Journal of Applied Science and Agriculture, 9(4) April 2014, Pages: 1777-1792

AENSI Journals

Journal of Applied Science and Agriculture

ISSN 1816-9112

Journal home page: www.aensiweb.com/jasa/index.html

The identifying and categorizing of norm technology components affected on agility of production line by MCDM fuzzy, the study of fragmentary yoghe partian manufactor

[1]Abolfazl Rafiei Gilavaii, [2]Arezoo Tavakoli, [3]Dr.S.Nobari, [4]Reza Tahermanesh, [5]Ensie Masoodi

[1]*Master of management technology, Azad tahran jonub, Tehran, Iran.*
[2]*Master of International Business, Azad tahran jonub.*
[3]*Information technology sabinanobari@yahoo.com.*
[4]*Master of International Business, Azad tahran jonub.*
[5]*Master of International Business, Azad tahran jonub.*

ARTICLE INFO

Article history:
Received 20 January 2014
Received in revised form 16
15 April 2014
Accepted 25 April November 2014
Available online 5 May 2014

Keywords:
Agility of production line
Fuzzy multi-criteria decision making
Agile production
DEMATEL

ABSTRACT

Technology, marketing conditions and customer's request are changing rapidly and in different ways. In recent years, organizations perceive that in this competitive and variable space they should accept these new conditions instead of reciprocity and it is development solution. Since the beginnings of 1990 decades agile production paradigm gives a solution to management in variable and dynamic environment. One of the most important elements of wealth thousandth is the speed .Of changing production in third , we need new kind of productive organization which can coordinate themselves with recently variable environment(to decrease the time of responsibly and improve flexibility.Most of agility criteria define by linguistic phrases and collection Fuzzy are involving qualitative variable better than unfussy collections.one of the mayor problem and obstacle of reaching to agility in our countries productive organization is not make use to appropriate and new Technologies, Flexibility, Speed(velocity) and act to. how we can gain or protect potential competitive in automobile industry and related companies(which is the most important industry in different parts such as use of Technology, development and competitive on it)by pay attention to recently conditions it means that embargo and approach of resistance Economy. We identify criteria and small criteria that effect on agility of production line and elements of soft technology by using of(normal- fuzzy normal) 8 criteria and 21 small criteria sieve and also most important of 10 soft technologies are determined. In next steps we have investigated influence and effective of small criteria by using of DEMATEL technique. The result of DEMATEL technique shower that small criteria of rapid production and flexibility in production have more effects on system. Then we weighting and sorting elements of software technology effective on production line agility by F.TOPSIS techniques. The result of F.TOPSIS shows that if the producer units or this kind of company wants to make use of the result of this research, they should pay more attention to flexibility production system techniques in recently condition.

To Cite This Article: Abolfazl rafiei gilavaii, ArezooTavakoli, Dr.s.nobari, Reza tahermanesh, Ensie masoodi., The identifying and categorizing of norm technology components affected on agility of production line by MCDM fuzzy, the study of fragmentary yoghe partian manufactor. ***J. Appl. Sci. & Agric.,*** *9(4): 1777-1792, 2014*

INTRODUCTION

A manufacturing enterprise needs to stand on three equally strong legs to be stable: innovative products, reconfigurable manufacturing systems and responsive business models to sell a variety of products. In its turn, every manufacturing plant should have three goals: to produce at low cost, to enhance product quality, and to possess capabilities for rapid responsiveness. At the end of the 20th century, manufacturing enterprises faced many challenges and changes, concerning market changes (changes in product demand, changes in current products and introduction of new products), customer orders (low cost, high quality, low volume products and custom products), government regulations (safety and environment) and system failures (maintain production despite equipment failures). It is certain that, in some cases, traditional manufacturing systems (DML): Dedicated Manufacturing Lines, FMS: Flexible Manufacturing Systems) are no longer able to respond to market conditions. Thus, global economic competition and rapid social and technological changes have forced manufacturers to face a new economic objective: manufacturing responsiveness. A new type of manufacturing system, a Reconfigurable Manufacturing System (RMS), has been developed in order to provide exactly the capacity and functionality needed, exactly when it is needed. (Dashchenko, A.I., 2006; Bi, Z., *et al*., 2007;

Corresponding Author: Abolfazl Rafiei Gilavaii, Master of management technology, Azad tahran jonub, Tehran, Iran.

Journal of Applied Science and Agriculture, 9(4) April 2014, Pages: 1777-1792

Cunha Pedro, F., G. Maropoulos Paul, 2007; Koren, Y., M. Shpitalni, 2010; Koren, Y., 2010; Lamotic, F., *et al*., 2005; Malhotra, V., *et al*., Wiendahl, H.P., *et al*., 2007) In recent years, the evolutionary progress and paradigm shifts of manufacturing systems have been moving towards agile manufacturing systems. The concept of agility will reduce the time to reach market with appropriate products/services. Agile manufacturing is defined as the capability of surviving and prospering in a competitive environment of continuous and unpredictable change, by reacting quickly and effectively to changing markets, driven by customer designed products and services (Cunha Pedro, F., G. Maropoulos Paul, 2007; Dahmardeh, N., *et al*., 2010; Gunasekaran, A., 2001; Agile Manufacturing, 2013). Bot tany has presented a concept of three steps of the framework with surveying of agility context and methodologies of gaining to agility in 2009, and its structure is admitted by more researchers.

This framework is based on three components, contained; organization competition fundamental, agility definition and agility abilities. Vaskiot dt.al have given checking of research literary and analyzing of multi-object-studying to produce agility, recognition and integration of valuable branch, simultaneous engineering, agility technology, knowledge management upon intensity and stable producing, based on pre-agility-models. In this procedure, spite of this fact, the generations of agility consequence are presented to be enhanced. That is meant, they would boost marketing competition. They have designed as a concept model based on available agility article and tested as a high process surveying of production in Spain. Attained conclusion showed that applying of environment integration, experienced by agility providing and boosted by power of competition in producing. Finally they have introduced the organizations that are capable to perform successfully, must be appeared as high agility level, because they adaption as followed below:

