Online supplement to the paper entitled

"The economic lot scheduling problem: A content analysis"

by Fabian G. Beck and Christoph H. Glock

Published in the International Journal of Production Research

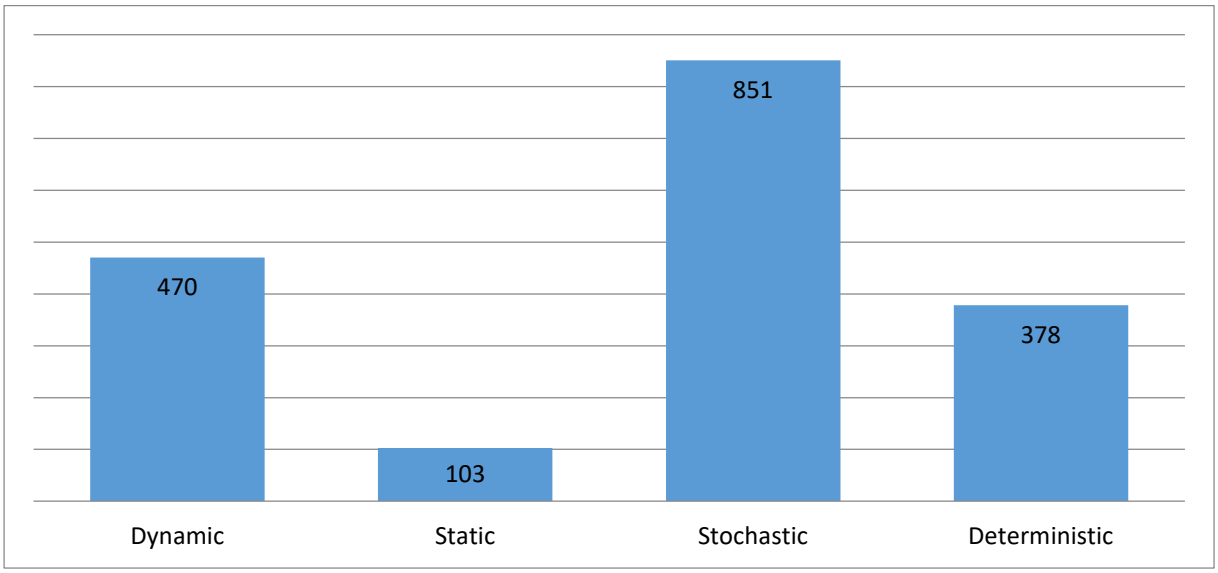

Figure S1: *Subgroups of the group "type of problem" and their number of recording unit hits*

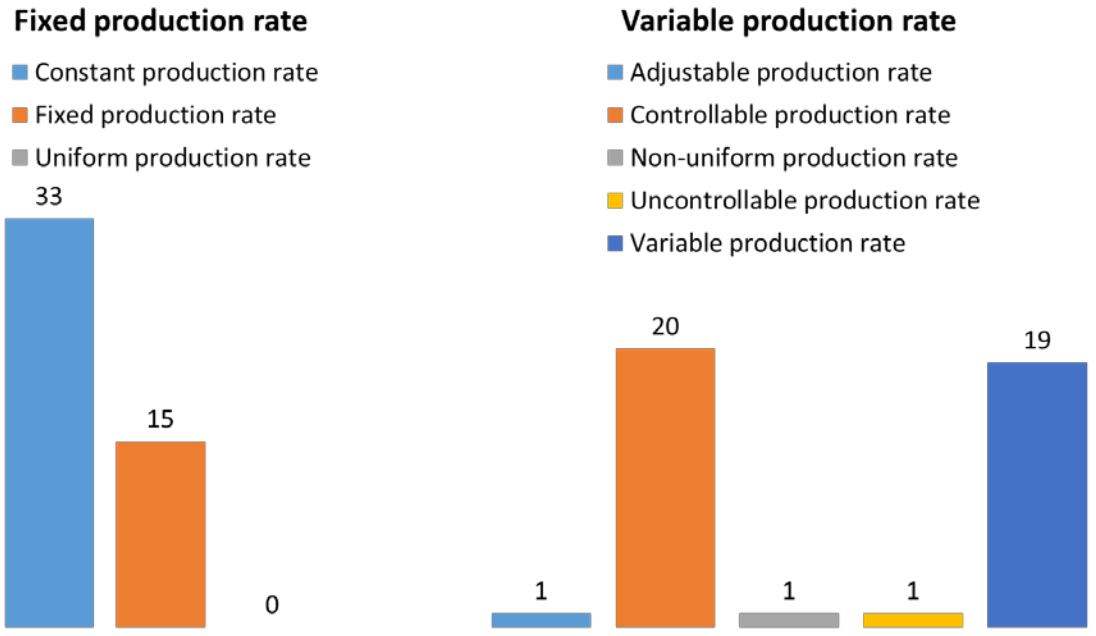

Figure S2: *Number of recording unit hits for different assumptions on the production rates*

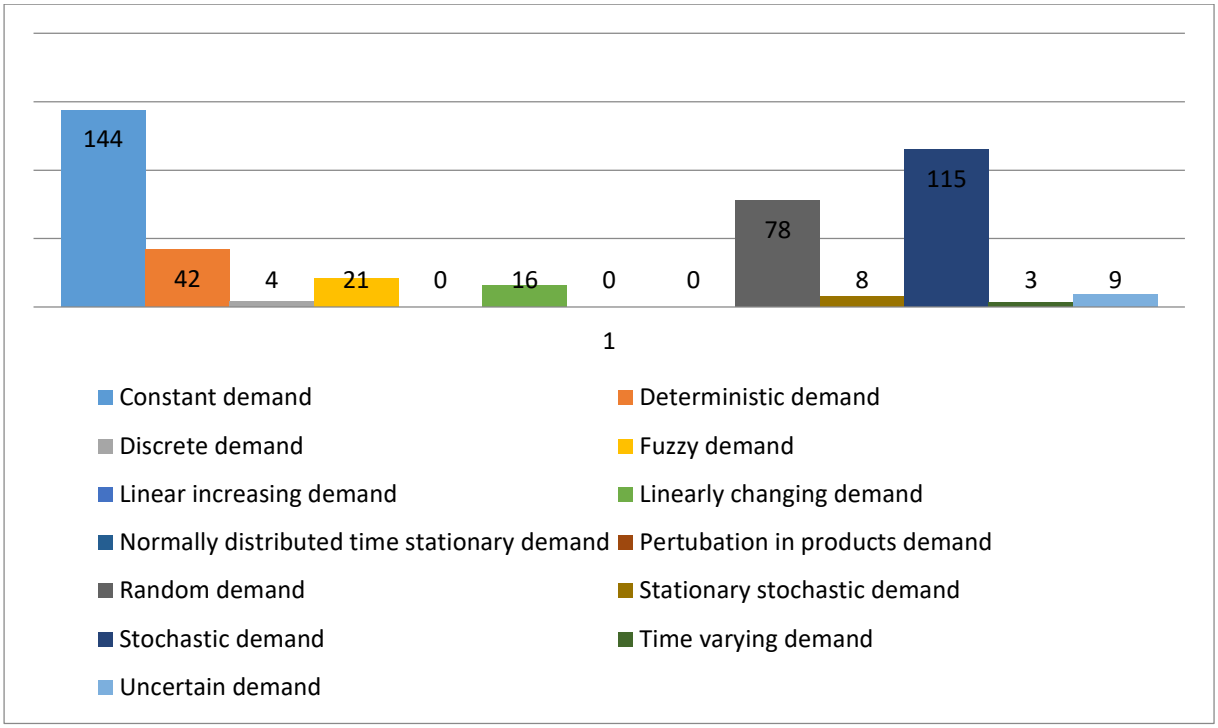

Figure S3: *Number of recording unit hits for different types of demand structures*

