

IN THIS ISSUE

Development of Victim
Jurisprudence

Countermarks on Caligula's
Coins

Access to Land and Food
Security

Inclusive Education Practices in
Ghana



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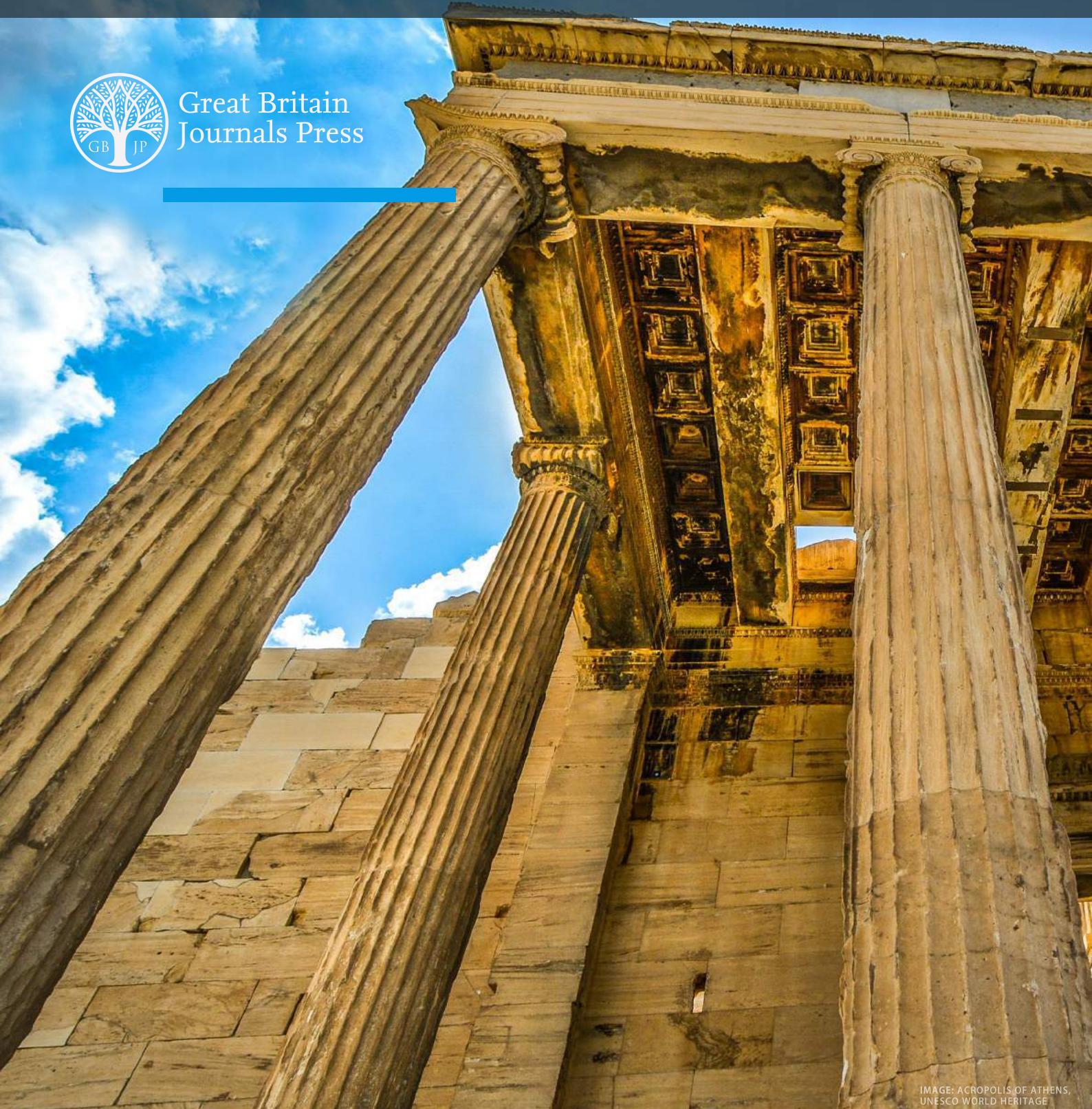


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Journal Content

In this Issue



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- i.** Journal introduction and copyrights
- ii.** Featured blogs and online content
- iii.** Journal content
- iv.** Curated Editorial Board Members

1. Teachers' Roles in Inclusive Education Practices in Ghana. **1-12**
2. The Right to the Truth: An Inevitable facet in the Development of Victim Jurisprudence. **13-20**
3. Hispanic Countermarks on Caligula's Coins. **21-38**
4. Entropy Change in Management, Ecology and Sociology. **39-46**
5. Exploring the Long-run Dynamic Links between Access to Land and Food Security: Evidence from Ethiopia. **47-54**

- V.** Great Britain Journals Press Membership

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Teachers' Roles in Inclusive Education Practices in Ghana

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ABSTRACT

The study examined teachers' roles in the implementation of inclusive education practices in the Central Region of Ghana. Qualitative case study design and multistage sampling technique were employed for the study. Semi-structured interview guide was used to gather data. Twenty-four teachers in twelve schools were interviewed. The findings revealed that some teachers varied their teaching methods and strategies to enable all learners have equal access to the curriculum. It was found that teachers had significant role to play in community sensitisation programme to educate the public on how learners with special educational needs would be accepted in the society. However, most teachers did not have much knowledge on how to screen and/or refer at risk learners for further evaluation to determine their real needs. Extensive in-service training must be offered by special education experts to enable teachers perform effectively in the practice of inclusive education.