1. Human resources
2. technology
3. Internal and external organizing
4. Simultaneous engineering
5. Knowledge management

Sharifi and zhang developed three-step-model for performing of agility in the production organizations in 2000. In this model, communication between inducers-capabilities and capabilities-susceptibility and appropriate mesh model has been designed for shorten making then in this project, they have counted conceptual and developing of methodology for achieving to agility and given that guarantying success and producing. This fact based on the appearing of new marketing age and one of main features is changeable. The sensitive position led to entire surveying in marketing primitives, strategic point view and capable of conventions continuity. They assumed that emphasizing on marketing environment adaption of changing the way is active method of marketing approach and ordered requirement due to the new collaboration methods such as unrealistic organization. Agility productions are appeared by this paradigm that creating the new agilities to perform well and being success through the marketing strategic revenue is to produce and to recognize new situation in the marketing environment. Changing and attaining its advantages, are fundamental concept of agility production.(14). In recent years, it has been used by Fuzzy logic and Fuzzy Mathematics for evaluating of agility on different fields especially in its classification. Lyn and st.al have boosted agility perspective and standard based on Fuzzy logic to provide massive ordered production. They have defined three main ability of agility are followed below: Agility of people management, agility of design production and design specific approach for each of them. They expressed that in agility space, there are principle question that must be asked consisted of which performance is agility? And how can it be measured? How coordination can be effective to reach and to increase agility? Answering these questions is vital for performer and design theory of agility. There are imperfect definition and doubtful approaches on evaluating agility. Most of these measurements are determined by language expression, with the probability and ambiguity mentioned above and gained measurement are neither effectiveness and nor appropriate. Because of this reason, Fuzzy logic are valuable device to encounter methods for making decision in the field that those are ambiguity phenomenon. The applied assessment methods consisted of definition of agility, capability variation language selection to assess and differentiating of language variables valiancy, Fuzzy assortment and integration of Fuzzy weighting and showing Fuzzy standards and making non- Fuzzy to identify unadapting factors then be able to spread agility consequence. Shirihigh and st.al have expressed that the remaining knowledge about generating of agility has been reviewed in order to extend agility concept of all organization. They reviewed whole articles related to generate agility and main standards of agility can apply for whole of organization segments as followed below:

1- Flexibility
2- Responsibility
3- Speed
4- Variable culture
5- Adaptability
6- Complex decreasing

Journal of Applied Science and Agriculture, 9(4) April 2014, Pages: 1777-1792

7- Making high quality
8- Ordered production
9- Boost the competition

In this project are stated flexibility, agility and adaptability as if applied to generate space has lots of meaning of those that will be recognized features that works with agility work force. Approach and sub-approach has been used in this project as an Approach and sub-approach identified by access articles and contexts about agility and producing line listed in table 1:

Table 1: extracted criteria and sub-criteria based on pervious researches

Sub-criteria	Criteria
The ability to identify and understand environmental changes	Responsibility
Ability to respond quickly to changes	
Ability to respond quickly to competitors' reactions	
Tough action to copy and business structure	Competence
The ability of multiple	
Flexibility in process	Flexibility
Flexibility in product	
Flexibility in the way	
Flexibility in Size	
Flexibility in development	
Flexibility in operation	
Flexibility in production	
The flexibility of the material	
The flexibility of the program	
Market flexibility	
Flexibility in Automation	
Flexibility in the labor force	
Flexibility in new design	
Flexibility to amend or modify	
Flexibility in machine	
The construction of the prototype	Speed
Rapid modeling technique for making new products	
Rapid production	
Rapid transfer	
Rapid identification of new opportunities in the market	
Agree to implement integrated activities	Integration
Information available to employees	
Synergistic Design of Integrated Operations	
Concurrent execution of activities	
Multiple communication equipment	Team building capabilities
Different methods Business Development Company	
Individuals working in teams	
The difference in performance	
The company is in the marginal	
Decentralization of decision-making	
Capable of working in teams	
Cross-functional teams	
Technology awareness	Technology
Leadership in Technology	
Advanced Technology Design	
Advanced Technology Production	
Information systems integrated with customer and suppliers	
Integrated information systems of production	
System Planning	
Increase in knowledge, technology and skills	
Technologies to improve knowledge and skills	
Technologies to improve knowledge and skills	
Taking advantage of ERP	
Greater quality of life of the product	Quality
Initial Field Product designed to add significant value	
Slight improvement in cycle time	
Employing techniques such as building improvements and new product	
Continuous Improvement	Changing
Changing culture	
internal Participation	Participation (joint stock companies)
external Partnership	
Relationship based on trust, customers and suppliers	
Fast forming partnerships	

Journal of Applied Science and Agriculture, 9(4) April 2014, Pages: 1777-1792

Customer contact strategy	
Close relationships with suppliers	
Index scale (ease of adding new components)	Bazaar
New product introduction	
Customer driven innovation	
Reshaping product mix	
Customer Satisfaction	
Respond to market changes	
Expandability	
A range of values	
Organizational Learning	Training
Flexible and multi-skilled people	
Update workforce skills	
Continuous learning and training	
Employee satisfaction	Welfare and Social Services
Setting up or changing overtime	Producing
Ability to change (diversity of operations, machines, workstations that can work)	
Compliance machine	
Mobility (ability to schedule jobs again)	
Joint Operation	
Variety capacity (loading) Handling Systems	
Diversification of production	
Diversity of sectors	
Instrumental in transforming	
Common parts	
Reshaping product mix	
Production Update	
Product construct new operations using JIT techniques	
Levels of Education	Persons
Job Rotation	
Interoperability with other departments (level of standardization)	Data
Grillwork	
Agility information	
Select customer-focused ideas based on previous studies and previous customer comments	Production design
Amount of information about customer demand	
Applying the technique to design and build robots to help in the design	
Making new product	
Rapid product design	
According to customer needs on new products and new product construction	Value Chain
Handling and processing customer value in order to test new product concepts	
Knowledge Management	Management
Management of Technology	
Supplier management	
	Concurrent Engineering, Innovation, Virtual Institute, Strategic planning, Ecommerce Information technology Organization

The method of researching:

1- Applying of internal science documents and Latin reference.
2- Internet searching and science site such as Emerald, Elsevier and etc.
3- Interviewing with expert and specialist
4- Questionnaires with spectrum of lyklert, dimtal and established Fuzzy.

Research Questions:

Main research question

What is the effective component on the agility of production *line PORZHE PART ARIA* MANUFACTURE?

Sub-main research question

1- What is considered approaches and non-approaches in component of effective norm technology proportion to agility of producing line?
2- What is the collaborating between approaches and non-approaches respectively?

Journal of Applied Science and Agriculture, 9(4) April 2014, Pages: 1777-1792

3- How is lattice and analyzing among of the considered approaches and non-approaches in the decision selection of the effective norm technology as an agility of producing line?

4- How is the related primitives to one the technologies component

Gained Project Objects:

Sifting (decimal- Fuzzy) for identifying of norm technology component After interviewing with experts and studying of available agility and also conveying of several articles among of agility of producing line, 47 effective norm technologies of producing line has been extract. So, the questionnaire has been provided to determine the importance of the norm technology that distributed through the experts, conclusion are listed on table 2.

