MARKETING, MAKING AND SELLING PRODUCTS BASED ON ORGANIC RESOURCES

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Abstract

The ordering of the title is intentional but often people do not fully appreciate the importance of understanding the market before making a product. The first step to making successful products is to understand the market as the hero of biosolids products, O. J. Noer, demonstrated so ably. Having established customers' needs and wants, is it possible to manufacture a product that satisfies them consistently? Product design (including branding and packaging), distribution and promotion are important but perhaps the make or break for many products is routes to market. The paper will describe the process of making products from organic resources successfully.

Keywords

Biosolids, branding, fertiliser, growing media, marketing, organic resources, products, selling, soil improver, struvite, topsoil

Introduction

The principles of selling products based on organic resources are basically similar to selling any other product. Is the product "of satisfactory quality" for the intended use? This is an implied requirement of the Sale of Goods Act and it means all of the production has to be satisfactory. If outdoor shoes fall apart when they get wet, they were not of satisfactory quality for the intended use. Is there a market for the product, which also means, do you understand the market? Have you planned the route to market for your product? Are there competitors for your product and if so, how are you going to steal market share from the competition?

Marketing

Marketing is the process of communicating the value of a product or service to customers, for selling the product or service. It is a critical business function for attracting customers and for finding out what customers need and want.

During development and before launch

Ideally, you do the market research before making the product but frequently in the field of organic resources somebody decides the treatment process before detailed research into the markets (just as was the case of two of the case studies).

Market research identifies what the potential customers want or need. It can also identify the best customers to whom the product should be launched; these are described by Geoffrey Moore (1999) as the "beachhead". Moore realised, from his experience in electronics and software, that it is not necessarily the best products that

succeed. He said there is a "chasm" between the early adopters and the majority; the products that succeed are the ones that cross the chasm and the key to crossing the chasm is identifying the beachhead from which to invade the market. A lot of energy and resources can be wasted if every possible lead is followed in the early days, which can bleed a company dry.

Pre-launch market research is useful to test choices of presentation, packaging, messages, etc. (i.e. the branding) to be associated with the product and finding the ones that resonate best with potential customers. For example, the size grade (e.g. 10 mm) or pH might be important to the producer but meaningless to a customer, who wants to know whether it is suitable for seeds and cuttings or whether it is suitable for acid-loving plants like rhododendrons. Even the colour of the packaging and the size and font of the print can affect perception and attractiveness.

Pricing and competition are important aspects. Maybe the market place is more crowded than the producer/innovator though and this restricts the price that customers would be willing to pay such that there is no prospect of generating the level of contribution a company desires. If this were the gloomy prospect, it would be important to find out before launch.

After launch

Marketing post-launch involves communicating about the product, including advertising and assessing customers' reactions to and experiences of the product. Does the total experience match the expectations created by the promotion? Maybe customers find values that were not expected or anticipated by the producer, for example, maybe plants grown with the product suffer less disease or drought stress. Alternatively, plant growth response might be less than expected from the promotion. Either scenario would suggest further research and possibly revision of the promotion.

Making the product

Making the product so that it always has the same characteristics and qualities as those refined through the development programme requires careful design for which HACCP (hazard analysis and critical control point) is a valuable paradigm (Evans, 2003). It combines with W. Edwards Deming's Plan-Do-Check-Act cycle, which is the core of Quality Assurance. Often, HACCP is not viewed in this broad concept but it is entirely applicable to the whole treatment, manufacturing and packaging process. HACCP is essentially an evolution from Failure Mode and Effects Analysis (FMEA), which was one of the first systematic techniques for failure analysis and developed by reliability engineers in the 1950s. It is important to know whether demand for your product is seasonal, has peaks or is reasonably constant and to gear the manufacturing and distribution capability accordingly. For example, the gardening market generally kicks off at Easter and it is vital to have stock to meet the peak of demand, but demand can be slow through winter.

Selling

Selling is a particular skill; some people are gifted, most can be coached to be more effective but a minority seems congenitally incapable of selling. Recruiting the right selling strategy and people are as critical as any other aspect.

The quotation "If a man can write a better book, preach a better sermon, or make a better mouse-trap, than his neighbour, though he build his house in the woods, the world will make a beaten path to his door." is attributed to Ralph Waldo Emerson but apparently it is a misquotation, more importantly, it is wrong. The world needs to know about this better thing and transmitting that knowledge is selling and marketing. The strategy for selling the product is as essential to the success of a product as getting the design right.