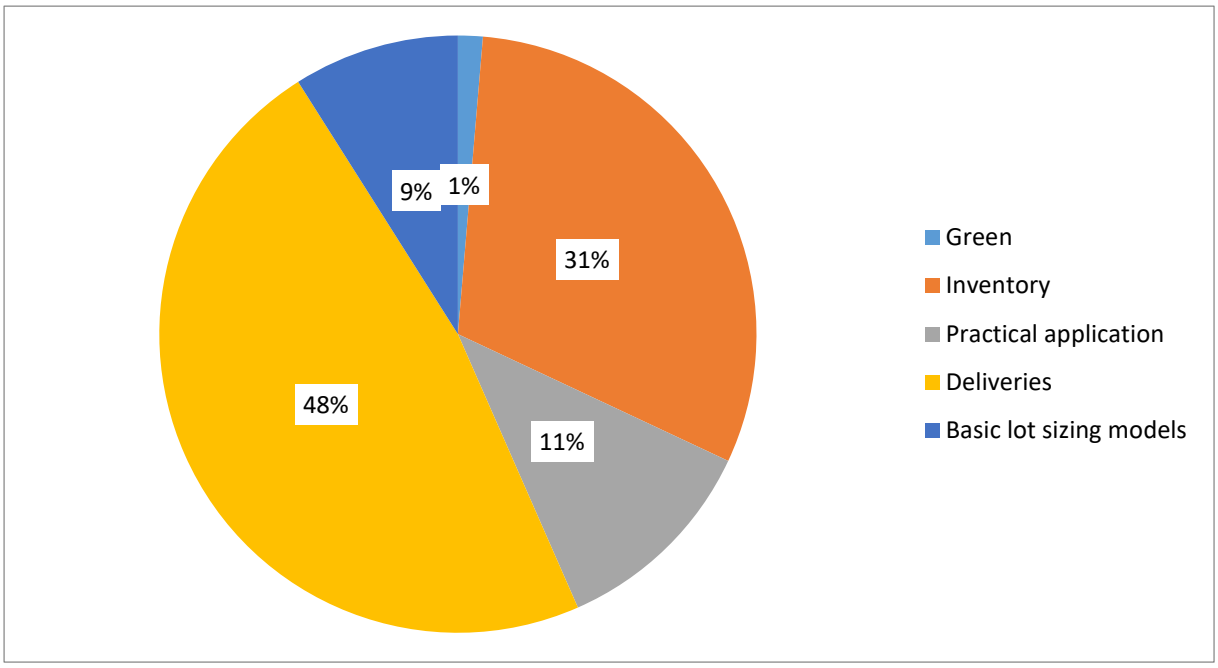

Figure S4: *Subgroups of the group "other topics" and their shares in the recording unit count*

Appendix

Appendix A: Detailed results of the CA

Table A1: *Results of the content analysis*

Group	**Subgroup**	**Terms**	**Recording units**	**Number of hits in the sample**	**Number of papers**	**Hits per paper**
1. Type of problem	Dynamic		dynamic[1]	470	96	4.90
	Static		static	103	43	2.40
	Stochastic		fuzzy	219	10	21.90
			probabilistic	27	13	2.08
			stochastic	605	90	6.72
	Deterministic		deterministic	378	127	2.98
2. Scheduling policy	Common-cycle-approach		common cycle, CC, CCA	1939	174	11.14

[1] The recording unit hits for “dynamic programming” have been subtracted from the recording unit hits for “dynamic”.

	Basic-period-approach	General terms	basic period[2], BP, BPA	1905	143	13.32
			fundamental cycle, fundamental period, FC	391	38	10.29
		Extended-Basic-Period-Approach	extended basic, EBP, EBPA	476	73	6.52
	Time-varying-lot-size-approach		time varying lot, TVLSA, TVLS	407	91	4.47
	No cycle approach		no cycle approach	0	0	0.00
	2^x-policy		power-of-two, POT, POW2	874	85	10.28
3. Solution methodology	Exact methods	General terms	branch and bound, B&B	58	29	2.00
			dynamic programming, DP	312	117	2.67
			enumeration	132	50	2.64
			exact algorithm	12	7	1.71

[2] The recording unit hits for “extended basic” have been subtracted from the recording unit hits for “basic period”.

			exact method	17	8	2.13
			linear programming, LP	410	110	3.73
			marginal analysis	44	17	2.59
			optimum	376	104	3.62
		More detailed	integer linear programming, ILP*	61	24	2.54
			lagrange, lagrangian	121	42	2.88
			mixed integer linear programming, MILP*	130	23	5.65
	Heuristic methods	General terms	dispatch rule, dispatching rule	2	2	1.00
			heuristic[3]	3701	212	17.46
			priority rule	55	10	5.50
		Specific heuristics	g-group heuristic*	19	15	1.27
			Johnson's algorithm	2	1	2.00
			mixed integer nonlinear programming, MINLP*	133	17	7.82

[3] The recording unit hits for "meta-heuristic" have been subtracted from the recording unit hits for "heuristic".

			pt heuristic*	18	7	2.57
			two-group heuristic*	20	11	1.82
	Meta-heuristic methods	General terms	evolutionary algorithm, evolution, EA	235	63	3.73
			greedy algorithm	71	25	2.84
			local search	151	35	4.31
			meta-heuristic	87	30	2.90
			neighborhood	169	40	4.23
		Specific meta-heuristics	artificial bee colony algorithm, ABC	266	9	29.56
			simulated annealing, SA	453	45	10.07
			ant colony algorithm, ACO, ACA	59	14	4.21
			binary search	61	6	10.17
			cuckoo search, CS	166	17	9.76
			genetic algorithm, GA	1564	79	19.80
			golden section search, GSS	71	9	7.89

			hybrid genetic algorithm, HGA*	387	40	9.68
			iterated local search, ILS*	104	5	20.80
			memetic algorithm	15	8	1.88
			partical swarm optimization, PSO	185	8	23.13
			tabu search, taboo, TS	491	72	6.82
	Artificial intelligence		artificial intelligence	3	3	1.00
			artificial neural network	4	4	1.00
	Simulation		simulation	372	67	5.55
4. Specific assumptions	Planning horizon		finite horizon[4]	89	33	2.70
			fixed horizon	1	1	1.00
			infinite horizon	76	44	1.73
	Production rate	General term	production rate	1250	209	5.98
		More detailed	adjustable production rate*	1	1	1.00

[4] The recording unit hits for “infinite horizon” have been subtracted from the recording unit hits for “finite horizon”.

			bottleneck	55	20	2.75
			constant production rate*	33	28	1.18
			controllable production rate[5]*	20	10	2.00
			fixed production rate*	15	7	2.14
			learning	131	28	4.68
			non-uniform production rate*	1	1	1.00
			uncontrollable production rate*	1	1	1.00
			uniform production rate[6]*	0	0	0.00
			variable production rate*	19	12	1.58
	Setup	General terms	setup[7]	4765	238	20.02
			changeover[8]	308	49	6.29
		More detailed	setup time*	1823	218	8.36

[5] The recording unit hits for “uncontrollable production rate” have been subtracted from the recording unit hits for “controllable production rate”.
[6] The recording unit hits for “non-uniform production rate” have been subtracted from the recording unit hits for “uniform production rate”.
[7] The recording unit hits for “setup cost” have been subtracted from the recording unit hits for “setup” since they belong to the group “scheduling objectives”.
[8] The recording unit hits for “changeover cost” have been subtracted from the recording unit hits for “changeover” since they belong to the group “scheduling objectives”.

			changeover time*	46	18	2.56
			family, families	701	58	12.09
			group technology	54	15	3.60
	Demand	General term	demand rate	835	204	4.09
		More detailed	constant demand	144	84	1.71
			deterministic demand	42	33	1.27
			discrete demand	4	3	1.33
			fuzzy demand	21	5	4.20
			linear increasing demand	0	0	0.00
			linearly changing demand	16	2	8.00
			normally distributed time stationary demand	0	0	0.00
			perturbation in products demand	0	0	0.00
			random demand	78	37	2.11
			stationary stochastic demand*	8	7	1.14

			stochastic demand	115	38	3.03
			time varying demand	3	2	1.50
			uncertain demand	9	8	1.13
	Number of products		two-product, two-item	466	122	3.82
			three-product, three-item	138	66	2.09
			multi-item, multi-product, n-item, n-product	908	193	4.70
	Shortages	General terms	runout	134	16	8.38
			shortage	420	99	4.24
			stock out	312	65	4.80
		More detailed	backlog	264	65	4.06
			backorder	662	101	6.55
			lost order, order lost	0	0	0.00
			lost sale	192	34	5.65
	Zero switch rule		zero switch, ZSR, zero inventory	184	58	3.17

	Sequence-dependency		sequence dependent, sequence dependency	342	76	4.50
	Product problems		coproduction	281	3	93.67
			defective item	82	13	6.31
			deterioration, deteriorating item	248	25	9.92
			failure rate	8	6	1.33
			imperfect quality	43	15	2.87
			non-conforming item	33	8	4.13
			remanufacturing	284	14	20.29
			reorder	133	34	3.91
			reproduction	63	22	2.86
			restoration	64	10	6.40
			rework	460	28	16.43
			shelf life	276	24	11.50