Table 3: calculating for determining total weight, the overall weighted fuzzy, fuzzy relative weight, normal weight, soft, fuzzy technology

Geometric mean	Weighted normalized fuzzy	Fuzzy relative weight of each indicator	Overall fuzzy weights	Normalized weight	The relative weight of each indicator	Total weight	Symbol	The norm of technology
0.020389931	0.020325054	0.4328125	13.85	0.020455014	0.465	14.88	A1	Employee participation system (EPS)
0.015188955	0.015078695	0.32109375	10.275	0.015300021	0.3478125	11.13	A 2	Education System
0.022556931	0.022819826	0.4859375	15.55	0.022297065	0.506875	16.22	A 3	Concurrent (CE) Engineering
0.017357679	0.017610155	0.36953125	11.825	0.017362018	0.3946875	12.63	A 4	Computer skills
0.024568443	0.024544154	0.52265625	16.725	0.024592756	0.5590625	17.89	A 5	Information Technology(IT)
0.014240362	0.014308251	0.3046875	9.75	0.014172795	0.3221875	10.31	A 6	Workshop
0.015950206	0.015885827	0.33828125	10.825	0.016014846	0.3640625	11.65	A 7	Model
0.011290823	0.011740103	0.2359375	7.55	0.011505945	0.2615625	8.37	A 8	Prototyping Rapid (RPT)Tools
0.01446598	0.014895256	0.3171875	10.15	0.014049076	0.319375	10.22	A 9	World web wide (WWW)
0.013125767	0.012987489	0.2765625	8.85	0.013265517	0.3015625	9.65	A 10	Computer simulation programs
0.01776908	0.017573467	0.37421875	11.975	0.017966871	0.4084375	13.07	A 11	Simulation program (SP)
0.028985235	0.029020068	0.61796875	19.775	0.028950443	0.658125	21.06	A 12	Virtual cell (VC)
0.023944766	0.024067212	0.5125	16.4	0.023822943	0.5415625	17.33	A 13	Virtual Manufacturing (VM)
0.016871768	0.016876399	0.359375	11.5	0.016867139	0.3834375	12.27	A 14	Barcode
0.016757131	0.016729647	0.35625	11.4	0.016784659	0.3815625	12.21	A 15	Internet
0.010248056	0.010639469	0.2140625	6.85	0.010488693	0.2375	7.6	A 16	Production Planning and Control (PPC)
0.041843234	0.041677367	0.8875	28.4	0.04200976	0.955	30.56	A 17	Reverse Engineering (RE)
0.041380457	0.041273801	0.87890625	28.125	0.041487387	0.943125	30.18	A 18	Manufacturing resource planning (MRPII)
0.029435556	0.029717137	0.6328125	20.25	0.029156643	0.6628125	21.21	A 19	Cell production
0.0156447	0.015885827	0.33671875	10.775	0.015478727	0.351875	11.26	A 20	Multimedia Systems (MS)
0.012674012	0.012840738	0.2734375	8.75	0.012509451	0.284375	9.1	A 21	Virtual Home software (VRS)
0.014038567	0.014124812	0.30078125	9.625	0.013952849	0.3171875	10.15	A 22	Variable standard of product (STEP)
0.012046881	0.012106982	0.2578125	8.25	0.011987078	0.2725	8.72	A 23	Computer supported cooperative work
0.039455261	0.039402722	0.8390625	26.85	0.03950787	0.898125	28.74	A 24	Computer-aided manufacturing

								(CAM)
0.009122237	0.009171956	0.1953125	6.25	0.009072789	0.20625	6.6	A 25	Three-dimensional computer map
0.013057754	0.013097553	0.27890625	8.925	0.013018077	0.2959375	9.47	A 26	Decision Support Systems (DSS)
0.040403471	0.040173167	0.85546875	27.375	0.040635095	0.92375	29.56	A27	Group Technology (GT)
0.042874469	0.042667939	0.90859375	29.075	0.043081999	0.979375	31.34	A28	Design for manufacturing (DFM)
0.04148791	0.041310489	0.8796875	28.15	0.041666094	0.9471875	30.31	A29	Design for Assembly (DFA)
0.017457935	0.017610155	0.375	12	0.017362018	0.3934375	12.59	A30	Computer-Aided Process Design
0.038134682	0.037971897	0.80859375	25.875	0.038298165	0.870625	27.86	A31	Enterprise Resource Planning (ERP)
0.010543024	0.010639469	0.2265625	7.25	0.010488693	0.2375	7.6	A32	Fast Switching Applications (RSC)
0.010563812	0.010639469	0.2265625	7.25	0.010488693	0.2384375	7.63	A33	Real-time control
0.039026684	0.038999156	0.83046875	26.575	0.039054231	0.8878125	28.41	A34	Flexible manufacturing systems (FMS)
0.013165475	0.013134241	0.2796875	8.95	0.013196783	0.3	9.6	A35	Communication systems, voice of the customer
0.041476762	0.041383865	0.88125	28.2	0.041569867	0.945	30.24	A36	Computer-Aided Design (CAD)
0.015186913	0.015115383	0.321875	10.3	0.015258781	0.346875	11.1	A37	Computer-aided system engineering (CASE)
0.037875688	0.037715082	0.803125	25.7	0.038036978	0.8646875	27.67	A38	Computer integrated manufacturing systems
0.018670674	0.018564039	0.3953125	12.65	0.018777923	0.426875	13.66	A39	Operations research models (OPM)
0.020135094	0.020325054	0.42578125	13.625	0.020455014	0.4609375	14.75	A40	Electronic Commerce (EC / EB)
0.011608541	0.011740103	0.25	8	0.011505945	0.2609375	8.35	A41	Ecommerce data (EDI)
0.014418908	0.014528378	0.309375	9.9	0.014310262	0.3253125	10.41	A42	Virtual Designing of Environments (VDE)
0.014068586	0.014895256	0.3	9.6	0.014049076	0.319375	10.22	A43	Wide area network (WAN)
0.015090301	0.015225447	0.32421875	10.375	0.014956354	0.34	10.88	A44	Client-centered approach to the design and improvement of product quality (QFD)
0.019513681	0.019701361	0.41953125	13.425	0.019327789	0.439375	14.06	A45	Expert Systems (ES)
0.011066006	0.011079723	0.2359375	7.55	0.011052306	0.25125	8.04	A46	The database (DB)
0.014794874	0.014895256	0.3171875	10.15	0.014695168	0.3340625	10.69	A47	Central (CNS) Network serve
1	1	21.29453125		1	22.7328125	Total		

Table 4: Ranking according to normalized norm technology weight

Normalized weight	Norm technologies	Symbol	Ranking
0.043081999	Design for manufacturing (DFM)	A28	1
0.04200976	Design for Assembly (DFA)	A 17	2
0.041666094	Design for Assembly (DFA)	A29	3