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Teachers' Roles in Inclusive Education Practices in Ghana

Emmanuel Danful Amoah^a & Abraham Yeboah^a

ABSTRACT

The study examined teachers' roles in the implementation of inclusive education practices in the Central Region of Ghana. Qualitative case study design and multistage sampling technique were employed for the study. Semi-structured interview guide was used to gather data. Twenty-four teachers in twelve schools were interviewed. The findings revealed that some teachers varied their teaching methods and strategies to enable all learners have equal access to the curriculum. It was found that teachers had significant role to play in community sensitisation programme to educate the public on how learners with special educational needs would be accepted in the society. However, most teachers did not have much knowledge on how to screen and/or refer at risk learners for further evaluation to determine their real needs. Extensive in-service training must be offered by special education experts to enable teachers perform effectively in the practice of inclusive education.

Keywords: education, inclusive, implementation, practices, teachers.

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I. INTRODUCTION

Inclusive education (IE) has been internationally recognised as a philosophy for attaining equity, justice, and quality education for all learners, especially those who have been traditionally excluded from mainstream education for reasons of disability, ethnicity, gender, or other characteristics. The philosophy of IE first drew attention at a conference held in Jomtien,

Thailand in 1990. There are many international movements spearheading this practice. One of these movements toward the inclusion of learners with special educational needs (SEN) in mainstream education that occurred in recent decades is the Salamanca Statement and Framework for Action on Special Needs Education. This was held in Salamanca in June 1994. This Salamanca statement called for inclusion to be the norm (UNESCO, 1994). Ghana is one of the 92 countries together with twenty-five international organisations that subscribe to the Salamanca Statement.

While IE has been implemented successfully in many developed countries, developing countries such as Ghana are still in the process of achieving this goal. For inclusion to work successfully there is the need for teachers, school administrators, professionals, and all other stakeholders to work together (UNESCO, 2005). Teachers should have the skills and understanding to make good practical decisions in their class teaching, such as placing learners with disabilities in front rows in class, giving clear explanations and responding to signals and communication from learners with SEN. Inclusive education calls for a joint effort of regular and special educator involvement. It is the responsibility of both regular and special teachers to develop and implement the curriculum and make instructional adaptations necessary to accommodate the specific needs of individual learners (Ministry of Human Resource Development, 1996).

According to Kaufman and Hallahan (2005), successful teaching of learners who are different requires that they be grouped homogeneously so that special pedagogical approaches can be deployed by teachers who have been trained to use them. It can be argued that when special education is conceptualised in this manner, it

becomes a barrier to the development of inclusion because it prevents the rest of the educational system from taking responsibility for the learning of all learners. The concept of IE is inseparable from quality education. Quality education can only be achieved if the needs of all learners are addressed so that every learner is given an opportunity to succeed (Peters, 2003). Teachers are crucial in determining what happens in classrooms. The development of more inclusive classrooms requires teachers to cater for different student learning needs through the modification or curriculum differentiation (Forlin, 2006).

Teachers play a pivotal role in inclusive education. The literature on IE undisputedly stipulates that no matter how excellent the educational infrastructure might be, how well articulated educational policy might be, how well resourced a programme might be, effective inclusion does not take place until classroom teachers deliver relevant and meaningful instruction to students with SEN (Mastropieri & Scruggs, 2010). Although there is widespread support for inclusion at a philosophical level, there are some concerns that the policy of inclusion is difficult to implement because teachers are not sufficiently well prepared and supported to work in inclusive ways (Ashman & Elkins, 2005). Ghana's vision of shaping the future of learners with SEN in inclusive classroom can only be achieved if all teachers are proactive in moulding the character of individuals in their care. Teachers' knowledge, insight and understanding of government policy document in IE are necessary for the practice of inclusion in the classroom (Agbenyega & Deku, 2011). For IE to succeed, it is important that teachers and headteachers maintain a positive attitude towards inclusion.

1.1 Statement of the Problem

IE in Ghana can be traced as far back as the 1951 Accelerated Education Plan and the 1961 Education Act for free education which resulted in increases in basic level enrolment. This means that Ghana has a well-defined legal framework for learners with disabilities and their inclusion into regular classrooms. Educational services to the disabled individual are no longer charitable in

Ghana, they are enshrined in the 1992 Constitution and emphasis is placed on almost all international conventions aimed at promoting and protecting the human rights of all citizens.

In the last decade, there has been an increased concern regarding the effects of inclusive practices on the achievement of learners in general education. Literature suggests that the implementation of inclusive education policies has been uneven (Evans & Lunt, 2002). Whilst there are many success stories to be told about inclusion (for example, Ainscow, 1997; Black-Hawkins, Florian & Rouse, 2007), there have also been failures and difficulties (Carrington & Elkins, 2002). There are numerous studies and researches surrounding the concept of IE, ranging from teachers' and parents' attitude and perception toward the implementation of inclusive education, to barriers or challenges of inclusive education (Ainscow, 1998; Gyimah, Ntim & Deku, 2012; Vanderpuye, 2013; Yekple & Deku, 2014), however, much of this research has not examined teachers' roles in the implementation of IE. Even though the Government of Ghana has adopted a cautious approach to the development and implementation of IE and is piloting it in certain regions and districts. It is unclear whether teachers are aware of the roles they must play. Avoke and Avoke (2004) observed that professional development for inclusion is not adequate because many teachers are not aware of their roles.