	Machine problems		breakdown	80	14	5.71
			disruption	112	17	6.59
			in control	54	16	3.38
			inspection	299	23	13.00
			machine availability	4	3	1.33
			machine reliability	0	0	0.00
			maintenance	93	35	2.66
			out of control	72	15	4.80
			performance decay	47	3	31.33
			process restoration	11	6	1.83
			repair	176	23	7.65
			stability	57	17	3.35
			unreliable machine	0	0	0.00

5. Flow pattern	Single-machine		single-machine, one facility, one machine, single facility, 1 machine, 1 facility, single stage	1101	210	5.24
	Multi-machine	General terms	multi-facility, multi-machine, multi-factory, n-machine, n-facilities, m-machine, m-facilities, two-stage, multi-stage	381	93	4.10
			flow shop	268	37	7.24
			job shop	142	31	4.58
			open shop	19	5	3.80
		Parallel machines	identical machine[9]	43	23	1.87
			non-identical machine	5	4	1.25
			parallel machine	146	26	5.62
			unrelated machine	3	3	1.00
			unrelated parallel machine*	34	7	4.86
	Schedule		cyclic schedule[10]	384	98	3.92

[9] The recording unit hits for “non-identical machine” have been subtracted from the recording unit hits for “identical machine”.
[10] The recording unit hits for “no cyclic schedule” have been subtracted from the recording unit hits for “cyclic schedule”.

			no cyclic schedule	4	4	1.00
			repetitive schedule	15	10	1.50
			rotation schedule	85	17	5.00
6. Structural properties of the ELSP	Feasibility	General term	feasibility	1219	186	6.55
		More detailed	capacity feasibility*	11	7	1.57
			schedule feasibility*	406	116	3.50
	Complexity		complexity	189	107	1.77
			np-complete	41	25	1.64
			np-hard	247	116	2.13
			polynomial	95	42	2.26
	Bounds		lower bound, LB	1836	165	11.13
			upper bound, UB	666	115	5.79
			independent solution	148	53	2.79
	Theory		theorem	330	52	6.35

			lemma	299	40	7.48
			corollary	68	23	2.96
7. Scheduling objectives	Cost		changeover cost	44	16	2.75
			energy cost	31	3	10.33
			holding cost	1451	225	6.45
			inventory cost	300	98	3.06
			order cost	167	44	3.80
			production cost	225	61	3.69
			setup cost	1882	233	8.08
			total cost	1220	190	6.42
			transportation cost	136	30	4.53
	Workload		work in process, work in progress, WIP	241	38	6.34
			workload	163	15	10.87
	Profit		profit	216	31	6.97

	Inventory		amount of inventory	11	10	1.10
	Makespan		completion time	92	32	2.88
			flow time	53	12	4.42
			makespan	91	16	5.69
			shortest processing time, SPT	62	10	6.20
8. Extended coverage	ELSP and its extensions		economic lot scheduling problem with returns, ELSPR*	172	9	19.11
			economic lot scheduling problem with reworks*	0	0	0.00
			flow shop ELSP, FS-ELSP*	67	5	13.40
			group technology-economic lot scheduling problem, GT-ELSP*	71	9	7.89
			capacitated lot sizing problem, CLSP	153	22	6.95
			discrete lotsizing and scheduling problem, DLSP	8	3	2.67
			economic lot and delivery scheduling problem, ELDSP	244	27	9.04

			economic lot scheduling and delivering problem, ELSDP	3	1	3.00
			economic lot and inspection scheduling problem, ELISP	47	2	23.50
			economic lot and supply scheduling problem, ELSSP	102	5	20.40
			economic lot scheduling problem, ELSP	4702	221	21.28
			general lotsizing and scheduling problem, GLSP	7	2	3.50
			proportional lotsizing and scheduling problem, PLSP	3	2	1.50
			stochastic economic lot scheduling problem, SELSP*	308	26	11.85
9. Other topics	Green		emission	8	2	4.00
			green	14	8	1.75
			sustainable, sustainability	3	2	1.50
			waste, wastage	40	25	1.60

	Inventory		base-stock	328	19	17.26
			buffer	108	33	3.27
			intermediate storage*	1	1	1.00
			make-to-order, MTO	183	19	9.63
			make-to-stock, MTS	151	19	7.95
			order up to level	51	11	4.64
			procurement	76	27	2.81
			safety-stock	426	40	10.65
			storage	163	44	3.70
	Practical application		chemical	105	36	2.92
			fashion	41	31	1.32
			food	256	38	6.74
			pharmaceutical	43	11	3.91
			plastic	44	30	1.47

			stamping	66	26	2.54
	Deliveries		batch size	304	64	4.75
			delivery	897	71	12.63
			equal-lot[11], ELS	95	37	2.57
			lead time	179	37	4.84
			lot-for-lot	8	4	2.00
			resource constraint	16	13	1.23
			routing	109	21	5.19
			shipment	425	33	12.88
			shipping	160	22	7.27
			unequal-lot	4	4	1.00
			vehicle	113	16	7.06
			economic order quantity, EOQ	196	72	2.72

[11] The recording unit hits for “unequal-lot” have been subtracted from the recording unit hits for “equal-lot”.

	Basic lot sizing models		economic production quantity, EPQ	168	41	4.10
			economic manufacture quantity, EMQ	72	12	6.00

Appendix B: Final sample

Aardal, K., Larsson, T., 1990. A benders decomposition based heuristic for the hierarchical production planning problem. European Journal of Operational Research, 45(1), 4-14.

Adelman, D., Barz, C., 2014a. A price-directed heuristic for the economic lot scheduling problem. IIE Transactions, 46(12), 1343-1356.

Adelman, D., Barz, C., 2014b. A unifying approximate dynamic programming model for the economic lot scheduling problem. Mathematics of Operations Research, 39(2), 374-402.

Adhisatya, F.Y., Ai, T.J., Gong, D.C., 2015. Economic lot scheduling problem with two imperfect key modules. Procedia Manufacturing, 4, 30-37.

Adil, S.H., Azhar Ali, S.S., Hussaan, A., Raza, K., 2013a. Solution of economic lot scheduling problem: a hybrid meta-heuristic approach. Life Science Journal, 10(3), 303-309.

Adil, S.H., Azhar Ali, S.S., Hussaan, A., Raza, K., 2013b. Hybridization of multiple intelligent schemes to solve economic lot scheduling problem using basic period approach. Life Science Journal, 10(2), 2992-3005.

Akrami, B., Karimi, B., Moattar Hosseini, S.M., 2006. Two metaheuristic methods for the common cycle economic lot sizing and scheduling in flexible flow shops with limited intermediate buffers: the finite horizon case. Applied Mathematics and Computation, 183(1), 634-645.

Alle, A., Pinto, J.M., Papageorgiou, L.G., 2004. The economic lot scheduling problem under performance decay. Industrial and Engineering Chemistry Research, 43(20), 6463-6475.

Allen, S.J., 1990. Production rate planning for two products sharing a single process facility: a real-world case study. Production & Inventory Management Journal, 31(3), 24-29.

Anderson, E.J., 1990. Testing feasibility in a lot scheduling problem. Operations Research, 38(6), 1079-1088.

Axsäter, S., 1982. Alternative dynamic programming approaches to obtain upper bounds for the economic lot scheduling problem. Engineering Costs & Production Economics, 6(1-4), 17-23.

Axsäter, S., 1984. Lower bounds for the economic lot scheduling problem using aggregation. European Journal of Operational Research, 17(2), 201-206.

Axsäter, S., 1987. An extension of the extended basic period approach for economic lot scheduling problems. Journal of Optimization Theory and Applications, 52(2), 179-189.

Bae, H., Moon, I., Yun, W., 2014. Economic lot and supply scheduling problem: a time-varying lot sizes approach. International Journal of Production Research, 52(8), 2422-2435.

Bae, H., Moon, I., Yun, W., 2016. A time-varying lot sizes approach for the economic lot scheduling problem with returns. International Journal of Production Research, 54(11), 3380-3396.

Banerjee, A., 2009. Simultaneous determination of multiproduct batch and full truckload shipment schedules. International Journal of Production Economics, 118(1), 111-117.

Banerjee, A., Pyreddy, V.R., Kim, S.L., 1996. Investment policy for multiple product setup reduction under budgetary and capacity constraints. International Journal of Production Economics, 45(1-3), 321-327.

Beck, F.G., Biel, K., Glock, C.H., 2019. Integration of energy aspects into the economic lot scheduling problem. International Journal of Production Economics, 209, 399-410.

Beck, F.G., Glock, C.H., 2016. The impact of batch shipments on the economic lot scheduling problem. Computers & Industrial Engineering, 96, 126-139.

Ben-Daya, M., Hariga, M., 2000. Economic lot scheduling problem with imperfect production processes. Journal of the Operational Research Society, 51(7), 875-881.