Journal of Applied Science and Agriculture, 9(4) April 2014, Pages: 1777-1792

0.041569867	Computer-Aided Design (CAD)	A36	4
0.041487387	Manufacturing resource planning (MRPII)	A 18	5
0.040635095	Group Technology (GT)	A27	6
0.03950787	Computer-aided manufacturing (CAM)	A 24	7
0.039054231	Flexible manufacturing systems (FMS)	A34	8
0.038298165	Enterprise Resource Planning (ERP)	A31	9
0.038036978	Computer integrated manufacturing systems	A38	10
0.029156643	Cell production	A 19	11
0.028950443	Virtual Cell	A 12	12
0.024592756	Information Technology(IT)	A 5	13
0.023822943	Virtual Manufacturing (VM)	A 13	14
0.022297065	(CE) Concurrent Engineering	A 3	15
0.020455014	Electronic Commerce (EC / EB) Employee participation system(EPS)	A1, A40	16
0.019327789	Expert Systems (ES)	A45	17
0.018777923	Operations research models (OPM)	A39	18
0.017966871	Simulation program (SP)	A 11	19
0.017362018	Computer-Aided Process Design Computer skill	A 4, A30	20
0.016867139	Barcode	A 14	21
0.016784659	Internet	A 15	22
0.016014846	Model	A 7	23
0.015478727	Multimedia Systems (MS)	A 20	24
0.015300021	Education System	A 2	25
0.015258781	Computer-aided system engineering (CASE)	A37	26
0.014956354	Client-centered approach to the design and improvement of product quality (QFD)	A44	27
0.014695168	Central Network server (CNS)	A47	28
0.014310262	Virtual Designing of Environments (VDE)	A42	29
0.014172795	Workshop	A 6	30
0.014049076	Wide area network (WAN) Worlds web wide (WWW)	A 9, A43	31
0.013952849	Variable standard of product (STEP)	A 22	32
0.013265517	Computer simulation programs	A 10	33
0.013196783	Communication systems, voice of the customer	A35	34
0.013018077	Decision Support Systems (DSS)	A 26	35
0.012509451	Virtual Home software (VRS)	A 21	36
0.011987078	Computer supported co-operative work(CSOW)	A 23	37
0.011505945	Ecommerce data (EDI) Prototyping rapid tools(RPT)	A 8, A41	38
0.011052306	The database (DB)	A46	39
0.010488693	Real-time control Fast switching application(RSC) Production planning and control(PPC)	A33, A 16, A32	40
0.009072789	Three-dimensional computer map(TDCG)	A 25	41

$$A28 > A7 > A29 > A36 > A18 > A27 > A24 > A34 > A31 > A38 > A19 > A12 > A5 > A13 > A3 > A1 = A40 > A45 > A39 > A11 > A4 = A30 > A14 > A15 > A7 > A20 > A2 > A37 > A44 > A47 > A42 > A6 > A9 = A43 > A22 > A10 > A35 > A26 > A21 > A23 > A8 = A41 > A46 > A33 = 32 = 16 > 25$$

Table 5: Ranking according to normalized fuzzy norm technology weight

Weighted normalized fuzzy	Norm technologies	symbol	Ranking
0.042667939	Design for manufacturing (DFM)	A28	1
0.041677367	Design for Assembly (DFA)	A 17	2
0.041383865	Design for Assembly (DFA)	A36	3
0.041310489	Computer-Aided Design (CAD)	A29	4
0.041273801	Manufacturing resource planning (MRPII)	A 18	5
0.040173167	Group Technology (GT)	A27	6
0.039402722	Computer-aided manufacturing (CAM)	A 24	7
0.038999156	Flexible manufacturing systems (FMS)	A34	8
0.037971897	Enterprise Resource Planning (ERP)	A31	9
0.037715082	Computer integrated manufacturing systems	A38	10
0.029717137	Cell production	A 19	11

Journal of Applied Science and Agriculture, 9(4) April 2014, Pages: 1777-1792

0.029020068	Virtual Cell	A 12	12
0.024544154	Information Technology(IT)	A 5	13
0.024067212	Virtual Manufacturing (VM)	A 13	14
0.022819826	(CE) Concurrent Engineering	A 3	15
0.020325054	Electronic Commerce (EC / EB) Employee participation system(EPS)	A1, A40	16
0.019701361	Expert Systems (ES)	A45	17
0.018564039	Operations research models (OPM)	A39	18
0.017610155	Computer-Aided Process Design Computer skill	A30, A 4	19
0.01735334	Simulation program (SP)	A 11	20
0.016876399	Barcode	A 14	21
0.016729647	Internet	A 15	22
0.015885827	Model Multimedia Systems (MS)	A 7, A 20	23
0.015225447	Client-centered approach to the design and improvement of product quality (QFD)	A44	24
0.015115383	Computer-aided system engineering (CASE)	A37	25
0.015078695	Education System	A 2	26
0.014895256	Wide area network (WAN) Worlds web wide (WWW) Sentral network server(SNS)	A 9, A43, A47	27
0.014528378	Virtual Designing of Environments (VDE)	A42	28
0.014308251	Workshop	A 6	29
0.014124812	Variable standard of product (STEP)	A 22	30
0.013134241	Communication systems, voice of the customer	A35	31
0.013097553	Decision Support Systems (DSS)	A 26	32
0.012987489	Computer simulation programs	A 10	33
0.012840738	Virtual Home software (VRS)	A 21	34
0.012106982	Virtual Home software (VRS)	A 23	35
0.011740103	Computer supported co-operative work(CSOW)	A41, A 8	36
0.011079723	The database (DB)	A46	37
0.010639469	Real-time control Fast switching application(RSC) Production planning and control(PPC)	A32, A33, A 16	38
0.009171956	Three-dimensional computer map(TDCG)	A 25	39

$$A28 > A7 > A29 > A36 > A18 > A27 > A24 > A34 > A31 > A38 > A19 > A12 > A5 > A13 > A3 > A1 = A40 > A45 > A39 > A11 > A4 = A30 > A14 > A15 > A7 > A20 > A2 > A37 > A44 > A42 > A6 > A9 = A47 = A43 > A22 > A10 > A35 > A26 > A21 > A23 > A8 = A41 > A46 > A33 = 32 = 16$$

>25

Table 6: calculating according to normalized weight geometric average and to normalized fuzzy norm technology weight

Geometric average	Norm technologies	symbol	Ranking
0.042874469	Design for manufacturing (DFM)	A28	1
0.041843234	Reverse Engineering (RE)	A 17	2
0.04148791	Design for Assembly (DFA)	A29	3
0.041476762	Computer-Aided Design (CAD)	A36	4
0.041380457	Manufacturing resource planning (MRPII)	A 18	5
0.040403471	Group Technology (GT)	A27	6
0.039455261	Computer-aided manufacturing (CAM)	A 24	7
0.039026684	Flexible manufacturing systems (FMS)	A34	8