An in-house sales force has the benefit that it is the most likely to be committed to the product but the cost of sales can be high if the portfolio of products is small and consequently so is the value of each order. Contracting selling to somebody already selling to your selected range of customers has the risk that they might not promote your product if they have something else that they can sell instead and that earns a bigger margin. The in-house team has employment, car, expenses, etc. [fixed] costs but a contracted sales force takes some of the value of each sale [variable cost].

When is a product not a waste?

Waste is stuff you intend to throw away; a product is something for which there is a market, something that people want. An implied term of the Sale of Goods Act is that products must be of satisfactory quality for the intended use. That all has the pragmatic sound of Anglo Saxon common law but the continental European ethos is to catalogue everything; maybe that stems from Napoleon? If a material is listed in the European Waste Catalogue, it is a "waste" even if there are people who want it and neither the producer/seller nor the customers regard it as something thrown away. It is a waste until somebody has designed and got approval for "end of waste criteria" and it passes those criteria. Then there is REACH (Registration, Evaluation, Authorisation and restriction of Chemicals) another EU initiative (Case study 3: Struvite). Fortunately, the original REACH legislation exempted composted materials and digestate.

Whichever route you plan to go down with your product(s) developed from organic resources, it is very advisable to have a substantial collection of data to demonstrate that hazards are all within acceptable limits of risk. When the product is criticised it is better to have a mass of data to demonstrate consistency and safety than to be floundering with a few data.

Case studies

Case study 1: Milorganite

Milorganite fertiliser is one of the longest established products based on organic resources in the world. It is sold across the United States and Canada.

Milwaukee, an industrial city on Lake Michigan, has a long legacy of protecting its local water resources. Milwaukee's Jones Island Water Reclamation Facility was an early adopter of the activated sludge process. When it opened in 1925, it was the largest activated sludge facility the world.

Since the beginning, Milwaukee hoped to exploit the nutrient value of its sludge. The intention was to dewater waste activated sludge and digested primary sludge, dry it and sell it to fertiliser companies, but initial assumptions about lucrative markets with customers "beating a path to their door" proved illusory. Hatton, the Chief Engineer, realised that "It is not customary for an engineering organization engaged in constructing a plant to be interested in the work of marketing that which is to be produced." Milwaukee's early publicity sought to promote its new fertiliser by criticising mineral fertiliser, which was a mistake because it angered fertiliser distributors and manufacturers, i.e. their intended customers.

Hatton realised the city needed to prove the value of its product. Milwaukee funded a fellowship in the School of Agriculture at the University of Wisconsin, Madison. Professor Emil Truog (honoured as a Soil Scientist) selected graduate student O. J. (Oyvind Juul) Noer for the work. Noer conducted field trials of the Jones Island product and other organic and inorganic fertilisers on dozens of farms and many crops. Hatton held a competition for a trade name because Noer advised that the term "sewage sludge" was not appealing to customers and the finished product needed to be differentiated from raw sewage. The winning entry was from a fertiliser dealer in South Carolina, who suggested "Milorganite" for Milwaukee organic nitrogen.

O. J. Noer joined Milwaukee's sewerage commission after completing his studies. He focussed on sales to golf courses, which proved a perfect fit. Milorganite is particularly valuable for turf because it contains (Table 1) both water soluble and slow release nitrogen to green the grass, phosphate to improve rooting and wear resistance and no viable weed seeds. Like all biosolids, it contains little potassium, but this was turned to a virtue for golf turf because potassium stimulates clover, which greens keepers did not want. By 1930, income from selling to golf courses exceeded that from selling to fertiliser manufacturers. By 1932, Milorganite was able to claim it was the most widely used fertiliser on golf courses.

Noer travelled extensively, visiting golf courses and was literally hands-on when it came to the product. He established the Turf Service Bureau to give technical advice and undertake trials and product development. It was linked with UW-Madison and gave independent, respected advice that was not aimed merely at selling Milorganite. Noer and others cultivated a reputation for scientific impartiality. Noer published a series of articles on "The ABC of Turf Culture" in The National Greens Keeper, which were later reprinted as one of the first books on turf culture – "Milorganite" only appears once and then only in passing. Today the O.J. Noer Turfgrass Research and Education Facility is part of UW-Madison, College of Agricultural and Life Sciences. It lists "Biosolids for sustainable sod production" as one of its research topics.