Boctor, F.F., 1988. A more efficient formulation of the single machine, static demand, lot scheduling problem. Engineering Costs and Production Economics, 14(1), 3-10.

Boctor, F.F., Poulin, P., 2005. Heuristics for the N-product, M-stage, economic lot sizing and scheduling problem with dynamic demand. International Journal of Production Research, 43(13), 2809-2828.

Bollapragada, R., Croce, F.D., Ghirardi, M., 2011. Discrete-time, economic lot scheduling problem on multiple, non-identical production lines. European Journal of Operational Research, 215(1), 89-96.

Bollapragada, R., Rao, U., 1999. Single-stage resource allocation and economic lot scheduling on multiple, nonidentical production lines. Management Science, 45(6), 889-904.

Bourland, K.E., Carl, L.K., 1994. Parallel-machine scheduling with fractional operator requirements. IIE Transactions, 26(5), 56-65.

Bourland, K.E., Yano, C.A., 1994. The strategic use of capacity slack in the economic lot scheduling problem with random demand. Management Science, 40(12), 1690-1704.

Bourland, K.E., Yano, C.A., 1997. A comparison of solution approaches for the fixed-sequence economic lot scheduling problem. IIE Transactions, 29(2), 103-108.

Brander, P., Forsberg, R., 2006. Determination of safety stocks for cyclic schedules with stochastic demands. International Journal of Production Economics, 104(2), 271-295.

Brander, P., Levén, E., Segerstedt, A., 2005. Lot sizes in a capacity constrained facility - a simulation study of stationary stochastic demand. International Journal of Production Economics, 93-94(SPEC.ISS.), 375-386.

Brander, P., Segerstedt, A., 2009. Economic lot scheduling problems incorporating a cost of using the production facility. International Journal of Production Research, 47(13), 3611-3624.

Bulut, O., Tasgetiren, M.F., 2014. An artificial bee colony algorithm for the economic lot scheduling problem. International Journal of Production Research, 52(4), 1150-1170.

Cárdenas-Barrón, L.E., 2012. A note on models for a family of products with shelf life, and production and shortage costs in emerging markets. International Journal of Industrial Engineering Computations, 3(2), 277-280.

Carreno, J.J., 1990. Economic lot scheduling for multiple products on parallel identical processors. Management Science, 36(3), 348-358.

Casas-Liza, J., Pinto, J.M., Papageorgiou, L.G., 2005. Mixed integer optimization for cyclic scheduling of multiproduct plants under exponential performance decay. Chemical Engineering Research and Design, 83(10 A), 1208-1217.

Chaieb Memmi, I., Hammani Laaroussi, S., 2013. A new approach for solving capacitated lot sizing and scheduling problem with sequence and period-dependent setup costs. Journal of Industrial Engineering and Management, 6(4), 1027-1054.

Chan, H.K., Chung, S.H., Chan, T.M., 2012. Combining genetic approach and integer programming to solve multi-facility economic lot-scheduling problem. Journal of Intelligent Manufacturing, 23(6), 2397-2405.

Chandrasekaran, C., Rajendran, C., Chetty, O.V.K., Hanumanna, D., 2009. A two-phase metaheuristic approach for solving Economic Lot Scheduling Problems. International Journal of Operational Research, 4(3), 296-322.

Chandrasekaran, C., Rajendran, C., Chetty, O.V.K., Hanumanna, D., 2007. Metaheuristics for solving economic lot scheduling problems (ELSP) using time-varying lot-sizes approach. European Journal of Industrial Engineering, 1(2), 152-181.

Chang, P.T., Yao, M.J., Huang, S.F., Chen, C.T., 2006. A genetic algorithm for solving a fuzzy economic lot-size scheduling problem. International Journal of Production Economics, 102(2), 265-288.

Chang, Y.J., Yao, M.J., 2009. A genetic algorithm for solving the economic lot scheduling problem with reworks. Journal of the Chinese Institute of Industrial Engineers, 26(5), 411-425.

Chang, Y.J., Yao, M.J., 2010. Solving the economic lot scheduling problem with multiple facilities in parallel using the time-varying lot sizes approach. Journal of Information & Optimization Sciences, 31(4), 809-835.

Chang, Y.J., Yao, M.J., 2011. New heuristics for solving the economic lot scheduling problem with reworks. Journal of Industrial and Management Optimization, 7(1), 229-251.

Chatfield, D.C., 2007. The economic lot scheduling problem: a pure genetic search approach. Computers & Operations Research, 34(10), 2865-2881.

Cheng, F., Yan, H., Yang, J., 1998. Production scheduling of continuous flow lines: multiple products with setup times and costs. Production and Operations Management, 7(4), 387-400.

Chung, S.H., Chan, H.K., 2012. A two-level genetic algorithm to determine production frequencies for economic lot scheduling problem. IEEE Transactions on Industrial Electronics, 59(1), 611-619.

Clausen, J., Ju, S., 2006. A hybrid algorithm for solving the economic lot and delivery scheduling problem in the common cycle case. European Journal of Operational Research, 175(2), 1141-1150.

Co, H.C., Sharafali, M., Goh, M., 2001. Scheduling part-families under FMS: To mix or not to mix? International Transactions in Operational Research, 8(2), 139-153.

Cooke, D.L., Rohleder, T.R., 2006. Inventory evaluation and product slate management in large-scale continuous process industries. Journal of Operations Management, 24(3), 235-249.

Cooke, D.L., Rohleder, T.R., Silver, E.A., 2004. Finding effective schedules for the economic lot scheduling problem: a simple mixed integer programming approach. International Journal of Production Research, 42(1), 21-36.

Cunha Neto, E., Ferreira Filho, V.J.M., Arruda, E.F., 2015. Stochastic economic lot sizing and scheduling problem with pitch interval, reorder points and flexible sequence. International Journal of Production Research, 53(19), 5948-5961.

Davis, S.G., 1990. Scheduling economic lot size production runs. Management Science, 36(8), 985-998.

Davis, S.G., 1995. An improved algorithm for solving the economic lot size problem (ELSP). International Journal of Production Research, 33(4), 1007-1026.

Ditt, S., Kuhn, H., 1997. An improved algorithm for solving the economic lot size problem (ELSP): A note. International Journal of Production Research, 35(6), 1785-1787.

Dobson, G., 1987. The economic lot-scheduling problem: Achieving feasibility using time-varying lot sizes. Operations Research, 35(5), 764-771.

Dousthaghi, S., Tavakkoli-Moghaddam, R., 2012. An economic lot and delivery scheduling problem with the fuzzy shelf life in a flexible job shop with unrelated parallel machines. International Journal of Industrial Engineering Computations, 3(4), 663-680.

Dousthaghi, S., Tavakkoli-Moghaddam, R., Makui, A., 2013. Solving the economic lot and delivery scheduling problem in a flexible job shop with unrelated parallel machines and a shelf life by a proposed hybrid PSO. International Journal of Advanced Manufacturing Technology, 68(5-8), 1401-1416.

El-Najdawi, M.K., 1992. A compact heuristic for common cycle lot-size scheduling in multi-stage, multi-product production processes. International Journal of Production Economics, 27(1), 29-41.

El-Najdawi, M.K., 1995. An experimental evaluation of single-stage lot-size scheduling heuristics in a multi-stage, multi-product production environment. Journal of Business Logistics, 16(2), 175-195.

Elhafsi, M., Bai, S.X., 1997. The common cycle economic lot scheduling problem with backorders: Benefits of controllable production rates. Journal of Global Optimization, 10(3), 283-303.

Eynan, A., 2003. The benefits of flexible production rates in the economic lot scheduling problem. IIE Transactions (Institute of Industrial Engineers), 35(11), 1057-1064.

Faaland, B.H., Schmitt, T.G., Arreola-Risa, A., 2004. Economic lot scheduling with lost sales and setup times. IIE Transactions, 36(7), 629-640.

Federgruen, A., Katalan, Z., 1996. The stochastic economic lot scheduling problem: Cyclical base-stock policies with idle times. Management Science, 42(6), 783-796.

Federgruen, A., Katalan, Z., 1998. Determining production schedules under base-stock policies in single facility multi-item production systems. Operations Research, 46(6), 883-898.

Federgruen, A., Katalan, Z., 1999. The impact of adding a make-to-order item to a make-to-stock production system. Management Science, 45(7), 980-994.

Fitz-Gerald, J.M., Billington, E.J., 1981. Manufacturing sequences for the economic lot scheduling problem. Bulletin of the Australian Mathematical Society, 24(3), 405-431.

Fransoo, J.C., Sridharan, V., Bertrand, J.W.M., 1995. A hierarchical approach for capacity coordination in multiple products single-machine production systems with stationary stochastic demands. European Journal of Operational Research, 86(1), 57-72.