Journal of Applied Science and Agriculture, 9(4) April 2014, Pages: 1777-1792

0.038134682	Enterprise Resource Planning (ERP)	A31	9
0.037875688	Computer integrated manufacturing system (GIM)	A38	10
0.029435556	Cell production	A 19	11
0.028985235	Virtual cell (VC)	A 12	12
0.024568443	Information technology (IT)	A 5	13
0.023944766	Virtual Manufacturing (VM)	A 13	14
0.022556931	Concurrent Engineering (CE)	A 3	15
0.020389931	Employee participation system (EPS)	A1	16
0.020135094	Electronic Commerce (EC / EB)	A40	17
0.019513681	Expert Systems (ES)	A45	18
0.018670674	Operations research models (OPM)	A39	19
0.01776908	Simulation program (SP)	A 11	20
0.017457935	Computer-aided process planning (CAPP)	A30	21
0.017357679	Computer skills	A 4	22
0.016871768	Barcode	A 14	23
0.016757131	Internet	A 15	24
0.015950206	Model	A 7	25
0.0156447	Multimedia Systems (MS)	A 20	26
0.015188955	Education System	A 2	27
0.015186913	Computer-aided engineering (CASE)	A37	28
0.015090301	Client-centered approach to the design and improvement of product quality (QFD)	A44	29
0.014794874	Server Central Network (CNS)	A47	30
0.01446598	World web Wide (WWW)	A 9	31
0.014418908	Designing Virtual Environments (VDE)	A42	32
0.014240362	Workshop	A 6	33
0.014068586	Wide area network (WAN)	A43	34
0.014038567	Variable standard of product (STEP)	A 22	35
0.013165475	voice of the customer Communication systems, (VDCS)	A35	36
0.013125767	computer simulation Programs (CS)	A 10	37
0.013057754	Decision Support Systems (DSS)	A 26	38
0.012674012	Virtual Home software (VRS)	A 21	39
0.012046881	Computer supported cooperative work (CSOW)	A 23	40
0.011608541	Ecommerce data (EDI)	A41	41
0.011290823	Tools for Rapid Prototyping (RPT)	A 8	42
0.011066006	The database (DB)	A46	43
0.010563812	Real-Time Control	A33	44
0.010543024	rapid Switching Applications (RSC)	A32	45
0.010248056	Production Planning and Control (PPC)	A 16	46
0.009122237	Three-dimensional computer graphics (TDCG)	A 25	47

In related to consider listed table, result so this discussion, the technologies will be attained higher degree followed bellow:

Converse engineering, human source programing; be produced by computer helping (assistance), group technology, and design for producing

Design for modifying, organization source programs, the flexibility producing systems, design with computer helping, for the producing collaborate system producing by computer. In other words, those are given by high effective that in terms of norm technology will be selected.

Journal of Applied Science and Agriculture, 9(4) April 2014, Pages: 1777-1792

Sifting (Decimal-Fuzzy) for agility approaches definition:

After interviewing with expert and studying of agility resource accessible, also surveying of several articles in the agility fields producing line has been extracted by 26 number of agility approaches calculating on relation to the studied agility approaches in order to take advantage making primitive such as sifting(Decimal-sifting) is component of norm technology. Attained results this discussion considered followed bellow: responsibility, quality training, producing, production design, speed and coordinating are more significant. In other word, these approached in order to be studied (A) will be selected.

Sifting (Decimal-sifting) for agility sub approaches definition:

After interviewing with experts and study of available agility resources After interviewing with expert and studying of agility resource accessible, also surveying of several articles in the agility fields producing line has been extracted by 26 number of agility approaches calculating on relation to the studied agility approaches in order to take advantage making primitive such as sifting (Decimal-sifting) is component agility sub-approaches. in other word as followed above subject, sub-approaches, though ability, capability of fast response to changing, flexibility at process, flexibility at performing and flexibility at producing, applying of the hast melodizing techniques, hast producing, performing of collaborated organization acting, data available for employee synergistic, the synergistic and designing of collaborating operate, high quality of producing age, applying improving techniques such as making and producing of new production, flexibility persons by multi-skills, training and learning consequently, changing availability, amount of machine adaptability, common activities, reforming of production component, applying of production on time, applying JIT technique in the performing of making new production, and ideas of costumer, applying of design technique and making with robot assistance in designing and making the new production, design the production fast, were more significant that will be studied in terms of agility sub-approached. The amount and way of synergistic in the agility approaches on producing line with applying of dimtel method, in this research, by using of experts and reviewing the research literary, we concentrated on extracting sub-approaches in 8 methods responsibility, flexibility, speed, integration, quality, training, design and providing of production. At the present we consider the decision methods making group to form systematic of these factors.

Model solution:

In first step with applying of the method are expressed that explained entirely in pervious units, 21 sub-approaches as a main factor affected on agility producing line has been identified that these factors are classified due to their essence in 8 categories as followed:

Table 7: criteria and sub-criteria of product line agility with symbol

Abbreviation	Sub-criteria	Criteria
C1	Identify and understand environmental changes	Response
C2	Ability to respond quickly to changes	
C3	Flexibility in process	Flexibility
C4	Flexibility in operation	
C5	Flexibility in production	
C6	Application of modeling techniques fast	Speed
C7	Rapid production	
C8	Implementation of integrated organizational activities	Integration
C9	Availability of information for staff	
C10	Synergistic Design of Integrated Operations	
C11	Greater quality of life of the product	Quality
C12	Employing techniques such as building improvements and new product	
C13	Flexible and multi-skilled people	Education
C14	Continuous learning	
C15	Alterability	Production
C16	Common Operation	
C17	Utilization of production on time	
C18	Application of JIT techniques in the construction of the new product	
C19	Select customer-focused ideas based on previous studies and reviews of previous customers	Product Design
C20	Design techniques are employed to aid in robot design and new product	
C21	Rapid product design	

Second step: The majority of paired comparison:

: 21 sub-criteria extracted in the previous step are a matrix polls.

Journal of Applied Science and Agriculture, 9(4) April 2014, Pages: 1777-1792

Third step: majority vote:

Attained matrix are collected from second step, be decided by experts by majority vote about available and non-available connection between two factor.

Forth step: central point:

The central point given by the experts from directly influence sub-approaches line (A) to sub-approach-line (B) have been determined for each emphasized communication in recent step.

Fifth step: forming the matrix (X):

The matrix (X) is generated by third and fourth step.