1.2 Purpose of the Study

- To examine teachers' roles in screening of learners with disabilities and SEN.
- To explore teachers' roles when referring learners at risk of developmental disabilities.
- To find out teachers' role when designing IEP for learners with special educational plan.
- To examine how teachers ensure that learners with disabilities and SEN have access to the school curriculum.

1.3 Research Questions

- What do teachers regard as their roles in screening of learners with disabilities and SEN?
- What roles do teachers play when referring learners at risk of developmental disabilities?
- What roles do teachers play in designing IEP for learners with special educational plan?
- How do teachers ensure that learners with disabilities and SEN have access to the school curriculum?

1.4 Significance of the Study

The study would reveal gaps that have to be filled to enhance teachers' roles for a successful implementation of IE in the Central Region. Findings would benefit teachers and educational administrators in such roles as screening and referral, design of IEP and access to the school curriculum of learners with SEN would be explored to get information on current practice.

II. LITERATURE REVIEW

2.1 The Concept of Inclusive Education

Inclusive Education policies worldwide are developed to integrate special need and regular education together in a unified education system. This cannot be done without teachers (Torombe, 2013). Inclusive Education is defined by UNESCO (2005) as a process of addressing and responding to the diverse needs of all learners by increasing participation in learning, cultures and communities and reducing exclusion within and from education. Thousand and Villa (2002) noted that inclusive practices involve substantial changes in both attitude and educational approaches. In contrast to the excellence and uniqueness of IE, Lewis (2000) intimated challenges questioning the rationale "behind getting same aged groups of students to learn where the real achievements of the less able will never be recognized as they will always be below the artificial average of their peers and where their final efforts are bound to be degraded in the common exam system" (pp. 98.)

Inclusive Education in Ghana has its root from the 1951 Accelerated Education Plan and the 1961 Education Act for free education which resulted in increases in basic level enrolment. This means that, Ghana has a well-defined legal framework for people with disabilities including children with disabilities and their inclusion in regular classrooms. In the 2003/2004 academic year, the Special Education Division (SPED) of Ghana Education Service (GES) in addressing the policy objectives initiated the implementation of IE on a pilot basis in ten (10) districts of three (3) regions namely, Greater Accra, Eastern and Central in 35 schools with learners population of 14,596. Despite these provisions, Kuyini (2004) and Kuyini and Desai (2006) reported that some Ghanaian principals and teachers possessed limited knowledge of the requirements of inclusion and that such educators were unlikely to have any reasonable capacity to provide appropriate instruction.

2.2 Teachers Roles in Screening and Referring

Screening and referral are integral part of IE because they are the first stages of the assessment process (Gyimah, Ntim & Deku, 2012). Berdine and Meyer (1987) indicated screening as the process of assessing many children for the purpose of identifying those who need more thorough evaluation to determine whether they have problems. Screening helps one to determine whether a child is likely to be eligible for special education services (Bigge & Shermis, 1999).

In screening teachers can identify children in each population, who perform below the normal ranges of development, areas of behaviours or intellectual achievement (Gyimah, et al., 2012). Gyimah and Yidana (2008) opine that screening helps to identify children at-risk or have problem for referral, helps teachers to seek for thorough assessment and enables them to know children who need special education services. Teachers as well as health personnel are the key figures involved in screening. This is because they usually deal with many children at a time (Gyimah et al., 2012). Symptoms of health, motor and behaviour problems of a child can be detected at birth by health personnel, but most academic problems

are undetected until a child reaches school going age. It is at this stage that classroom teachers can identify children who have academic and classroom behaviour problem.

Gyimah, et al, (2012) also state that referral becomes necessary whenever there is sufficient evidence that a child has a form of difficulty. This may be behavioural, sensory disability (that is hearing or visual problem), motor handicap, intellectual problem, and communication or health problems. Gyimah and Yidana (2008) are of the view that teachers must make referral, only when they have first attempted remediation efforts. By remediation efforts, they explained that it is initial steps the teacher takes to help a child to overcome a suspected difficulty. For example, the child's seating position can be changed. The teacher should be able to identify the children who display educationally disabling conditions and those whose performance indicates that they may be at risk for such conditions (Balshaw, 1999).

2.3 Curriculum Access or Modification

Central to the teaching and learning that occurs in schools is the curriculum. Curriculum is an umbrella concept that is comprehensive in scope and complex in practice and it includes all the learning experience offered by a school (Gardner & Boix-Mansilla, 1994). Curriculum modification includes a technical analysis of curriculum content, processes and outcomes by the teacher and the adjustments they make to their instructional practices to meet the specific learning needs of children with disability in their classroom (Operiti & Brady, 2011; Williams, 2011).

Curriculum modification is essential as it reduces the chances of stigma that disabled/SEN students can feel when teachers do not consider the special learning needs of disabled students (Florian, 2008). Shea and Bauer (1997) helps buttress the point that if teachers can make the classroom a place of equity and social acceptance for all learners, it will make one a better teacher by allowing him/her to bring the learners together as a group.

Runswick-Cole (2011) mentioned example of a curriculum modification/adaptation as teacher considering an alternative strategy that would include a boy who uses a wheelchair to participate in the regular physical education lesson without the sense of exclusion. Modifying or creating access to the curriculum is a must-do action in a class with children with diverse learning needs because it is the way to keep all learners in the school (Avramidis, Bayliss & Burden, 2002; Florian, 2008). It is important, therefore, for teachers to create a collaborative environment within the school so that their colleagues can draw from the experiences they have and get the support they need to differentiate effectively and accommodate learners successfully (ibid).