Fujita, S., 1978. The application of marginal analysis to the economic lot scheduling problem. AIIE Transactions, 10(4), 354-361.

Gallego, G., 1990a. An extension to the class of easy economic lot scheduling problems. IIE Transactions (Institute of Industrial Engineers), 22(2), 189-190.

Gallego, G., 1990b. Scheduling the production of several items with random demands in a single facility. Management Science, 36(12), 1579-1592.

Gallego, G., 1993. Reduced production rates in the economic lot scheduling problem. International Journal of Production Research, 31(5), 1035-1046.

Gallego, G., 1994. When is a base stock policy optimal in recovering disrupted cyclic schedules? Naval Research Logistics (NRL), 41(3), 317-333.

Gallego, G., Joneja, D., 1994. Economic lot scheduling problem with raw material considerations. Operations Research, 42(1), 92-101.

Gallego, G., Moon, I., 1992. The effect of externalizing setups in the economic lot scheduling problem. Operations Research, 40(3), 614-619.

Gallego, G., Moon, I., 1995. Strategic investment to reduce setup times in the economic lot scheduling problem. Naval Research Logistics (NRL), 42(5), 773-790.

Gallego, G., Roundy, R., 1992. The economic lot scheduling problem with finite backorder costs. Naval Research Logistics (NRL), 39(5), 729-739.

Gallego, G., Shaw, D.X., 1997. Complexity of the ELSP with general cyclic schedules. IIE Transactions, 29(2), 109-113.

Galvin, T.M., 1987a. Economic lot scheduling problem with sequence-dependent setup costs. Production & Inventory Management, 28(1), 96-105.

Galvin, T.M., 1987b. Simulating the economic lot scheduling problem: part I. model description. Production & Inventory Management Journal, 28(4), 32-38.

Galvin, T.M., 1988. Simulating the economic lot scheduling problem: part II. experimental results. Production & Inventory Management Journal, 29(1), 11-15.

Galvin, T.M., 1989. Increasing production efficiency through restricted sourcing and sequence-dependent setup costs. Production and Inventory Management Journal, 30(1), 58-62.

Garn, W., Aitken, J., 2015. Agile factorial production for a single manufacturing line with multiple products. European Journal of Operational Research, 245(3), 754-766.

Geng, P.C., Vickson, R.G., 1988. Two heuristics for the economic lot scheduling problem: an experimental study. Naval Research Logistics (NRL), 35(4), 605-617.

Ghirardi, M., Amerio, A., 2019. Matheuristics for the lot sizing problem with back-ordering, setup carry-overs, and non-identical machines. Computers & Industrial Engineering, 127, 822-831.

Gim, B., Han, M.H., 1997. Economic scheduling of products with N components on a single machine. European Journal of Operational Research, 96(3), 570-577.

Giri, B.C., Moon, I., 2004a. Note on an economic lot scheduling problem under budgetary and capacity constraints. International Journal of Production Economics, 91(3), 229-234.

Giri, B.C., Moon, I., 2004b. Accounting for idle capacity cost in the scheduling of economic lot sizes. International Journal of Production Research, 42(4), 677-691.

Giri, B.C., Moon, I., Yun, W.Y., 2003. Scheduling Economic Lot Sizes in Deteriorating Production Systems. Naval Research Logistics, 50(6), 650-661.

Glass, C.A., 1992. Feasibility of scheduling lot sizes of three products on one machine. Management Science, 38(10), 1482-1494.

Glass, C.A., 1994. Feasibility of scheduling lot sizes of two frequencies on one machine. European Journal of Operational Research, 75(2), 354-364.

Goli, A., Davoodi, S.M.R., 2018. Coordination policy for production and delivery scheduling in the closed loop supply chain. Production Engineering, 12(5), 621-631.

Goncalves, J.F., Leachman, R.C., 1998. A hybrid heuristic and linear programming approach to multi-product machine scheduling. European Journal of Operational Research, 110(3), 548-563.

Goncalves, J.F., Leachman, R.C., Gascon, A., Xiong, Z.K., 1994. Heuristic scheduling policy for multi-item, multi-machine production systems with time-varying, stochastic demands. Management Science, 40(11), 1455-1468.

Goncalves, J.F., Sousa, P.S.A., 2011. A genetic algorithm for lot sizing and scheduling under capacity constraints and allowing backorders. International Journal of Production Research, 49(9), 2683-2703.

Goyal, S.K., Deshmukh, S.G., 1997. Integrated procurement- production system in a just-in-time environment-modelling and analysis. Production Planning and Control, 8(1), 31-36.

Graves, S.C., 1979. On the deterministic demand multi-product single-machine lot scheduling problem. Management Science, 25(3), 276-280.

Grznar, J., Riggle, C., 1997. An optimal algorithm for the basic period approach to the economic lot scheduling problem. Omega, 25(3), 355-364.

Gupta, D., 1992. On the economic lot scheduling problem with backlogging: The common cycle approach. Operations Research Letters, 12(2), 101-109.

Haessler, R.W., 1979. An improved extended basic period procedure for solving the economic lot scheduling problem. AIIE Transactions, 11(4), 336-340.

Hahm, J., Yano, C.A., 1995a. Economic lot and delivery scheduling problem: powers of two policies. Transportation Science, 29(3), 222-241.

Hahm, J., Yano, C.A., 1995b. The economic lot and delivery scheduling problem: models for nested schedules. IIE Transactions (Institute of Industrial Engineers), 27(2), 126-139.

Hahm, J., Yano, C.A., 1995c. The economic lot and delivery scheduling problem: the common cycle case. IIE Transactions (Institute of Industrial Engineers), 27(2), 113-125.

Haji, R., Mansuri, M., 1995. Optimum common cycle for scheduling a single-machine multiproduct system with a budgetary constraint. Production Planning and Control, 6(2), 151-156.

Haksoz, C., Pinedo, M., 2011. Economic lot scheduling with resources in parallel. International Journal of Production Research, 49(9), 2625-2641.

Hanson, B.B., Hodgson, T.J., Kay, M.G., King, R.E., Thoney-Barletta, K.A., 2015. On the economic lot scheduling problem: stock-out prevention and system feasibility. International Journal of Production Research, 53(16), 4903-4916.

Hennet, J.C., 2001. A common cycle approach to lot-scheduling in multistage manufacturing systems. Production Planning & Control, 12(4), 362-371.

Ho, W.T., Tseng, Y.C., Hsiao, Y.C., 2015. The economic lot-size scheduling problem with equally sized batch shipment policy and stochastic demands. European Journal of Industrial Engineering, 9(2), 195-221.

Hockstra, D.J., 1997. Simple policies in the economic lot scheduling problem with zero setup costs. Production Planning & Control, 8(1), 25-30.

Holmbom, M., Segerstedt, A., van der Sluis, E., 2013. A solution procedure for economic lot scheduling problems even in high utilisation facilities. International Journal of Production Research, 51(12), 3765-3777.

Hoque, M.A., Kingsman, B.G., 2006. Synchronization in common cycle lot size scheduling for a multi-product serial supply chain. International Journal of Production Economics, 103(1), 316-331.

Horng, S.C., 2015. Combining artificial bee colony with ordinal optimization for stochastic economic lot scheduling problem. IEEE Transactions on Systems, Man & Cybernetics. Systems, 45(3), 373-384.

Hsu, W.L., 1983. On the general feasibility test of scheduling lot sizes for several products on one machine. Management Science, 29(1), 93-105.

Huang, J.Y., Yao, M.J., 2006. An improved heuristic for solving the economic lot scheduling problem in flow shops under power-of-two policy. Journal of the Chinese Institute of Industrial Engineers, 23(2), 127-140.

Huang, J.Y., Yao, M.J., 2007. A new algorithm for determining production schedules when solving the multi-product economic lot sizing problem in flow shops. International Journal of Advanced Manufacturing Technology, 33(5-6), 560-578.

Huang, J.Y., Yao, M.J., 2008. A genetic algorithm for solving the economic lot scheduling problem in flow shops. International Journal of Production Research, 46(14), 3737-3761.

Huang, J.Y., Yao, M.J., 2013. On the optimal lot-sizing and scheduling problem in serial-type supply chain system using a time-varying lot-sizing policy. International Journal of Production Research, 51(3), 735-750.

Hwang, H., Moon, D.H., 1991. A production inventory model for producing two-products at a single facility with deteriorating raw materials. Computers & Industrial Engineering, 20(1), 141-147.

Inman, R.R., Jones, P.C., 1993. Decomposition for scheduling flexible manufacturing systems. Operations Research, 41(3), 608-617.

