefits when purchasing your veggies?

	Not important at all	Not very important	Somewhat important	Very important	Extremely important
Locally grown in and around Sydney	○	○	○	○	○
Supports local farmers with a fair price	○	○	○	○	○
In season	○	○	○	○	○
Organic/biodynamic	○	○	○	○	○
Pesticide/chemical free	○	○	○	○	○
Reducing climate change impacts	○	○	○	○	○

SUSTAINABLE FOOD SYSTEMS: CONSUMER PREFERENCES FOR VEGGIES GROWN WITH COMPOST

Part B: Buying veggies grown with compost

Did you know that buying vegetables grown using compost can have many environmental sustainability benefits. Compost is usually used by small scale and local farmers.



* 5. How important would you consider veggies grown with compost as a sustainability benefit, when purchasing your veggies?

Not important at all	Not very important	Somewhat important	Very important	Extremely important
○	○	○	○	○

* 6. How likely would you be to buy veggies grown using compost than other veggies (if all other attributes were the same).

Not likely at all	Not very likely	Somewhat likely	Very likely	Extremely likely
○	○	○	○	○

* 7. If you were to buy veggies grown using compost, which would be your most important reasons for doing so? Please select the top two reasons.

- [ ] Preventing greenhouse gas emissions
- [ ] Diverting your green & garden waste from landfill
- [ ] Healthier soils and reduced water use
- [ ] Reducing chemical fertiliser use
- [ ] Increasing crop yields for farmers
- [ ] Other (please specify)

8. Do you have any questions or concerns about buying veggies grown with compost?

9. Do you have any other comments?

SUSTAINABLE FOOD SYSTEMS: CONSUMER PREFERENCES FOR VEGGIES GROWN WITH COMPOST

Demographics

We would love to know more about you if you are able to answer a few short questions on your demographics.

10. Do you identify as?

- ◯ Male
- ◯ Female
- ◯ Other

11. What is your age range?

- ◯ 15 - 19
- ◯ 20 - 29
- ◯ 30 - 39
- ◯ 40 - 49
- ◯ 50 - 59
- ◯ 60 - 69
- ◯ 70 or older

12. Please give your postcode

13. Which of the following best describes your annual household income before tax:

- ◯ Less than $31,000
- ◯ Between $31,000 and $62,000
- ◯ Between $62,000 and $94,000
- ◯ Between $94,000 and $130,000
- ◯ $130,000 or more
- ◯ Prefer not to answer

14. Please select what type of household best describes you situation:

- ◯ Single person household
- ◯ Couple with no children
- ◯ Family
- ◯ Shared house
- ◯ Prefer not to answer

15. How many people (including yourself) usually live in your household?

Thank you for your participation!

D Farmer and other stakeholder survey questions

COMPOST SURVEY
Growing veggies with compost: Your views and values

Introduction

We are interested in what you consider to be the benefits and barriers to using compost.

This survey is part of a broader research project to understand stakeholder needs and preferences to unlock the demand potential for recycled organics in horticulture. We are particularly interested in vegetables grown using compost in the Sydney Basin and Central West NSW.

Your participation will involve taking part in a short survey and will take approximately 10 minutes. The research data gathered from this project will be published in a form that does not identify you in any way. You are free to withdraw your participation from this research project at any time without giving a reason.

This survey is being undertaken by the Institute for Sustainable Futures (ISF) at the University of Technology Sydney. It is part of the Creating Demand for Recycled Organics project, a joint project with Greater Sydney Local Land Services and NSW Farmers, and funded by NSW EPA.

The information gathered from these surveys will be used to better understand the barriers and opportunities in the food supply chain to the demand for vegetables produced using local compost.

If you have any concerns or questions about the research you can contact Dr Dana Cordell (dana.cordell@uts.edu.au) or Elsa Dominish (elsa.dominish@uts.edu.au) at the Institute for Sustainable Futures, UTS.

Research ethics

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You may also contact the UTS Ethics Committee through the Research Ethics Officer (02 9514 9615). Any complaint you make will be treated in confidence and investigated fully and you will be informed of the outcome.

COMPOST SURVEY
Growing veggies with compost: Your views and values

Part A: Your perceptions and experience in using compost

* 1. Please select the category that best describes you or the organisation you represent. Please select one response.

- ◯ I am a commercial **farmer**
- ◯ I am a **waste manager** (managing green waste/compost alongside other waste types) ***if not a commercial farmer, go to Q6***
- ◯ I am a **compost producer/landscaper**
- ◯ I am a **food distributor or retailer**
- ◯ I am a **service provider** e.g. spreading contractors, agricultural advsiors, fertiliser companies/sellers, transport & logistics companies
- ◯ I am a **government** manager, policy maker and/or regulator
- ◯ I am **otherwise involved** in 'compost' e.g. researcher (please specify here)

COMPOST SURVEY
Growing veggies with compost: Your views and values

Part A: Your perceptions and experience in using compost

IMPORTANT: 'Compost' in this survey is defined as recycled organic waste such as municipal green/garden waste that has been diverted from landfill, processed by composting.