Table 1: Example of the guaranteed analysis declaration for Milorganite

Guaranteed Analysis (sample label)	
Total Nitrogen (N)	6.0%
Water Soluble Nitrogen	2.5%
Water Insoluble Nitrogen*	3.5%
Available Phosphate (P_2O_5)	2.0%
Calcium (Ca)	1.2%
Total Iron (Fe)	4.0%
Chlorine (Cl) maximum	1.0%

*3.5% Slowly available nitrogen. Nutrients Derived from biosolids

Milorganite maintained sales through the Depression by advertising, product quality, and product evolution. At times, there were tensions between the objectives of sanitation and fertiliser manufacture. Milwaukee faced the dilemma of either treating high flows and producing a low nitrogen product or allowing overflows and maintaining nitrogen levels. In 1940, Milorganite pioneered the inclusion of selective herbicide, seven years before Scotts launched "weed and feed".

As local population grew, the Milwaukee area added a second water reclamation facility, South Shore, in the 1960s. In the 1990s, South Shore was connected to Jones Island by pipeline, allowing the use of solids from both Jones Island and South Shore to make Milorganite.

Currently, the Milwaukee Metropolitan Sewerage District serves 1.1 million people in 28 communities. As is has for almost 90 years, the Jones Island Water Reclamation Facility continues to make Milorganite, using waste activated sludge and digested primary sludge. Solids are pressed and then dried using heat. A product temperature of 80° C and a solids concentration greater than 90% minimizes pathogens and attractiveness to vectors. Several versions of Milorganite are available: 5:2:0 is sold in 16 kg bags for the retail market and in bulk for agricultural application or blending in other fertiliser products. 5:2:0 and 6:2:0 are sold in larger bags for the professional market. A special product with a smaller particle size is packaged for golf courses and called Greens Grade (Figure 1).

Figure 1: Milorganite bags – Greens and Classic grades

Other cities, including in the UK, tried to emulate Milwaukee but either they did not have the scale (50,000 tons/year) or the will or the expertise to sustain 90 years of sales with distribution the length and breadth of a continent. Milwaukee had the legacy of an investment in dewatering and drying at Jones Island, which it continues to maintain and operate (Schneider, 2011).

Case study 2: Thames Water

Like other UK water companies, Thames Water's antecedents had their imitations of Milorganite but without its technical backup. Morganic was the most successful and longest-lived. It was made from digested biosolids that had been air dried, finished in a thermal drier and bagged in paper sacks. Production ceased about 1978 when the dryer needed a major refurbishment.

Thamesgro topsoil was an evolution (in the 1980s) from a large biosolids recycling operation (Thamesgro Organic Soil Treatment) that served most of the London area. It was manufactured by blending air dried digested biosolids with selected subsoil and/or overburden. At the time, the British Standard (BS 3882:1965) was not sufficiently specific, consequently landscape architects had their own specifications for topsoil, which led to a plethora of specifications that made supply difficult because each customer wanted something slightly different and all in a very restricted range of textures. We used test plots to assess formulations for manufactured topsoil and demonstrate their efficacy. We had an extensive database of chemical analyses to prove the safety and consistency of our product. At the same time, the British Standard was being revised and I came to chair the technical drafting committee so we had the accumulated wisdom of practising Soil Scientists. The revised edition was published in 1994 (BS 3882:1994 Specification for topsoil). Thamesgro topsoil dominated the London area through the late 1980s because of superior performance and consistency, but when the market for quality topsoil decreased as a result of the redevelopment crash, we ceased production because we were not prepared to compromise quality for the low prices that the reduced market was willing to pay.

The TERRA ECO•SYSTEMS range of garden centre products, which launched in 1996, was the next venture from recycling biosolids to agriculture and land restoration into the retail sector. This time it was selling to retailers who then sold to domestic gardeners. A prime motivation was to demonstrate that members of the public were not faecal-averse but rather would buy products containing treated sewage sludge.

Little Marlow WwTW (p.e. 100k) came into the TERRA portfolio of works in about 1993. It was turned-windrow composting raw cake with straw and had a stockpile of mature compost. As a favour to the local authority, we started co-composting food waste from an experimental kerbside collection round but this meant that we had to get a waste management Site License. The license detailed all aspects of the treatment process but was silent about the compost.

Gardeners were being entreated not to use peat. I was chairman of the British and European Standards technical committees for soil improvers and growing media and was well aware of the horticultural value of peat-based media; however, it was interesting to see whether a product could be made from Little Marlow's compost. In my greenhouse at home, I tested six formulations containing compost against the brand-leading peat-based multipurpose compost in a randomised trial with triplicate replication. One of the formulations performed just as well. Tissue analysis of the plants showed trace element uptake was acceptable. Exhaustion analysis of the growing medium showed there were still reserves of nutrients. My director, also a keen gardener saw the results and approved using consultants to develop the product.