2.4 Individualized Education Plan (IEP)

An IEP is a written document that provides information on what strengths and weaknesses a child has and measures to help the child to overcome the difficulties (Gyimah, Ntim & Deku, 2012). The IEP is a written plan describing the special education programme and a service required by a particular child and is based on a thorough assessment of the child's strengths and needs (Ontario Ministry of Education, 2004).

IEPs are usually developed by a teacher in collaboration with parents. Parents have a wealth of information about their child which can help with the selection of appropriate IEP goals and strategies. To facilitate parental input, Gyimah, et al. (2012) opine that the teacher should:

- explain the IEP process prior to meetings and/or consultations so that parents know what to expect.
- provide a letter or pre-planning form that allows for input to be shared in writing, in a telephone interview or at a planning meeting.
- share information in advance so that parents are prepared to fully participate.

Ideally, planning the child's IEP is best achieved through collaboration, and should involve the combined efforts of the student, the parents, the school, and other professionals. However, one of the most frequent complaints voiced by parents is that they are not involved in this process, and they

often feel that their contribution is not regarded as equally important to that of the professionals (Pinkus, 2005).

Learners are more likely to respond positively to interventions when they understand the rationale and are given direct access to the process of decision making (Frederickson & Cline, 2002). Active pupil involvement also improves self-esteem, increases motivation and cooperation and can often provide important, unexpected, and illuminating information (Flutter & Rudduck, 2004; Glenny, 1996). The IEP provides teachers and parents with the opportunity to have a practical and realistic dialogue about the student's needs and to develop creative ways of meeting those needs.

Table 1: Distribution of Inclusive Pilot Schools in the Central Region

No	District	Pilot inclusive Schools	Population of Teachers		Total Population
			Male	Female	
1	Awutu Senya	4	10	15	25
2	Agona West	8	32	24	56
3	Agona East	6	22	18	40
4	Kasoa	10	32	38	70
5	Efutu Municipal	23	78	81	159
6	Cape Coast	7	26	30	56
Total		58	200	206	406

Source: Central Region Education Office

3.3 Sample and Sampling Procedure

The study employed the multistage sampling technique. Firstly, the researcher employed the simple random sampling technique to select 12 schools across the six districts. This was done through the lottery method. Since some districts had more IE schools than others, we

proportionally selected the schools to give fair and evenly selection of schools from the various districts. Twenty-four (24) teachers were systematically sampled to form the sample size. Two (2) teachers (a male and a female) were sampled from each school out of the 12 schools selected, to form the 24 teachers (See Table 2).

Table 2: Proportional Sample of Schools and Teachers

No	Districts	Number of Pilot Inclusive schools	Number of schools sampled	Number of teachers sampled
1	Awutu Sanya	4	1	2
2	Agona West	8	2	4
3	Agona East	6	1	2
4	Kasoa	10	2	4
5	Efutu Municipal	23	5	10

6	Cape Coast	7	1	2
Total		58	12	24

Source: Field Data

3.4 Instrumentation

The semi-structured interview guide was used for the study. The interview involved the use of open-ended questions. The questions were self-constructed based on the literature on IE. The interview guide had 5 sections. Section 1 dealt with demography information of the respondent. Section 2, 3 and 4 asked questions which elicited information about the respondent's roles in curriculum adaptation, screening and referral, development of IEP. Each section had at least 3 questions and a follow-up question were asked after each question when necessary.

3.5 Data Collection Procedures

We conducted interviews with teachers that were selected from each of the schools for the study. During the interview, permission was sought to tape record the information given by the teachers. In line with this, Kvale (1996) explains that interview in qualitative research attempts to understand the world from the subjective way, to unfold the meaning of people's understandings, to discover their lived world prior to scientific justifications. Each interview section lasted for 45 to 55 minutes and in all, one month–two weeks was used to collect all the data.

3.5 Data Analysis

The thematic approach to qualitative data analysis by Braun and Clarke (2006) cited in Vanderpuye, (2013) was adopted for this study. Thematic analysis is a method for identifying, analysing, and reporting patterns (themes) within the data. It minimally organises and describes one's data set in detail" (Braun & Clarke 2006, p.79).

3.6 Results of the Study

The study sought to examine teachers' roles in inclusive education practices in the Central Region of Ghana. Twenty-one (21) respondents were used for the study, which is less than the required sample of 24. It was found that male

respondents were 13 (61.9%) and female respondents were 8 (38.1%).

3.7 Screening and Referral

On whom should be responsible for screening and how screening should be done for special educational need learners, respondents offered varied views. One respondent coded R21 offered the view that "*With the screening, I believe there are other people who are specialised so I am being a teacher the little I can I do when I identified a child with special needs..... I will invite an expert to assist me in the screening and referral issues*". Some respondents did not know what screening and referral was, however, they offered views that were not related to what is known about screening and referral. In one instance, respondent R8 indicated that "*There is this provision that is err the special need teachers, therapeutic teachers and so on. These teachers are solely trained to deal with learners with these challenge or the other that is special learners....., in curbing this situation, teachers have to be re-trained in the use of the sign language with the idea that in the end special needs learners would be mixed with those that are not having their problem*". Despite teachers' role in IE, screening and referral is only known by special trained teachers.

On what a teacher should do, when he/she identifies a child who may have SEN and/or disabilities in his/her class, views were shared adequately but with variations or dissimilarities.

Respondent R21 indicated that "*....., the pupil who has that problem should be seated in a place or position that he or she can have access or can have access to hear. Those with sight issues, for them it depends, whether long or short sightedness. If its long sightedness he or she should be seated in front and those with short should be at the back of class*". The revelation shows that teachers do not know about what to do when they identify a child with special educational needs in their classes.