Sub-criteria	C1	C2	C3	C4	C5	C6	C7	C8	C9	C10	C11	C12	C13	C14	C15	C16	C17	C18	C19	C20	C21
C1	0	2	3	2	3	2	1	1	2	2	2	3	1	2	2	2	2	2	3	0	2
C2	1	0	2	3	2	2	2	2	2	2	1	2	4	2	1	1	2	2	2	1	1
C3	2	2	0	2	2	2	2	2	2	3	1	2	3	2	1	2	2	2	3	2	2
C4	3	2	2	0	2	2	3	2	2	2	1	2	2	2	1	1	2	2	1	3	2
C5	2	2	3	2	0	3	3	2	2	1	2	2	2	2	2	2	3	2	1	3	2
C6	1	1	2	2	2	0	2	1	1	2	2	2	2	2	1	1	2	2	3	2	3
C7	1	2	2	3	2	2	0	2	2	3	2	2	3	2	4	1	3	3	1	4	2
C8	1	2	2	2	2	2	2	0	3	2	1	2	2	1	1	3	2	2	1	1	1
C9	2	2	3	2	2	1	2	2	0	2	2	2	3	2	2	1	3	2	2	1	1
C10	1	2	2	3	3	1	3	1	1	0	1	1	2	2	2	2	2	2	1	2	1
C11	0	1	2	2	2	2	2	1	2	1	0	2	2	2	1	1	3	3	2	2	1
C12	2	1	3	2	2	2	2	2	2	2	1	0	2	1	2	2	2	2	1	2	2
C13	1	3	2	2	3	2	3	2	2	1	2	1	0	2	2	2	3	2	1	2	2
C14	2	1	2	2	2	2	2	1	2	2	1	2	2	0	2	1	3	2	1	2	1
C15	2	2	3	3	3	1	2	1	2	2	2	2	2	2	0	1	2	2	1	2	1
C16	1	1	2	2	2	1	2	1	2	2	1	2	1	1	2	0	2	3	2	2	1
C17	2	2	3	3	3	2	2	2	1	2	2	3	2	2	1	1	0	3	2	3	2
C18	2	2	2	2	4	2	4	2	2	2	3	2	2	2	1	1	2	0	2	3	2
C19	2	2	2	3	2	2	2	1	2	2	1	1	1	1	2	1	2	2	0	0	2
C20	0	1	3	3	3	3	3	2	2	2	3	2	2	2	2	2	3	3	1	0	2
C21	2	2	3	2	3	2	3	2	2	1	2	2	1	0	1	2	2	2	1	2	0

Sixth step: forming the matrix (x):

Only input of matrix (x) multiplied in reversed maximum total row of its matrix (λ) to beat up matrix (x) to obtain, that shows intensity of the relative impact of the ruling on direct relations in the system.

Seventh step: forming the matrix (s). (M=λ*X)

Matrix (s) which is combined by the relative impact of direct and indirect relationship governing the formation is: S=M (I-M) ^ (-1)

Table 9:

	R	J	R+J	R_J
C1	4.567127	3.665889	8.233016	0.901238
C2	4.419001	4.220982	8.639983	0.198019
C3	4.834023	5.630795	10.46482	-0.79677
C4	4.697498	5.523945	10.22144	-0.82645
C5	5.140108	5.758867	10.89897	-0.61876
C6	4.28979	4.58439	8.87418	-0.2946
C7	5.49303	5.624885	11.11792	-0.13186
C8	4.178515	3.942352	8.120866	0.236163
C9	4.65025	4.465593	9.115843	0.184657
C10	4.256826	4.54684	8.803666	-0.29001
C11	4.127619	4.000013	8.127632	0.127606
C12	4.438993	4.629361	9.068353	-0.19037
C13	4.801838	4.952497	9.754334	-0.15066
C14	4.24097	4.143616	8.384586	0.097354
C15	4.577797	3.95825	8.536048	0.619547
C16	4.000971	3.573947	7.574918	0.427023
C17	5.130333	5.554334	10.68467	-0.424
C18	5.26873	5.30531	10.57404	-0.03658
C19	3.957757	3.798888	7.756644	0.158869
C20	5.253099	4.875258	10.12836	0.377841
C21	4.471559	4.039821	8.51138	0.431738

Eighth step: attained conclusion and calculating with excel software calculating values (R), (J), (R+J) and (R-J) is obtained due to table 9:

Table 9 is followed amount of values (R), (J), (R+J) and (R-J).

With the making sort of values (R), (J), (R+J) and (R-J) are gained in descending order tabled.

Effectiveness and impact of the sub-approaches relation to other criteria:

Journal of Applied Science and Agriculture, 9(4) April 2014, Pages: 1777-1792

Table 10:

Priority	Sort interact	R	Sort interact	J
1	C7	5.49303	C5	5.758867
2	C18	5.26873	C3	5.630795
3	C20	5.253099	C7	5.624885
4	C5	5.140108	C17	5.554334
5	C17	5.130333	C4	5.523945
6	C3	4.834023	C18	5.30531
7	C13	4.801838	C13	4.952497
8	C4	4.697498	C20	4.875258
9	C9	4.65025	C12	4.629361
10	C15	4.577797	C6	4.58439
11	C1	4.567127	C10	4.54684
12	C21	4.471559	C9	4.465593
13	C12	4.438993	C2	4.220982
14	C2	4.419001	C14	4.143616
15	C6	4.28979	C21	4.039821
16	C10	4.256826	C11	4.000013
17	C14	4.24097	C15	3.95825
18	C8	4.178515	C8	3.942352
19	C11	4.127619	C19	3.798888
20	C16	4.000971	C1	3.665889
21	C19	3.957757	C16	3.573947

Table 11: Sort final impact of the sub-criteria on the other end of Sort and the system

Row	Weighted priority based on the interaction	$(R+J)$	Row	Prioritized based on severity of impact purified / interact	$(R-J)$	type
1	C7	11.11792	1	C1	0.901238	Influenced criteria
2	C5	10.89897	2	C15	0.619547	
3	C17	10.68467	3	C21	0.431738	
4	C18	10.57404	4	C16	0.427023	
5	C3	10.46482	5	C20	0.377841	
6	C4	10.22144	6	C8	0.236163	
7	C20	10.12836	7	C2	0.198019	
8	C13	9.754334	8	C9	0.184657	
9	C9	9.115843	9	C19	0.158869	
10	C12	9.068353	10	C11	0.127606	
11	C6	8.87418	11	C14	0.097354	
12	C10	8.803666	12	C18	-0.03658	Influenced criteria
13	C2	8.639983	13	C7	-0.13186	
14	C15	8.536048	14	C13	-0.15066	
15	C21	8.51138	15	C12	-0.19037	
16	C14	8.384586	16	C10	-0.29001	
17	C1	8.233016	17	C6	-0.2946	
18	C11	8.127632	18	C17	-0.424	
19	C8	8.120866	19	C5	-0.61876	
20	C19	7.756644	20	C3	-0.79677	

Journal of Applied Science and Agriculture, 9(4) April 2014, Pages: 1777-1792

2 1	C16	7.574918	21	C4	-0.82645	

Ninth step: formation of classified final diaphragm depicted:

Diaphragm is a simplified view of the final structure of the system.

Tenth step: final classification based on the following criteria (R+J) and (R-J).

In this section according to given data followed by pervious steps, the following criteria in terms of agility; (R+J) and (R-J) are ranked that finally explained.

5_ conclusion:

The sifting conclusion (fuzzy-decimal):

In response to a question based on the results of the first sub-study, the first stage of the literature review, 26 criteria, with the following main criteria affecting the agility of their software product line technology to number 47 were identified Then, using the screening method (floating-fuzzy) number 8 and number 21 under the original measure criterion with 10 technologies that are more important.