Inman, R.R., Jones, P.C., Gallego, G.M., 1991. Economic lot scheduling of fully loaded processes with external setups. Naval Research Logistics (NRL), 38(5), 699-713.

Jenabi, M., Fatemi Ghomi, S.M.T., Torabi, S.A., Karimi, B., 2007. Two hybrid meta-heuristics for the finite horizon ELSP in flexible flow lines with unrelated parallel machines. Applied Mathematics and Computation, 186(1), 230-245.

Jenabi, M., Fatemi Ghomi, S.M.T., Torabi, S.A., 2008. Finite horizon economic lot and delivery scheduling problem: flexible flow lines with unrelated parallel machines and sequence dependent setups. International Journal of Engineering, Transactions A: Basics, 21(2), 143-158.

Jensen, M.T., Khouja, M., 2004. An optimal polynomial time algorithm for the common cycle economic lot and delivery scheduling problem. European Journal of Operational Research, 156(2), 305-311.

Jodlbauer, H., 2006. An approach for integrated scheduling and lot-sizing. European Journal of Operational Research, 172(2), 386-400.

Jones, P.C., Inman, R.R., 1989. When is the economic lot scheduling problem easy? IIE Transactions (Institute of Industrial Engineers), 21(1), 11-20.

Kamath B,N., Bhattacharya, S., 2007. Lead time minimization of a multi-product, single-processor system: a comparison of cyclic policies. International Journal of Production Economics, 106(1), 28-40.

Karalli, S.M., Flowers, A.D., 2006. The multiple-family ELSP with safety stocks. Operations Research, 54(3), 523-531.

Kayvanfar, V., Zandieh, M., 2012. The economic lot scheduling problem with deteriorating items and shortage: an imperialist competitive algorithm. International Journal of Advanced Manufacturing Technology, 62(5-8), 759-773.

Kelle, P., Clendenen, G., Dardeau, P., 1994. Economic lot scheduling heuristic for random demands. International Journal of Production Economics, 35(1-3), 337-342.

Khouja, M., 1997. The scheduling of economic lot sizes on volume flexible production systems. International Journal of Production Economics, 48(1), 73-86.

Khouja, M., 1999. A note on deliberately slowing down output in a family production context. International Journal of Production Research, 37(17), 4067-4077.

Khouja, M., 2000. The economic lot and delivery scheduling problem: common cycle, rework, and variable production rate. IIE Transactions (Institute of Industrial Engineers), 32(8), 715-725.

Khouja, M., Michalewicz, Z., Vijayaragavan, P., 1998. Evolutionary algorithm for economic lot and delivery scheduling problem. Fundamenta Informaticae, 35(1-4), 113-123.

Khouja, M., Michalewicz, Z., Wilmot, M., 1998. The use of genetic algorithms to solve the economic lot size scheduling problem. European Journal of Operational Research, 110(3), 509-524.

Khoury, B.N., Abboud, N.E., Tannous, M.M., 2001. The common cycle approach to the ELSP problem with insufficient capacity. International Journal of Production Economics, 73(2), 189-199.

Kia, H., Ghodsypour, S.H., Davoudpour, H., 2017. A hybrid imperialist competitive algorithm for solving economic lot and delivery scheduling problem in a four-stage supply chain. Advances in Mechanical Engineering, 9(2), 1-20.

Kim, D., Mabert, V.A., Pinto, P.A., 1993. Integrative cycle scheduling approach for a capacitated flexible assembly system. Decision Sciences, 24(1), 126-147.

Kim, T., Goyal, S.K., 2010. Design of flexible capacity plan for multiple items in a single production facility. International Journal of Procurement Management, 3(2), 167-180.

Kim, T., Goyal, S.K., 2011. Composite sourcing policy for multiple products on a single production facility. International Journal of Logistics Systems and Management, 8(1), 86-100.

Kim, T., Goyal, S.K., 2012. Composite sourcing policy considering raw-material consumption. International Journal of Logistics Systems and Management, 11(4), 535-549.

Kim, T., Hong, Y., Chang, S.Y., 2006a. Joint economic procurement-production-delivery policy for multiple items in a single-manufacturer, multiple-retailer system. International Journal of Production Economics, 103(1), 199-208.

Kim, T., Hong, Y., Chang, S.Y., 2006b. Joint economic production-shipment policy in a single-manufacturer- multiple-item system. International Journal of Industrial Engineering : Theory Applications and Practice, 13(4), 357-363.

Kirschstein, T., 2018. Planning of multi-product pipelines by economic lot scheduling models. European Journal of Operational Research, 264(1), 327-339.

Kuhn, H., Liske, T., 2011. Simultaneous supply and production planning. International Journal of Production Research, 49(13), 3795-3813.

Kuhn, H., Liske, T., 2014. An exact algorithm for solving the economic lot and supply scheduling problem using a power-of-two policy. Computers & Operations Research, 51, 30-40.

Kuo, H.W., Inman, R.R., 1990. A practical heuristic for the group technology economic lot scheduling problem. International Journal of Production Research, 28(4), 709-722.

Larraneta, J., Onieva, L., 1988. The economic lot-scheduling problem: a simple approach. Journal of the Operational Research Society, 39(4), 373-379.

Lee, C.Y., Danusaputro, S., 1989. Economic lot scheduling for two-product problem. IIE Transactions (Institute of Industrial Engineers), 21(2), 162-169.

Levén, E., Segerstedt, A., 2007. A scheduling policy for adjusting economic lot quantities to a feasible solution. European Journal of Operational Research, 179(2), 414-423.

Liberopoulos, G., Pandelis, D., Hatzikonstantinou, O., 2013. The stochastic economic lot sizing problem for non-stop multi-grade production with sequence-restricted setup changeovers. Annals of Operations Research, 209(1), 179-205.

Lin, G.C., Kroll, D.E., Lin, C.J., 2006. Determining a common production cycle time for an economic lot scheduling problem with deteriorating items. European Journal of Operational Research, 173(2), 669-682.

Lin, G.C., Wu, A., Gong, D.C., Huang, B., Ma, W.N., 2014. On a multi-product lot scheduling problem subject to an imperfect process with standby modules. International Journal of Production Research, 52(8), 2243-2257.

Liu, J., Wu, L., Zhou, Z., 2008. A time-varying lot size method for the economic lot scheduling problem with shelf life considerations. European Journal of Industrial Engineering, 2(3), 337-355.

Löhndorf, N., Minner, S., 2013. Simulation optimization for the stochastic economic lot scheduling problem. IIE Transactions, 45(7), 796-810.

Löhndorf, N., Riel, M., Minner, S., 2014. Simulation optimization for the stochastic economic lot scheduling problem with sequence-dependent setup times. International Journal of Production Economics, 157(1), 170-176.

Ma, W.N., Gong, D.C., Lin, G.C., 2010. An optimal common production cycle time for imperfect production processes with scrap. Mathematical and Computer Modelling, 52(5-6), 724-737.

Markowitz, D.M., Reiman, M.I., Wein, L.M., 2000. The stochastic economic lot scheduling problem: Heavy traffic analysis of dynamic cyclic policies. Operations Research, 48(1), 136-154.

Matthews, J.P., 1988. The optimality of the ‘zero-switch’ rule for a class of economic lot-scheduling problems. Journal of the Operational Research Society, 39(12), 1155-1161.

Maxwell, W.L., Singh, H., 1983. The effect of restricting cycle times in the economic lot scheduling problem. IIE Transactions (Institute of Industrial Engineers), 15(3), 235-241.

Mohammadi, M., Musa, S.N., Bahreininejad, A., 2014. Optimization of mixed integer nonlinear economic lot scheduling problem with multiple setups and shelf life using metaheuristic algorithms. Advances in Engineering Software, 78, 41-51.

Mohammadi, M., Musa, S.N., Bahreininejad, A., 2015. Optimization of economic lot scheduling problem with backordering and shelf-life considerations using calibrated metaheuristic algorithms. Applied Mathematics and Computation, 251, 404-422.

Mohammadi, M., 2017. The tradeoff between outsourcing and using more factories in a distributed flow shop system. Economic Computation and Economic Cybernetics Studies and Research, 51(4), 279-295.

Mokhlesian, M., Fatemi Ghomi, S.M.T., Jolai, F., 2010. Economic lot scheduling problem with consideration of money time value. International Journal of Industrial Engineering Computations, 1(2), 121-138.

Monahan, J.P., 1976. Production scheduling of perishable products. International Journal of Production Research, 14(6), 689-697.

Moon, D.H., Christy, D.P., 1998. Determination of optimal production rates on a single facility with dependent mold lifespan. International Journal of Production Economics, 54(1), 29-40.