3.8 Curriculum Access

For teachers to get learners to actively participate in their classes' activities, respondents indicated that they employ various means and strategies so that at the end of the day objectives can be realised. In doing so, one respondent R21 indicated that "*Role play sometimes can be used to get learners to participate fully in class. You give them the chance to ask questions and ask them questions too. Questions should be distributed and appropriate everyone. Let's say you share answers with the learners and among their colleagues*". This means that for teachers to involve learners actively in class roles must be assigned to them and teachers will have to observe them as they perform these roles. This will go a long way to help both able and disabled learners participate actively in class since it gives every pupil an opportunity to be part of the learning process. In another instance, respondent R15 shared that "*Hmm learners with disability, yes first and foremost, I being a teacher I need to psyche the pupil with disability for him or her to know that he or she is also part of the class. Now doing that I will include the learners with disability to learners who are not suffering from disability during class like teaching using the activity method yeah, I will group them too so that they feel being part of the group in the class. Even though activity method takes much time in teaching and learning process but that will be best for me to improve my learners' performance in class*". It is therefore evident that teachers in their course of work try to get the learners to participate actively in class.

On the teaching methods used by teachers to improve upon learners' performance, some respondents touched on many methodologies. Some respondents indicated using discussion, activity, and demonstration methods and this is what respondent R11 had to say "*For teaching method, it depends on the class. The discussion method can be very good for others and not good for others too. You blend all methods depending on the topic. You can do demonstration and group whether homogenous or heterogeneous groupings*". For respondent R9, the method he usually employs is the activity method. He had

this to say about the issue "*Even though the activity method takes much time in teaching and learning process but that is best for me to improve my learners' performance in class*". Apart from this, some teachers could not give concrete methods and accepted the fact that they have forgotten because it has been a while, they have read about the teaching methods. Respondent R18 had this to say "*You must adopt the methods that the learners understand the most in the class*". Follow-up question which I asked was "what are some of these methods"? R18 replied: "*For the methods I have forgotten*".

For the kind of teaching aids and their usage, respondents made mention of TLMs such as charts, videos, and flash cards in facilitating teaching and learning in the class. Respondent R6 said that "*Now with the teaching aids, I for one, I use, I normally use videos and chats to help facilitate my teaching and learning activities. Now in its usage especially with the videos, at times I allow them to watch the videos on the lesson I'm teaching and after that I discuss with them. At times too as the video is playing, I explain to my learners' stage by stage*".

In ending the interview sessions, respondents were asked about suggestions they could offer to improve teachers' roles in the implementation of inclusive education in the Central Region of Ghana. In their responses, some respondents indicated that scholarships should be given to teachers who would want to pursue courses in special education so that they can be equipped to facilitate the implementation of inclusive education. Respondent R1 suggested that "*Scholarships should be given to teachers to specialise in special education so that they will come back to help in the screening process. In fact, it is difficult identifying learners with special needs but I use their gesture as they most often look quite in class because they may not understand whatever I'm doing as a teacher in the class due to their situation. In short, we don't have expertise in doing screening and referral; we use our layman's expertise so specialists should be asked to be moving from school to school*".

Again, it was suggested that society as a whole and teachers in general should have positive view about disabled learners. This will facilitate the implementation of inclusive education and again teachers re-training would be laudable in meeting the implementation demands. Besides, inclusive education is good but its strength rests on resources. To get it done, funding should be a shared responsibility, and this was what Respondent R18 suggested

“Like as I was saying, err, sometimes it comes with funding. Having to prepare and teach all the lessons you must use aids especially at the primary level. Piaget even said at a point, a child cannot think in abstract terms so having to use the TLMs, you make the thing concrete for them to understand. So it is very important that we use it but how many subjects can you teach with these TLMs so government has to provide them”.

3.9 Individual Educational Plan (IEP)

On the issue of soliciting for teachers' understanding about the Individualised Educational Plan, there were diverse views about their understanding of IEP. Respondent R5 said that “*IEP is good but very demanding and in this case we plan on the various issues in the class. If it is done right, the outcome would be wonderful but very demanding because we at primary level teach all subjects and teach individual students too based on their programme*”. Respondent R4 indicated that “*We normally do in-service training from time to time, so let's say for example periodically, teachers are selected for workshops on these things and they also come back to help impart them onto their colleagues who were not part of such workshops. In short, we don't have expertise in doing screening and referral; we use our layman's expertise so specialists should be asked to be moving from school to school*”. Based on responses given, it appeared that most teachers did not know or understand what IEP is. This lack of understanding about what IEP is may imply that there is inadequate training in inclusive education.

Nonetheless, some teachers knew what IEP is and the importance of planning towards its implementation. On what teachers should do before the design of IEP, R16 indicated that “*you need to plan and go by the plan by assembling all materials that are needed*”. On what to do after IEP R16 stated that “*in ensuring the success of the plan as a teacher, you must be diligent, and whatever that goes into the plan, you get your materials available from school authority and engage the child by motivating him or her. Attention is very important in this situation as you go through the plan step-by-step through the child centred method. Give instructions to the child and observe the child if he's following the instructions. You ask questions and give tasks to them as you observe*”. This shows that those who knew about IEP also knew about the importance of planning.

In answering the question on what teachers should do to ensure the success of IEP, varied responses were given probably due to the lack of understanding on the part of some the inclusive teachers. In one interaction, R17 reported that “*So before we come to the teacher we start with the authorities. The new schools or old schools can be (stammered) 'err err' like built for people that use the armchair can be able to come school without any other special assistance.....*” Then also the provision of the necessary devices e.g. a child that has hearing impairment would have to be given a hearing aid”.