Includes:

- ✓ Recycled organic waste
- ✓ Green/garden waste that has been diverted from landfill

Does not include:

- ✗ Agricultural wastes (e.g. cotton trash, feedlot refuse)
- ✗ Manure
- ✗ Biosolids
- ✗ Other organic wastes

2. Please select the type of farming on your property. Please choose all that apply.

- [ ] Vegetables
- [ ] Fruit
- [ ] Other (please specify)

3. Which statement best describes your current use of compost (made from recycled green waste) on your property? Please think about using compost for commercial or trial use (i.e. not on your flower garden or veggie-patch). Please choose ONE response.

- ○ I have never used compost on my property
- ○ I have used compost on my property in the past, but do not currently use it (have not used compost for 12 months or more)
- ○ I have used compost on my property in the past 12 months

4. Please choose the statement which best describes your interest and plans in using compost. Please think about using compost for commercial or trial use (i.e. not on your flower garden or veggie-patch). Please choose ONE response.

- ◯ I do not wish to use compost on my property and do not plan to use it in the next 12 months
- ◯ I am interested to use compost on my property at some point in the future, but have no plans to use it in the next 12 months
- ◯ I plan to use compost on my property in the next 12 months

5. Please specify the number of tonnes of compost you have used on your property in the past 12 months or how much you intend to use in the next 12 months. Please give the total number of tonnes in the 12 month period.

COMPOST SURVEY
Growing veggies with compost: Your views and values

Part A: Your perceptions and experience in using compost

IMPORTANT: 'Compost' in this survey is defined as recycled organic waste such as municipal green/garden waste that has been diverted from landfill, processed by composting.

Includes:

- ✓ Recycled organic waste
- ✓ Green/garden waste that has been diverted from landfill

Does not include:

- ✗ Agricultural wastes (e.g. cotton trash, feedlot refuse)
- ✗ Manure
- ✗ Biosolids
- ✗ Other organic wastes

6. Are you aware of compost products that are available for use on a farming property?

- ◯ Yes
- ◯ No

Please list the products (including the manufacturer if known) you are aware of (including composts you may already be using).

7. Which, if any, of the following do you perceive as benefits to using compost? Please tick ALL responses that apply.

- [ ] Using compost increases soil health
- [ ] Using compost increases the land valuation of a farming property
- [ ] Using compost is better for the environment
- [ ] Using compost is good value for money
- [ ] Using compost allows a farmer to sell their product for a premium (e.g. because of 'green' image, organic certification, etc.)
- [ ] I don't know of any benefits to using compost
- [ ] There are no benefits to using compost
- [ ] Other (please specify here)

8. Which, if any, of the following costs do you believe currently prevent/limit the use of compost in farming? Please tick ALL responses that apply.

- [ ] None, compost is economically viable
- [ ] The cost to transport compost to a farming property is too high
- [ ] The cost of spreading compost on a farming property is too high
- [ ] The cost of compost as a product is too high
- [ ] The cost of changing the farming process to use compost on a farming property is too high
- [ ] I don't know
- [ ] Other (please specify)

9. Which other reasons, if any, do you believe currently prevent/limit the use of more compost in farming? Please tick ALL responses that apply.

- [ ] a) There is nothing preventing farmers from using / using more compost
- [ ] b) Farming with compost is a different way of farming that farmers are unfamiliar with
- [ ] c) The quality of compost is uncertain
- [ ] d) Compost is not suitable / does not meet the requirements of a farming property or farming method
- [ ] e) There is insufficient quality assurance / standard certified compost available for use on a farming property
- [ ] f) There are no compost suppliers near farming properties
- [ ] g) Compost supply is too variable / uncertain / risky for a farmer to use compost
- [ ] h) There are no compost spreaders near farming properties / Farmers do not have the required equipment to apply compost to a property
- [ ] i) Other (please specify)

COMPOST SURVEY
Growing veggies with compost: Your views and values

Part A: Your perceptions and experience in using compost

10. Which response to the previous question presents the biggest hurdle to using compost?

- ◯ a) There is nothing preventing farmers from using / using more compost
- ◯ b) Farming with compost is a different way of farming that farmers are unfamiliar with
- ◯ c) The quality of compost is uncertain
- ◯ d) Compost is not suitable / does not meet the requirements of a farming property or farming method
- ◯ e) There is insufficient quality assurance / standard certified compost available for use on a farming property
- ◯ f) There are no compost suppliers near farming properties
- ◯ g) Compost supply is too variable / uncertain / risky for a farmer to use compost
- ◯ h) There are no compost spreaders near farming properties / Farmers do not have the required equipment to apply compost to a property
- ◯ i) Other (please specify)

Please leave any additional comments here:

COMPOST SURVEY
Growing veggies with compost: Your views and values

Part B: How you share information about compost

This section asks you questions about where you source information about compost and with whom you share information. This is to help us understand the compost supply chain and network.