Moon, I., 1993. A note of correction on “Multi-product scheduling on a single machine”. Omega, 21(5), 597-599.

Moon, I., Gallego, G., Simchi-Levi, D., 1991. Controllable production rates in a family production context. International Journal of Production Research, 29(12), 2459-2470.

Moon, I., Giri, B.C., Choi, K., 2002. Economic lot scheduling problem with imperfect production processes and setup times. Journal of the Operational Research Society, 53(6), 620-629.

Moon, I., Hahm, J., Lee, C., 1998. The effect of the stabilization period on the economic lot scheduling problem. IIE Transactions (Institute of Industrial Engineers), 30(11), 1009-1017.

Moon, I., Silver, E.A., Choi, S., 2002. Hybrid genetic algorithm for the economic lot-scheduling problem. International Journal of Production Research, 40(4), 809-824.

Moon, I.K., Cha, B.C., Bae, H.C., 2006. Hybrid genetic algorithm for group technology economic lot scheduling problem. International Journal of Production Research, 44(21), 4551-4568.

Narro Lopez, M.A., Kingsman, B.G., 1991. The economic lot scheduling problem: theory and practice. International Journal of Production Economics, 23(1-3), 147-164.

Nilsson, K., Segerstedt, A., 2008. Corrections of costs to feasible solutions of economic lot scheduling problems. Computers & Industrial Engineering, 54(1), 155-168.

Nobil, A.H., Afshar Sedigh, A.H., Tiwari, S., Wee, H.M., 2019. An imperfect multi-item single machine production system with shortage, rework, and scrapped considering inspection, dissimilar deficiency levels, and non-zero setup times. Scientia Iranica, 26(1), 557-570.

Öner, S., Bilgiç, T., 2008. Economic lot scheduling with uncontrolled co-production. European Journal of Operational Research, 188(3), 793-810.

Osman, H., Demirli, K., 2012. Economic lot and delivery scheduling problem for multi-stage supply chains. International Journal of Production Economics, 136(2), 275-286.

Ouenniche, J., Bertrand, J.W.M., 2001. The finite horizon economic lot sizing problem in job shops: the multiple cycle approach. International Journal of Production Economics, 74(1-3), 49-61.

Ouenniche, J., Boctor, F.F., 2001a. The multi-product, economic lot-sizing problem in flow shops: the powers-of-two heuristic. Computers & Operations Research, 28(12), 1165-1182.

Ouenniche, J., Boctor, F.F., 2001b. The two-group heuristic to solve the multi-product, economic lot sizing and scheduling problem in flow shops. European Journal of Operational Research, 129(3), 539-554.

Park, K.S., Yun, D.K., 1984. A stepwise partial enumeration algorithm for the economic lot scheduling problem. IIE Transactions (Institute of Industrial Engineers), 16(4), 363-370.

Pasandideh, S.H.R., Niaki, S.T.A., Nobil, A.H., Cárdenas-Barrón, L.E., 2015. A multiproduct single machine economic production quantity model for an imperfect production system under warehouse construction cost. International Journal of Production Economics, 169, 203-214.

Pesenti, R., Ukovich, W., 2003. Economic lot scheduling on multiple production lines with resource constraints. International Journal of Production Economics, 81/82, 469.

Philipoom, P.R., Rees, L.P., Taylor, B.W., 1989. Solving the economic lot-scheduling problem using the method of prime subperiods. Decision Sciences, 20(4), 794-809.

Prasetyo, H., 2013. Comment on "multiple cycle economic lot and delivery-scheduling problem in a two-echelon supply chain". International Journal of Advanced Manufacturing Technology, 64(9-12), 1541-1543.

Prasetyo, H., Lee, S.H., 2013. Comment on "simultaneous determination of multiproduct batch and full truckload shipment schedules". International Journal of Production Economics, 144(2), 405-408.

Rahman, H.F., Sarker, R., Essam, D., 2015. A genetic algorithm for permutation flow shop scheduling under make to stock production system. Computers & Industrial Engineering, 90, 12-24.

Rajaram, K., Karmarkar, U.S., 2004. Campaign planning and scheduling for multiproduct batch operations with applications to the food-processing Industry. Manufacturing & Service Operations Management, 6(3), 253-269.

Ramani, S., Narayanan, N., 1992. Single facility, multi-item lot sizing under just-in-time and "cyclic scheduling for improvement". International Journal of Production Economics, 26(1-3), 333-339.

Raza, A.S., Akgunduz, A., 2008. A comparative study of heuristic algorithms on Economic Lot Scheduling Problem. Computers & Industrial Engineering, 55(1), 94-109.

Raza, S.A., Akgunduz, A., Chen, M.Y., 2006. A tabu search algorithm for solving economic lot scheduling problem. Journal of Heuristics, 12(6), 413-426.

Rogers, J., 1958. A computational approach to the economic lot scheduling problem. Management Science, 4(3), 264-291.

Roundy, R., 1989. Rounding off to powers of two in continuous relaxations of capacitated lot sizing problems. Management Science, 35(12), 1433-1442.

Ruiz-Torres, A.J., Santiago, P.I., Chung, W., 2010. The campaign and lot size scheduling problem: a modification of the economic lot scheduling problem for the pharmaceutical industry. International Journal of Logistics Systems and Management, 7(2), 184-197.

Sağlam, Ü., Banerjee, A., 2018. Integrated multiproduct batch production and truck shipment scheduling under different shipping policies. Omega, 74, 70-81.

Salvietti, L., Smith, N.R., 2008. A profit-maximizing economic lot scheduling problem with price optimization. European Journal of Operational Research, 184(3), 900-914.

Salvietti, L., Smith, N.R., Cárdenas-Barrón, L.E., 2014. A stochastic profit-maximising economic lot scheduling problem with price optimisation. European Journal of Industrial Engineering, 8(2), 193-221.

Sarin, S.C., Kalir, A.A., Chen, M., 2008. A single-lot, unified cost-based flow shop lot-streaming problem. International Journal of Production Economics, 113(1), 413-424.

Schweitzer, P.J., Silver, E.A., 1983. Mathematical pitfalls in the one machine multiproduct economic lot scheduling problem. Operations Research, 31(2), 401-405.

Shirodkar, V.A., Madhusudanan Pillai, V., Sridharan, R., 2011. On the feasibility of sequence-dependent economic lot scheduling problem. International Journal of Production Research, 49(10), 2925-2939.

Shirodkar, V.A., Sridharan, R., Madhusudanan Pillai, V., 2011. Effective allocation of idle time in the group technology economic lot scheduling problem. International Journal of Production Research, 49(24), 7493-7513.

Smith-Daniels, V.L., Ritzman, L.P., 1988. A model for lot sizing and sequencing in process industries. International Journal of Production Research, 26(4), 647-674.

Smits, S.R., Wagner, M., De Kok, T.G., 2004. Determination of an order-up-to policy in the stochastic economic lot scheduling model. International Journal of Production Economics, 90(3), 377-389.

Soman, C.A., Van Donk, D.P., Gaalman, G.J.C., 2006. Comparison of dynamic scheduling policies for hybrid make-to-order and make-to-stock production systems with stochastic demand. International Journal of Production Economics, 104(2), 441-453.

Soman, C.A., Van Donk, D.P., Gaalman, G.J.C., 2004. A basic period approach to the economic lot scheduling problem with shelf life considerations. International Journal of Production Research, 42(8), 1677-1689.

Sox, C.R., Muckstadt, J.A., 1997. Optimization-based planning for the stochastic lot-scheduling problem. IIE Transactions (Institute of Industrial Engineers), 29(5), 349-357.

Stawowy, A., Duda, J., 2017. Iterated local search for foundry lotsizing and scheduling problem with setup costs. Archives of Foundry Engineering, 17(4), 161-164.

Sule, D.R., 1983. Effect of learning and forgetting on economic lot size scheduling problem. International Journal of Production Research, 21(5), 771-786.

Sun, H., Huang, H.C., Jaruphongsa, W., 2009. A genetic algorithm for the economic lot scheduling problem under the extended basic period and power-of-two policy. CIRP Journal of Manufacturing Science and Technology, 2(1), 29-34.

Sun, H., Huang, H.C., Jaruphongsa, W., 2010. The economic lot scheduling problem under extended basic period and power-of-two policy. Optimization Letters, 4(2), 157-172.

Sun, H., Jaruphongsa, W., Huang, H.C., 2009. Genetic algorithms for the multiple-machine economic lot scheduling problem. International Journal of Advanced Manufacturing Technology, 43(11-12), 1251-1260.