The conclusion of ditmel method:

In order to answer the second and third sub-study, the following conclusions can be pointed out., At this stage, according to data from the implementation of the ditmel method and amount of (R-J), (R+J), (J), (R) Class diagram layout and the corresponding matrix X The desired criteria in the previous chapter based on the relative importance of Experts and the net impact and interact, are priorities that will lead to the following conclusions:

The following 1 sub-criteria: Produce fast:

The following criteria have the greatest impact is on other criteria. Because the resulting value (r) is equal to 493/5 which is a highest value among the twenty-one sub-approaches. The following criteria are equal to the value of R + J 1179/11 shows that most interaction with the other sub criteria. The net effect of severity (the amount of influence) is equal to the amount obtained RJ (13186/0-) is the thirteenth rank And the intensity of the response j be third level is 5.6248. As a result, the following criteria in terms of influence and interact with other sub has won first place and show that it is more importance.

The following 2 sub-criteria: Flexibility in production:

Based on the results of the expert panel, the sub criteria, the sub criteria produces fast among the other criteria of is greatest importance (weight). This sub-criterion is equal to the value of R + J 8989/10 and in the second position and justifies the fact that under the criteria in terms of interaction with other sub in second place. The following criteria is equal to the amount of R 1401/5 after sub criteria applying JIT techniques, operations and new product Applying the technique to design and build robots to help in the design and manufacture of new products in the fourth place, which indicates That the influence of other sub is pretty good.

The following 3 sub-criteria: Updated applying the generated:

This sub r + j in terms of interaction with other sub with the 684/10 and after, sub flexibility to produce the greatest interaction with other sub-criteria and is in third place. R The following criteria severely affected by the 1303/5 and is ranked fifth in terms of intensity j taking effect with the 5543/5 was in fourth place. The net effect of taking the value of (R) and (J) (434/0-) is the eighteenth priority indicates a certain impressionable

The following 4 sub-criteria: Application of JIT techniques in the construction of the new product:

Rate (R + J) of this sub criteria with the 5704/10 and the fourth degree of interaction terms (R) with the 2687/5 which shows that - in terms that strongly influence the arrangement is allocated to other sub second. The severity of the effect of pure plasticity (RJ) is equal to the amount (0365/0-), which is in twelfth place. The (J) The following criterion is equal to 3053/5, which indicates that in sixth place, with regard to interact. The above results indicate that the following generally sub-criteria in terms of the impact on other criteria, interaction and influence is a relatively large influence of the following criteria, as well as with the other

The following 5 sub-criteria: Flexibility in process:

The following criteria, in terms of interaction with other sub-criteria (R + J) with the 4648/10, after sub applying JIT techniques, new products operations located in the fifth place. The severe of the impact (RA)is the sub-criteria with amount of the 834/4, which is located on the fifth position. Rate (J) of this sub interact with the 6307/5 second contract and the net effect (RJ) value (7967/0-) Rank is 20, which indicates a certain impressionable.

Journal of Applied Science and Agriculture, 9(4) April 2014, Pages: 1777-1792

The following 6 sub-criteria: Flexibility in operation:

The following criteria for severity of impact (R) to the other sub-criteria with the 6974/4 following criteria are flexible and multi-skilled individuals are ranked eighth. Interact (J) of this Sub criteria 5239/5, which is located on the fifth position indicates the Sub criteria providers interact is relatively high. The net effect of plasticity (RJ) on the system (8264/0-), located at No. 21, is regarded as a definite influence. Also in terms of interaction with the other sub (R + J) with the 2214/10 is in sixth place.

The following 7 sub-criteria: applying the technique to design and build robots to help in the design and manufacture of a new product:

The following criteria, in terms of interaction with other sub-criteria (R+J) with the 1283/10 in seventh grade, which indicates good interaction with the other criteria. The rate of response of (R) This sub, with the 2531/5 is in third place. Also in terms of the amount of influence (J) with the 8752/4 is the eighth and the net effect of severity (RJ) with the 3778/0 is in fifth place after a sub operation

The following 8 Sub-criteria: Flexible and multi-skilled people:

This Sub criteria matched to interact with other sub (R + J with the 7543/9 was the ranks eighth indicating that is good interaction with the other sub criteria. The rate of response of (R) of the Sub criteria with the 8018/4 and also in terms of the response of (J) with the 9524/4 is ranked seventh in both cases. The rate of response of (R) of the Sub criteria with the 8018/4 and also in terms of the response of (J) with the 9524/4 is ranked seventh in both cases.

The following 9 sub-criteria: Availability of information for staff:

Rate ((R + J the following criteria, with the 1158/9 is a good deal of interaction with the other criteria. This sub severity of impact (R) with the 6502/4 the measure of flexibility in operations located in the ranked ninth. Taking effect (J) of this sub-criterion with the 4655/4 and this is the twelfth degree. The net effect of (RJ) with the 1846/0, which is ranked eighth in this regard, is a good influence

The following 10 sub-criteria: Employing techniques such as building improvements and new product:

The results indicate that the sub-criteria consider the impact of (R) with the 4389/4 ranked thirteenth is located and also the interaction with other sub-criteria (R + J) of 0683/9 at the point of contract that reflects the interaction of medium with other is sub criteria. The net standpoint interact (RJ) with the (1903/0 -) is an absolute inspiration.

The following 11 sub-criteria: Application of fast simulation techniques:

This Sub criteria collaborated view with other sub criteria ((R + J with the 8741/8 ranked eleventh in terms of the Contract, as well as the impact of the Sub criteria (R) with the 2897 quarters are located in fifteenth place. The terms interact (J) with the 5843/4 in terms of The net point and then interact (RJ) with the (2946/0 -), which is ranked seventh ¬ showing that much of the system interact.

The following 12 sub-criteria: Synergistic Design of Integrated Operations:

The results demonstrate that the following criterion in terms of interaction with other sub-criteria (R + J) with the 8.8036 is located in twelfth place. In terms net interact (RJ) with a value of (29/0 -) located in sixteenth place, indicating that interact much. Also the effect of plasticity (J) with the 4.5468 quarters, it has ranked eleventh.

The following 13 sub-criteria: Ability to respond quickly to changes:

The following criteria in terms of severity of impact (R) with the other sub-criteria amount of 419/4, after the fourth rank the standard of education and continuous learning. Thus interact (J) of this Sub criteria with a value of 2209/4 is a thirteenth place. Also, the amount of interaction with the other sub criteria (R + J) with the 6399/8 in thirteenth place that has been Sub criteria represents the average interaction of other sub criteria. In terms of the net effect (RJ) with a value of 198/0 Rated seventh, which represents the criterion of effectiveness is good.

The following 14 sub-criteria: Switch (type operations, machines, workstations that can work):

The influence (R) of the sub with the 5777/4 is the point. Also in terms of interaction with the other sub (R + J) of this sub with the 536/8 in fourteenth place, this represents less interaction with the system. Based on the net impact (RJ) with the 6195/0 in second place after the sub's ability to identify and understand environmental changes, which indicate a definite effect is considered. The sequence interact (J) with the 958/3 is ranked seventeenth.