IV. DISCUSSION

4.1 Screening and Referral

It was evident from the study that most teachers do not know what screening and referral entail and offered views that were not directly related to the subject matter. Most respondents did not know who should be responsible for screening, how screening could be and what they can do as teachers when they identify a pupil with a special educational need. This situation may be because of the inadequacy of the training they had concerning special education as a course. Either they might have forgotten what they learnt, or they were poorly taught. The situation can have

adverse effects on a child at-risk because their identification might be difficult, and this can delay remedies needed to overcome their conditions. Although responses were not direct, they can partly contribute to screening and this goes in line with Gyimah et al., (2012) that in screening several learners in schools, teachers are able to identify learners in each population, who perform below the normal ranges of development, areas of behaviours or intellectual achievement.

The respondents' feedback on who should be responsible for screening and referral of learners suspected to be at-risk and/or with SEN in the classroom, indicated that they do not know it was their responsibility. Rather, many referred to specialists trained for that purpose, while forgetting that specialists are invited after identification to give probable remedies to the situation. This view is in congruent with the assertion that teachers are responsible for identifying learners who display educationally disabling condition and those whose performance indicates that they may be at-risk for such conditions. Teachers are to use various methods or procedures to screen individuals who have at-risk conditions, Winzer (as cited in Gyimah, et al. 2012).

On what teachers can do when they identify someone with SEN in their classroom, it was revealed that teachers are not specifically aware of what to do when they identify a child who is at-risk and/or with SEN. It means that some teachers do not offer remediation anytime they identify learners with disability or SEN, and this buttresses the point made by Gyimah and Yidana (2008), that teachers can only do referral if they have tried remediation strategies to curb the situation. However, many of the respondents gave responses that were not related to the question and this situation may be because of the inadequacy of the training they had in special education. Again, either they might have forgotten what they learnt, or they were poorly taught. The situation can have a telling effect on any potential special child because their identification might be difficult on the part of teachers, and this can delay subsequent intervention.

4.2 Curriculum Access

On what teachers can do to ensure that all learners participate actively in an inclusive classroom, respondents emphasised on role play, peer tutoring and giving preference to low achieving students in the classroom. They further indicated that learners could be placed in positions that would allow them to benefit from whatever activity that goes on within the teaching environment. The responses go in line with the creation of equal access to curriculum by all learners, which is relevant to any school whether mainstream or inclusive as opined by Babbage, Byers, and Redding (2000). All learners need to be given the chance to learn and in so doing they may grasp every opportunity to enrich their lives.

About the teaching methods that would help to improve upon students' performance, respondents reported they used the discussion, role-play, activity, and demonstration methods. To them, these methods give every pupil the opportunity to do and observe whatever goes on and equally get engaged by practicing some concepts that pertain to teaching and learning. There were few instances where some teachers were not able to give clear cut methodologies they employ in teaching. When they were probed, they indicated that they have forgotten. In fact, this revelation is worrying because teachers are mandated to know the methodology or pedagogy to use to benefit the entire class. But in a situation like this, where teachers report that they have forgotten the methods, where lies the fate of the learners they teach? Such teachers may in one way or the other cause more harm than good to learners they teach.

On the type of teaching aids used and how they use them in getting learners to understand whatever the teacher presents, respondents indicated that they use charts, videos, and flash cards as aids to teach. Although some teachers reported they find it difficult getting teaching aids, they make use of what is available to them because of the value it adds to delivery of a lesson in the classroom. In doing so, the subject information produced by the learners is remembered better than the same information

presented to the learners by the teacher (Jacoby, 1978 & McDaniel, Friedman & Bourne, 1978). Teaching with TLMs encourages the pupil to search for relevant knowledge rather than the teacher monopolising the transmission of information to the learners.

On suggestions teachers could offer on the implementation of inclusive education in the Central Region, respondents indicated that teachers should be sponsored on special education programmes. Learners with SEN should be separated and given special attention within the inclusive school environment. This suggestion is in contrast with the Framework for Action on Special Education cited in Yekple and Deku (2014) which contend that learners with SEN must have access to regular schools which should accommodate them within a child-centered pedagogy capable of meeting their needs. Stainback and Stainback (1996) buttress that the reason for including learners in the mainstream is to avoid the ill effects of segregation inherent when learners are placed in special schools and classes.

4.3 Individual Educational Plan (IEP)

The respondents shared their views on IEP and these views were contrary to what is known as much as special education is concerned. Gyimah, Ntim and Deku (2012) point out that IEP is a written document that provides information on what strengths and weaknesses a child has and measures that can be taken to help the child to overcome the difficulties. Notwithstanding the understanding gap, Respondent R14 said that "*IEP is a plan a teacher designs if he or she identifies a pupil with SEN so that he can give much attention to such pupil*". This response seemingly relates to the meaning of IEP offered by Ontario Ministry of Education (2004) that IEP is a written plan describing the special education programme and a service required by a particular child and is based on a thorough assessment of the child's strengths and needs. Based on these submissions, it is evident that not all teachers know or understand what IEP is. This lack of a concrete understanding about IEP on the part of inclusive teachers might be because of lack of

training, or the non-existence of such programmes in the schools they teach. This indicates that learners with SEN who happen to find themselves in the hands of these teachers in these inclusive schools are not getting exactly what is required for them to function as expected.