Taj, S., Nedeltcheva, G.N., Pfeil, G., Roumaya, M., 2012. A spread-sheet model for efficient production and scheduling of a manufacturing line/cell. International Journal of Production Research, 50(4), 1141-1154.

Tang, L.C., Lee, L.H., 2005. A simple recovery strategy for economic lot scheduling problem: a two-product case. International Journal of Production Economics, 98(1), 97-107.

Tang, O., Teunter, R., 2006. Economic lot scheduling problem with returns. Production and Operations Management, 15(4), 488-497.

Taylor, G.D., Taha, H.A., Chowning, K.M., 1997. A heuristic model for the sequence-dependent lot scheduling problem. Production Planning and Control, 8(3), 213-225.

Teunter, R., Kaparis, K., Tang, O., 2008. Multi-product economic lot scheduling problem with separate production lines for manufacturing and remanufacturing. European Journal of Operational Research, 191(3), 1241-1253.

Teunter, R., Tang, O., Kaparis, K., 2009. Heuristics for the economic lot scheduling problem with returns. International Journal of Production Economics, 118(1), 323-330.

Torabi, S.A., Fatemi Ghomi, S.M.T., Karimi, B., 2005a. The finite horizon economic lot scheduling in flexible flow lines. International Journal of Engineering, Transactions B: Applications, 18(3), 273-284.

Torabi, S.A., Fatemi Ghomi, S.M.T., Karimi, B., 2005b. The economic lot and delivery scheduling problem in flexible job shops. Amirkabir (Journal of Science and Technology), 16(62 B), 83-91.

Torabi, S.A., Fatemi Ghomi, S.M.T., Karimi, B., 2006. A hybrid genetic algorithm for the finite horizon economic lot and delivery scheduling in supply chains. European Journal of Operational Research, 173(1), 173-189.

Torabi, S.A., Jenabi, M., 2008. A basic period approach for solving the economic lot and delivery scheduling In flexible flow lines. International Journal of Engineering, Transactions A: Basics, 21(4), 361-374.

Torabi, S.A., Jenabi, M., 2009. Multiple cycle economic lot and delivery-scheduling problem in a two-echelon supply chain. International Journal of Advanced Manufacturing Technology, 43(7-8), 785-798.

Torabi, S.A., Karimi, B., Fatemi Ghomi, S.M.T., 2005. The common cycle economic lot scheduling in flexible job shops: the finite horizon case. International Journal of Production Economics, 97(1), 52-65.

Van den Broecke, F., Van Landeghem, H., Aghezzaf, E.H., 2005. An application of cyclical master production scheduling in a multi-stage, multi-product environment. Production Planning & Control, 16(8), 796-809.

Van den Broecke, F., Van Landeghem, H., Aghezzaf, E.H., 2008. Implementing a near-optimal solution for the multi-stage, multi-product capacitated lot-sizing problem by rolling out a cyclical production plan. International Journal of Production Economics, 112(1), 121-137.

Vemuganti, R.R. 1978. On the feasibility of scheduling lot sizes for two products on one machine. Management Science, 24(15), 1668-1673.

Vidal-Carreras, P.I., Garcia-Sabater, J.P., 2009. Comparison of heuristics for an economic lot scheduling problem with deliberated coproduction. Journal of Industrial Engineering and Management, 2(3), 437-463.

Vidal-Carreras, P.I., Garcia-Sabater, J.P., Coronado-Hernandez, J.R., 2012. Economic lot scheduling with deliberated and controlled coproduction. European Journal of Operational Research, 219(2), 396-404.

Viswanathan, S., Goyal, S.K., 2002. On 'Manufacturing batch size and ordering policy for products with shelf lives'. International Journal of Production Research, 40(8), 1965-1970.

Wagner, B.J., Davis, D.J., 2002. A search heuristic for the sequence-dependent economic lot scheduling problem. European Journal of Operational Research, 141(1), 133-146.

Wagner, B.J., Davis, D.J., Kher, H.V., 2002. The production of several items in a single facility with linearly changing demand rates. Decision Sciences, 33(3), 317-346.

Wagner, M., Smits, S.R., 2004. A local search algorithm for the optimization of the stochastic economic lot scheduling problem. International Journal of Production Economics, 90(3), 391-402.

Wang, J., Li, X., Zhu, X., 2012. Intelligent dynamic control of stochastic economic lot scheduling by agent-based reinforcement learning. International Journal of Production Research, 50(16), 4381-4395.

Yan, C., Liao, Y., Banerjee, A., 2013. Multi-product lot scheduling with backordering and shelf-life constraints. Omega, 41(3), 510-516.

Yang, H., Low, V., Zhang, C., Zheng, L., Miao, L., 2017. Behaviour perception-based disruption models for the parallel machine capacitated lot-sizing and scheduling problem. International Journal of Production Research, 55(11), 3058-3072.

Yao, M.J., 2005. The economic lot scheduling problem without capacity constraints. Annals of Operations Research, 133(1-4), 193-205.

Yao, M.J., Chen, S.C., Chang, Y.J., 2012a. A common cycle approach for solving the economic lot and inspection scheduling problem. Journal of Industrial and Management Optimization, 8(1), 141-162.

Yao, M.J., Chen, S.C., Chang, Y.J., Tseng, T.Y., 2012b. Solving the economic lot and inspection scheduling problem using the extended basic period approach under power-of-two policy. Journal of the Chinese Institute of Industrial Engineers, 29(1), 43-60.

Yao, M.J., Elmaghraby, S.E., 2001. The economic lot scheduling problem under power-of-two policy. Computers and Mathematics with Applications, 41(10-11), 1379-1393.

Yao, M.J., Elmaghraby, S.E., Chen, I.C., 2003. On the feasibility testing of the economic lot scheduling problem using the extended basic period approach. Journal of the Chinese Institute of Industrial Engineers, 20(5), 435-448.

Yao, M.J., Huang, J.X., 2005. Solving the economic lot scheduling problem with deteriorating items using genetic algorithms. Journal of Food Engineering, 70(3), 309-322.

Zanoni, S., Segerstedt, A., Tang, O., Mazzoldi, L., 2012. Multi-product economic lot scheduling problem with manufacturing and remanufacturing using a basic period policy. Computers & Industrial Engineering, 62(4), 1025-1033.

Zipkin, P.H., 1991. Computing optimal lot sizes in the economic lot scheduling problem. Operations Research, 39(1), 56-63.

Zohali, H., Naderi, B., Mohammadi, M., Roshanaei, V., 2019. Reformulation, linearization, and a hybrid iterated local search algorithm for economic lot-sizing and sequencing in hybrid flow shop problems. Computers & Operations Research, 104, 127-138.

Zoller, K., 1990. Coordination of replenishment activities. International Journal of Production Research, 28(6), 1123-1136.

Appendix C: List of abbreviations

ABC	Artificial bee colony
ACA	Ant colony algorithm
ACO	Ant colony optimization
B&B	Branch & bound
BP	Basic period
BPA	Basic-period-approach
CA	Content analysis
CC	Common cycle
CCA	Common-cycle-approach
CS	Cuckoo search
CLSP	Capacitated lot sizing problem
DLSP	Discrete lotsizing and scheduling problem
DP	Dynamic programming
EA	Evolutionary algorithm
EBP	Extended basic period
EBPA	Extended-basic-period-approach
ELDSP	Economic lot and delivery scheduling problem
ELS	Equal lot size
ELSDP	Economic lot scheduling and delivering problem
ELISP	Economic lot and inspection scheduling problem
ELSSP	Economic lot and supply scheduling problem
ELSP	Economic lot scheduling problem
ELSPR	Economic lot scheduling problem with returns

EMQ	Economic manufacture quantity
EOQ	Economic order quantity
EPQ	Economic production quantity
FC	Fundamental cycle
FS-ELSP	Flow shop-economic lot scheduling problem
GA	Genetic algorithm
GLSP	General lotsizing and scheduling problem
GT-ELSP	Group technology-economic lot scheduling problem
GSS	Golden section search
HGA	Hybrid genetic algorithm
ILP	Integer linear programming
ILS	Iterated local search
LB	Lower bound
LP	Linear programming
MILP	Mixed integer linear programming
MINLP	Mixed integer nonlinear programming
MTO	Make-to-order
MTS	Make-to-stock
PLSP	Proportional lotsizing and scheduling problem
POT	Power-of-two
POW2	Power-of-two
PSO	Partical swarm optimization
SA	Simulated annealing
SELSP	Stochastic economic lot scheduling problem

SPT	Shortest processing time
TS	Tabu search
TVLS	Time varying lot size
TVLSA	Time-varying-lot-size-approach
UB	Upper bound
WIP	Work in process
ZSR	Zero switch rule