Through my BSi work, I knew experts from the growing media market. The market research consultant advised that more than one product in the range was necessary to be credible. Through two more years of trials a multipurpose compost and a growing bag medium were developed; the third product in the range was soil improver (compost). The target of matching or exceeding the performance of the brand-leading products was achieved (Evans and Rainbow, 1998).

Before venturing into the fast moving consumer goods market, I wanted to be sure that we were proof against adverse publicity. The products had to be "safe" and they had to be "of satisfactory quality" for the intended use. There were no regulations about using biosolids outside agriculture. The compost was not "waste" otherwise the site licence would have specified its management. The USEPA had (and still has) the most rigorous regulations for biosolids. They are based on a 14-pathway peer-reviewed risk assessment (USEAP 1992 and 1993). The products were well inside the chemical and pathogen limits for unrestricted use, including hobby gardeners. Sharps were a concern. Our reputation would not survive if customers cut themselves using the products. If there were glass in wastewater, it would be captured and removed during preliminary treatment (screenings and grit). Composted food waste was not used in the products because of the risk of glass. An eddy current detector to stop the belt during bagging would prevent needles (stainless steel) should any be present.

Market research, especially using focus groups, showed the gardeners liked the products and their "story" and would buy them provided they performed as well as the ones they

normally used and they cost no more; the absence of peat was a bonus but not something for which gardeners were prepared to pay a premium. Many gardeners had tried peat-free products, none of them with success, but our extensive trial results (from Ageratum to Tomato) gave them confidence to try again. We also tested elements of the bag design with the focus groups.

Market research amongst independent retailers confirmed that earlier peat-frees had not worked and they had been left with unsold stock. Retailers wanted to know why they should give space to pallets of these new products, how would our products increase their footfall and what were our advertising plans?

Regarding our plan to market, I decided against the multiple retailers (sheds) because of the vulnerability of large sales to a few customers and instead that we would sell (initially) to independent retailers, for whom this would be a competitive advantage against the sheds. Similarly, I decided against targeting nurseries because of the financial risk if there were growing problems in a nursery's product line. Whereas the major manufacturers demanded a retailer took whole truckloads, we accepted orders for as few as three pallets. A brand-building consultant advised most strongly against introductory discounts (which salespeople suggested) because he said they send the message that a product was not worth its full price.

The products were launched at the major annual trade show in 1996 with wholesale prices that with standard industry margins would mean retail prices the same as the brand-leading competitors. Despite a good launch and lots of interest, we found that the world was not beating a path to our door for these better products and, rather belatedly, we recruited a freelance salesman to sell. We also assigned two people to be a sales support team that interfaced between customers, sales, bagging and distribution. Distribution was contracted to hauliers in the business of pallet distribution.

I took some bags of product to Alan Titchmarsh; he used it on Gardeners World (primetime TV) showing the brand (phones went into meltdown). We wrote advertorials for gardening magazines. All this gave maximum exposure for minimum cost.

The bags and point of sale signs said "made from sewage cake composted with straw and other biomaterials" so there could be no mistaking the provenance. None of our promotion criticised peat; the absence of peat in our products was just a fact. The products were good in their own rights; the absence of peat was a bonus for those for whom that was an interest.

We achieved nationwide distribution in the first year and sales doubled year on year; it was on track to earning profits in 2001. Even though gardeners repeat bought the products, we learnt that retailers needed "nursing" to reorder and maintain their stock levels. Some nurseries tried the products and adopted them in preference to their customary growing media.

After a while, a party of regulators visited Little Marlow, more perplexed than downright hostile because what we were doing did not seem to be covered in their rulebooks. However we had abundant data to demonstrate that we were well within the most

rigorously based regulations in the world (USEPA, 1993). The waste management licence was silent about the compost. The "nation's favourite gardener" had featured and praised the products on the premier television gardening programme. The regulators withdrew.

This was a low budget [skunk works] exercise that took a lot of input and enthusiasm. It proved the point that members of the general product would buy products made from sewage sludge and use it in their gardens.

The sales support team and I all left the company in 1999. Production and sales continued under our successors, who spent resources rebranding, but it was a lot more trouble than land application for farming and restoration and after a year or two it ceased.