On what a teacher can do before and after an IEP programme, respondents applied their general knowledge about management of lessons and students in the classroom, which is contrary to that of IEP programme. Respondents' emphases were on planning, executing, and evaluating what has been planned and executed on daily basis. According to NCSE (2006), IEP involves setting appropriate goals, and monitoring and evaluating progress on a regular basis.

On how to ensure the success of IEP programme, respondents re-echoed the stance of proper planning and commitment in educational programme without reference to whatever logistics a teacher has at his/her disposal. The revelation is in line with the idea that teachers should be involved actively, at a level appropriate to their maturity and understanding in the monitoring and review of their own progress (Gearheart, Weishahn & Gearheart, 1988).

V. CONCLUSIONS

It can be concluded that teachers at the basic school do not actively and adequately play their role well to ensure successful implementation of IE in the Central Region of Ghana. They may require some in service training to help them play their expected roles as teachers. Pre-service teachers in the various colleges of education in Ghana should be taken through courses that will equip them with the requisite knowledge and skills in the aspect of screening and referral of learners suspected to be at-risk, IEP development and its implementation as well as curriculum adaptation.

RECOMMENDATIONS

- Teachers should be equipped with knowledge and skills through in-service training and workshops by Ghana Education Service and

Ministry of Education. Teacher training programmes must be broadened to equip pre-service teachers with enough knowledge to screen and refer at-risk learners and enable them to develop and implement IEP after completion.

- In the quest to promote social acceptance among children with SEN and/or disabilities, it is imperative for Ministry of Education, Ministry of Information as well as Ministry of Gender, Women and Children Affairs to assist in educating the society about the need to accept and include children with SEN/or disabilities without hindrance.
- The Ministry of Education and Ghana Education Service should be jointly responsible for training teachers on curriculum adaptation, with Ghana Education Service focusing on the lesson plan, and how to use TLM to involve all learners.

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The Right to the Truth: An Inevitable facet in the Development of Victim Jurisprudence

Kushal Srivastava

ABSTRACT

The discussion on the ambit of right to the truth in International Law has deepened in contemporary times. The aspect of right to the truth is of paramount importance in terms of International human rights and International criminal justice. It is evident that human suffering in the shape of atrocities like war, genocide, and other conflicts against humanity are real and happening. These circumstances implicate immense psychological and emotional distress on the victim. It is here that the need to know the truth arises, so that the victim gets an opportunity to come across reality. It also helps in divulging the truth and it facilitates the judicial process in the end and helps to achieve the transitional justice that is vouched. There are several vital forums namely international human right courts, truth commissions, and international criminal courts that are in existence for the protection of rights to life and prohibition of torture against victim in furtherance of transnational justice.

Keywords: right to the truth, victim jurisprudence, human right, international criminal law, transitional justice.

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The discussion on the ambit of right to the truth in International Law has deepened in contemporary times. The aspect of right to the truth is of paramount importance in terms of International human rights and International criminal justice. It is evident that human suffering in the shape of atrocities like war, genocide, and other conflicts against humanity are real and happening. These circumstances implicate immense psychological and emotional distress on the victim. It is here that the need to know the truth arises, so that the victim gets an opportunity to come across reality. It also helps in divulging the truth and it facilitates the judicial process in the end and helps to achieve the transitional justice that is vouched. There are several vital forums namely international human right courts, truth commissions, and international criminal courts that are in existence for the protection of rights to life and prohibition of torture against victim in furtherance of transnational justice.

Moreover, it is evident that right to the truth in general parlance arises in situations wherein a particular state fails to deal with atrocities using their own civil and criminal procedures. It is here that the matter attracts concerns and invokes jurisdiction of international entities. Through this research manuscript, an attempt is made to understand and analyse the role of aspect of right to the truth in the development of victim jurisprudence. Another aspect of the manuscript contributes, suggests, and hits the core of the international debate on the right of a victim to the truth. Ultimately, it attempts to ring the bell at the right time and is an appropriate read for the enthusiasts of International Criminal law and those who have zeal to acknowledge the realities of a victim.

Keywords: right to the truth, victim jurisprudence, human right, international criminal law, transitional justice.

I. INTRODUCTION

“The Truth is an empowering and healing force. We embrace it for the past, the present and the future.”

-UN Secretary-General Antonio Guterres

Recently, the entire society was reminded of the International day for the right to truth. The day reminds each individual that they possess the right to know the truth behind the human rights violations, the importance of dignity of victims and to know about the events that led to sufferings. It is true that such a right is considered an imperative for the victim's right and even the United Nations have established such a right to the truth in favour of victims of human right atrocities, but in reality, not much is settled.

The conflict-ridden society or the aftermath of any human right violation or atrocity witnesses harsh questions on the truth behind the happenings of such events. Aggrieved individuals and the concerned society are in the right position to know as to what was the reason behind the happening of events and be aware of all truth incidental thereto or connected therewith. Quest for such questions portrays a jurisprudential dilemma about substantial rights of a victim and its role towards transitional justice and connected justice delivery mechanisms. Apart from such inbuilt necessities, there is an emerging demand to delve deeper, go to the roots of the reasons behind the need for the right to truth, and give impetus in analysing the entire scenario. There are various reports that present sufficient instances to prove that the right to truth is

universal in nature and the same cannot be considered in isolation. In parallel terms with the need to know the truth, it is vital to have a basic understanding of the right itself. It is important to discuss the elements like the content of the right to truth and as to how the entire emergence took place.