Journal of Applied Science and Agriculture, 9(4) April 2014, Pages: 1777-1792

The following 15 sub-criteria: Rapid product design:

The sub criteria in terms of interaction with the other sub ((R + J with the 5113/8 ranked fifteenth, which indicates that the interaction small system. Matched the intensity of impact (R) to other sub with the 4715/4 in place of the twelfth degree, after followed criteria to identify environmental changes and understanding the contract. Well in terms of the interact (J) with the 0398/4 ranked fifteenth and matched affect net (RJ) with the 4317/0 after the measure change (variety of operations, machines, workstations who can do the job), the ranking is third.

The following 16 sub-criteria: Continuous learning:

This sub severity of impact (R) with other sub with the 2409/4 is in seventeenth place. The sequence interact (J) of this sub with the 1436/4 is devoted to the fourth rank. Also in terms of interaction with the other sub ((R + J) with the 3845/8) are located 16 degree, which indicates low interaction with the system. Terms of net effect (RJ) with a value of 09735/0 is the lowest of the system interact

The following 17 sub-criteria: The ability to identify and understand environmental changes:

It interacts with other sub-criteria of (R + J) the amount of 233/8 in ranked seventh in terms of influence sub-criteria (R) are located 17 degree. Also in terms of the sub criteria interact (J) with the 6658/3 position twentieth your accounts. It is noteworthy that the net impact of the following criteria (RJ) with the 9012/0 has a definite impact

The following 18 sub-criteria: Greater quality of life of the product:

This sub severity of impact (R) to the other sub-criteria with the 1276/4 to place after sub executes integrated organizational activities under. The sequence interact (J) with the 4 value rank is located. A net term of effectiveness (RJ) The sub with the 1276/0 was the point which represents the sub criteria's low impact. Also in terms of interaction with the other sub (R + J) with the 1276/8 is ranked eighteenth.

The following 19 sub-criteria: Implementation of integrated organizational activities

Results indicate that the following criterion in terms of interaction with the other sub (R + J) with the 1208/8 is ranked eighteenth. Terms of net effect (RJ) with the 2361/0 is rated sixth that reflects the influence on the system. The influence (R) of the sub with the 1785/4 after the standard of teaching and learning is consistently ranked eighteenth. The sequence interact (J) with the 9423/3 located in eighteenth place.

The following 20 sub-criteria: Select customer-focused ideas based on previous studies and reviews of previous customers:

The sub criteria in terms of interaction with the other sub (R + J) with the 7566/7, which shows the sub-twentieth ranked joint operations with minimal interaction system. Also the effect of (R) with the 9577/3 in place of the twenty-first has been and interact (J) with the 7988/3 located in nineteenth place. The net effect (RJ) with the 1846/0 is ranked ninth.

The following 21 sub-criteria: Joint Operation:

The sub of the impact (R) has the value 4 ranked twentieth in terms of the interact (J) with the 5739/3 has the twenty-first place, that is in last place and are least able to interact. As well as many other sub-criteria (R + J) with the 5749/7 is devoted to showing that the last rank - shows the least interaction with the system, and the net effect (RJ) with a value of 427/0 in the fourth there.

The following 3 criteria: updated applying the generated

On the answering of the sub forth question, and also the main research question, according to the results of component norm technology affecting the agility of the product line based on the opinions of experts has compiled the results of the establishment phase of the 10 software technology holds more importance to the following priorities are:

Table 5-3: ranking component norm technology

Component norm technology	Priority
Flexible manufacturing systems (FMS)	1
Group Technology (GT)	2
Design for manufacturing (DFM)	3
Manufacturing resource planning (MRPII)	4
Computer-aided manufacturing (CAM)	5
Computer integrated manufacturing system (GIM)	6
Design for Assembly (DFA)	7
Reverse Engineering (RE)	8
Enterprise Resource Planning (ERP)	9
Computer-Aided Design (CAD)	10

Journal of Applied Science and Agriculture, 9(4) April 2014, Pages: 1777-1792

REFERENCES

Dashchenko, A.I., 2006. Reconfigurable Manufacturing Systems and Transformable Factories. Springer, Netherlands.

Bi, Z., S. Lang, W. Shen, 2007. Reconfigurable manufacturing systems: the state of the art. International Journal of Production Research, 46/4:967-992.

Cunha Pedro, F., G. Maropoulos Paul, 2007. Digital Enterprise Technology: Perspectives and Future Challenges. Springer.

Koren, Y., M. Shpitalni, 2010. Design of reconfigurable manufacturing systems. Journal of Manufacturing Systems, 29: 130-141.

Koren, Y., 2010. The Global Manufacturing Revolution: Product-Process- Business Integration and Reconfigurable Systems. John Wiley & Sons.

Lamotic, F., P. Berrct, J. Philippe, 2005. L "A model for the reconfiguration of manufacturing systems".the 16th IFAC World Congress Proceedings. Prague.

Malhotra, V., T. Raj, A. Arora, 2010. Excellent Techniques of Manufacturing Systems: RMS and FMS. International Journal of Engineering Science and Technology, 2/3: 137-142.

Wiendahl, H.P., H.A. ElMaraghy, P. Nyhuis, M.F. Zäh, H.H. Wiendahl, N. Duffie, M. Brieke, 2007. Changeable Manufacturing-Classification, Design and Operation. CIRP Annals-Manufacturing Technology, 56/2: 783 809.

Dahmardeh, N., S.A. Banihashemi, 2010. Organizatinal Agility and Agile Manufacturing. European Journal of Economics and Administrative Sciences, 27: ISSN 1450-2275.

Gunasekaran, A., 2001. Agile Manufacturing: The 21st Century Competitive Strategy. Elsevier, UK.

Bottani, E., 2009. "A Fuzzy QFD approach to achieve agility" ,international journal of production economics, pp: 76.

Lin, C.T., H. Chiu, Y. Chu po, 2006."agility index in the supply chain",international journal of production economies,100(2): 355-356.

Lin, C.T., H. Chiue, Y.H. Tseng, 2006. "Agility evaluation using fuzzy logic",Int.J.production Economics, 101: 353-368.

Sharifi, H., Z. Zhang, 2000. "A methodology for achiving agility in manufacturing organizations an international", journal of operations and production management, 20(4): 496-512.

Sherehiy, B., Karwowski, L. Waldemar, k. John, 2007. "Areview of enterprise agility: Concepts, framworks,and attributes",international iournal industrial ergonomics, 37: 445-460.

Vazquze, D., A. Bustelo, Fernandez, 2007."agility drivers,enablers and outcomes ",international jurnal of operations and production management, 27(12): 1303-1332.

Proposal for a Generic Model Dedicated to Reconfigurable and Agile Manufacturing, 2013. Systems (RAMS), Imad Chalfouna, Khalid Kouissa,b, Anne-Lise Huyet, Nicolas Bouton, Pascal Ray.