Case study 3: Struvite

Berlin Water and Thames Water both developed struvite recovery in the early 2000s using equipment built in-house. This was mainly to prevent uncontrolled and problematic struvite precipitation in pipes and pumps (Heinzmann and Engel, 1997 and Jaffer and Pearce, 2004). The idea being to make the struvite where it was not going to be a problem rather than let it crystallise where it would be a problem. Berlin Water has continued with its Airprex® process and has developed a market for its fertiliser, selling under the local fertiliser regulations. It is the lead registrant of struvite under REACH (EC 232-075-2; CAS 7785-21-9). Rachel Green of [REACH Facilitation Company] ReFaC has advised (ESPP, 2013) that each producer of struvite is required to register under REACH but that if it can co-register under Berlin Water's registration the cost of producing the dossier should only be of the order of £5000 including ReFaC's fees to negotiate the process. An additional cost for ECHA's administration, based on the company's [initial] annual tonnage of struvite produced is also applicable (ranging from €24,901 EUR for >1,000 tonnes/year to €450 for1-10 tonnes/year). It is probable that a company's subsequent production facilities would come under its initial registration with no extra fee.

Struvite recovery from dewatering liquor after anaerobic digestion would make sense on a whole life cost basis for many WwTWs (especially ones operating biological phosphate removal) rather than recycling it back through the treatment works. Even more phosphate can be recovered by blending some primary sludge with the waste activated sludge (WAS) to render it anoxic (which causes phosphate-accumulating bacteria to release their luxury phosphate) prior to thickening and then sending the thickener liquor to the struvite plant. This stripping from WAS pre-digestion has the added benefit that reducing the P concentration in liquid digested sludge improves dewatering and reduces polyelectrolyte demand. Recovering P reduces the cost of wastewater treatment, reduces the cost of dewatering, improves cake dryness, reduces the cost of cake haulage and biosolids recycling and eliminates struvite scaling from pipes and other places; it is a sextuple win. SME fertiliser companies are keen to enter contracts to buy the struvite. Several companies now offer first generation struvite recovery apparatus.

Struvite has good fertiliser properties and it is far from new. Sir James Murray patented the use of struvite as fertiliser in 1857, the same time as superphosphate was developed.

In fertiliser terms, struvite is 5.7% N : 29% P_2O_5 : 0% K_2O : 16% MgO. Typically crops take nutrients out of soil in the ratio approximately 2 : 1 : 1 (N : P_2O_5 : K_2O). Clearly, struvite is not a complete fertiliser but Ostara believes it can develop a niche, premium market amongst golf courses; time will tell whether Crystal Green can emulate Milorganite's success, though its nutrient profile is far from similar. Blending with other ingredients to make compound fertilisers is agronomically sensible and an alternative to Ostara's approach.

Conclusions

Marketing, making and selling products based on organic resources is feasible. There are successful precedents but even though the EU espouses changing from a disposal to a recycling society it is getting more difficult. Waste is stuff you intend to throw away; a product is something for which there is a market, something that people want. Products must be of satisfactory quality. This pragmatic, common law, catchall approach has worked but it is at variance with the EU's ethos of catalogue everything.

Marketing, making and selling products based on organic resources requires additional skills compared with "conventional" organic resource treatment and bulk distribution. It requires particular additional technical knowledge. It can be less costly and even be profitable compared with conventional approaches. All of this is common to other innovations and product development, marketing, manufacturing and selling.

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References

BS3882 Specification for topsoil. British Standards Institution, London.

ESPP (2013) European Sustainable Phosphorus Platform technical meeting on regulatory issues relating to the use of recycled phosphates in agriculture. The Farmers' Club, London, 24th September 2013

Evans, T. and Rainbow, A. (1998). Wastewater biosolids to garden centre products via composting. Acta Horticulturae no 469, 157-168.

Evans, T.D. (2003) Hazard Analysis and Critical Control Point (HACCP) for Composters. ISBN 0-9532546-6-6 The Composting Association, Wellingborough, England

Heinzmann, B. and Engel, G. (1997) Induced magnesium ammonia phosphate precipitation to prevent incrustations and measures for phosphorus recovery. Proc. IWA Specialist Conference: Moving Forward – Wastewater biosolids sustainability. June 2007. Moncton, NB, Canada

Jaffer, Y. and Pearce, P. (2004) Phosphorus recovery via struvite production at Slough sewage treatment works, UK – a case study. in Phosphorus in Environmental Technology: Principles and Applications. Valsami-Jones, E. (ed) IWA Publishing, London.

Moore, Geoffrey, A. (1999) Crossing the chasm. 2nd edition. Capstone Publishing Ltd. Oxford, England.

Schneider, D. (2011) Hybrid nature: sewage treatment and the contradictions of the industrial ecosystem. MIT Press.
USEPA (1992) Technical Support Document for Land Application of Sewage Sludge, Volume I and II (Appendices). US Environmental Protection Agency, Eastern Research Group, Lexington.
USEPA (1993). Standards for the Use and Disposal of Sewage Sludge. 40 CFR Part 503. Federal Register 58 (32), 9248-9415. (19 February 1993).