Question 11 asks you to tick which people you source information about compost from and qustions 12 asks the name of specific people. Please be as specific as possible to ensure we can identify sources common to multiple people (names of individuals will be used only for analysis but not for reporting).

11. Where do you source information about compost? Please tick all the categories that apply

- [ ] a) Other farmers
- [ ] b) Service providers
- [ ] c) Waste managers
- [ ] d) Compost producers/ landscapers
- [ ] e) Food distributors or retailer
- [ ] f) Government staff or resources
- [ ] g) Online resources or websites
- [ ] h) Industry networks
- [ ] i) Public events or programs
- [ ] j) People within my organisation
- [ ] k) Other

12. Please write the name of the individual or organisation for the categories.

a) other farmers

b) service providers

c) waste managers

d) compost producers / landscapers

e) food distributors or food retailers

f) government staff or resources

g) on-line resources or websites

h) industry networks

i) public events or programs

j) people within my organisation

k) other

13. Where do you **share** information about compost?
Please tick all the categories that apply

- [ ] a) Other farmers
- [ ] b) Service providers
- [ ] c) Waste managers
- [ ] d) Compost producers/ landscapers
- [ ] e) Food distributors or retailer
- [ ] f) Government staff or resources
- [ ] g) Online resources or websites
- [ ] h) Industry networks
- [ ] i) Public events or programs
- [ ] j) People within my organisation
- [ ] k) Other

14. Please write the name of the specific individual or organisation for the categories on the left.

Other farmers	
Service providers	
Waste managers	
Compost producers/landscapers	
Food distributors or retailer	
Government staff or resources	
Online resources or websites	
Industry networks	
Public events or programs	
People within my organisation	
Other	

COMPOST SURVEY
Growing veggies with compost: Your views and values

Respondent details

Your responses to this survey will be confidential. Please provide your details so we can contact you regarding future initiatives.

15. Your details

Name:

Role and organisation:

Email address or phone:

Postcode:

16. Additional details if you are a farmer

Property size:
Approximate size in ha

Property name/ address:

Property type: e.g.
orchard, vegetables, etc.

Market: Where do you sell your produce?

17. Please select below if you do not wish to be contacted about future research and initiatives

◯ Select here if you do not wish to be contacted about future initiatives

Thank you for your participation!

E Farmer and other stakeholder survey additional data

Which, if any, of the following costs do you believe currently prevent/limit the use of compost in farming?	Farmers	Other stakeholders
None, compost is economically viable	15%	5%
The cost to transport compost to a farming property is too high	30%	43%
The cost of spreading compost on a farming property is too high	7%	29%
The cost of compost as a product is too high	22%	19%
The cost of changing the farming process to use compost on a farming property is too high	19%	24%
I don't know	7%	19%
Other (please specify)	37%	29%

Which, if any, of the following do you perceive as benefits to using compost?	Farmers	Other stakeholders
Using compost increases soil health	85%	100%
Using compost increases the land valuation of a farming property	15%	48%
Using compost is better for the environment	48%	90%
Using compost is good value for money	33%	67%
Using compost allows a farmer to sell their product for a premium (e.g. because of 'green' image, organic certification, etc.)	15%	33%
I don't know of any benefits to using compost	0%	0%
There are no benefits to using compost	4%	0%
Other (please specify here)	30%	33%

Which other reasons, if any, do you believe currently prevent/limit the use of more compost in farming?	Farmers	Other stakeholders
There is nothing preventing farmers from using / using more compost	15%	24%
Farming with compost is a different way of farming that farmers are unfamiliar with	44%	71%
The quality of compost is uncertain	52%	57%
Compost is not suitable / does not meet the requirements of a farming property or farming method	22%	10%
There is insufficient quality assurance / standard certified compost available for use on a farming property	33%	33%
There are no compost suppliers near farming properties	7%	24%
Compost supply is too variable / uncertain / risky for a farmer to use compost	19%	29%
There are no compost spreaders near farming properties / Farmers do not have the required equipment to apply compost to a property	26%	19%
Other (please specify)	44%	24%

Which response to the previous question presents the biggest hurdle to using compost?	Farmers	Other stakeholders
Farming with compost is a different way of farming that farmers are unfamiliar with	24%	53%
The quality of compost is uncertain	33%	21%
Compost is not suitable / does not meet the requirements of a farming property or farming method	5%	0%
There is insufficient quality assurance / standard certified compost available for use on a farming property	10%	8%
There are no compost suppliers near farming properties	5%	0%
Compost supply is too variable / uncertain / risky for a farmer to use compost	0%	0%
There are no compost spreaders near farming properties / Farmers do not have the required equipment to apply compost to a property	10%	0%
Other	14%	27%