Through various heads, it is an attempt to analyse such vital postulates. This research manuscript unfolds by elaborating on the element of the right to truth, aspects and content it entails. After giving a brief glimpse into the basic understanding of the right, it proceeds to examine the foundational need of the right to truth. Need behind the demand for such rights helps to get a brief idea as to why voices advocating the victim's right to the truth are escalating and it assists in examining the genuinely attached. Moreover, another facet of the discussion depicts the contemporary developments, events at international pedestal that is playing a crucial role in affecting the domain and course of victim jurisprudence at large. Eventually another facet analyses the instrumentality of this right towards achieving transitional justice. It is true that there are judicial authorities and commissions that are working towards the objective of justice but right to the truth has the potential to make the entire postulate more holistic.

II. UNDERSTANDING THE RIGHT TO THE TRUTH

Before delving into the discussion and analysis of the right to truth, it is vital to go through the basic understanding of the concept and get a glimpse of the content of such right to the truth. In a judgment of 2008, the Inter-American Court of Human Rights (IACtHR) observed that-

*"This right to the truth requires a procedural determination of the most complete historical truth possible, including the determination of patterns of collective action and of all those..."*¹

¹ Valle Jaramillo et al. v. Columbia (November 2008) para 108.

There are literature that depict the trajectory² and highlights that initially the right to the truth was seen as soft obligation and was under the domain of *lex ferenda* but with time, there has been a wholesome difference in the understanding of the concept. Today the reality is that the right to truth is accepted to be norm with binding capacity and as an element falling within the definition of *lex lata*.³ The relevant courts and authorities with an objective to make the concept more elaborate and inclusive have interpreted the content on various occasions. It has also been accepted as a general principle of law at several instances.

There is a three dimensional approach executed to get the knowledge of the content of the right to the truth. Firstly, the approach is at individual level wherein the state has an obligation towards the individual/ victim of human right atrocities. Information revolving around the incident is to be looked for and thorough investigation to be done with an objective to gain knowledge about the perpetrators. These attempts are considered as elements of the content of right to the truth.⁴ The second approach that elaborates on the content aspect is of the structural level. Under this approach, it is essential to analyse the then existing administrative as well as political composition. This helps to identify the scenario circumscribing a particular atrocity and look for the what, when, and how questions. The third approach to be apprised with the content of the right to truth is involving the victim and their families and listening to their stories of the events. It adds to the knowledge of the content however, this specific approach has its own limitations.

² Malanie Klinkner & Howard Davis, 'The Right to the Truth in International Law', *Victims' rights in human rights and International Criminal Law*, 2020, Routledge-Taylor and Francis Group, 45.

³ Sam Szoke-Burke, 'Searching for the Right to Truth: The Impact of International Human Rights Law on National Transitional Justice Policies' (2015), 33 (2), *Berkeley Journal of International Law* 526 at 528.

⁴ UN Commission on Human Rights, Study on the Right to the Truth, Report of the Office of the United Nations High Commissioner for Human Rights, 8 February 2006, E/CN.4/2006/91, available at: <https://www.refworld.org/docid/46822b6c2.html> accessed 20 April 2023.

III. NEED FOR SUCH TRUTH: AN INEVITABLE REQUISITE

It is true that human suffering opens a plethora of questions and calls for various immediate actions. One such element is the need for truth. The requisite for such need is important and is growing more strong and deeper with time. The aspect of knowing the truth behind the atrocities that happened is of paramount importance. Primarily, the need arises because the victims and their relatives are left with existential questions. Human atrocities have the tendency to create a void wherein victims are not in a state to understand and grasp the reasons behind such acts. The reasons and need behind seeking such truth are many. Primarily the information behind such disappearances or sufferings can help in explaining the absence of a father or a mother or a child for that matter. It can facilitate the investigation process and assist victims and their kins in getting answers to several of their questions and making the entire process more accountable. Need to know the truth can also be seen as a means to achieve justice. Another need arises if unfortunately death has occurred, it can help in tracing the mortal remains and giving opportunity of last rites and showering a dignified funeral to the dead. Moreover, it can also give way for an instance of documenting such human atrocities so that it helps in disseminating such stories to the public at large.⁵ Documenting the sufferings can also act as genuine precedent and assist connected judicial proceedings and boost the aspect of human rights advocacy.⁶

In addition to such a need for truth about victims, the need also arises from society's point of view. The right to the truth behind a human right violation is equally important when it comes to a concerned society. It will not be wrong to state that the community at large becomes a

⁵ Louis Bickford, Patricia Karam, Hassan Mneimneh and Patrick Pierce, 'Documenting Truth' (International Centre for Transitional Justice Report 2009), <https://www.ictj.org/sites/default/files/ICTJ-DAG-Global-Documenting-Truth-2009-English.pdf> accessed 28 April 2023.

⁶ Simon Robins, Families of the Missing: A Test for contemporary approaches to transitional justice (Routledge 2013).

stakeholder if the target of such offence is the identity of such community itself. A particular society gets affected when the human rights of its inhabitants are threatened or altered with. With such breach in the fundamental human rights of individuals, the entire rule of law of that specific society or connected societies will be on the verge of collapse. Therefore, the need for such truth is evidently vital for both individuals and society. These aspects are so interwoven that it's not easy to accept and analyse them in isolation and according to one's own whim and fancies.

IV. THE UNIVERSALITY OF TRUTH TOWARDS TRANSITIONAL JUSTICE

When we talk about the domain of transitional justice, the aspect of truth is considered to be both universal in nature and as a prerequisite for the justice that is sought. It will not be wrong to state that such a right is complementary to the entire justice delivery mechanism. If there has been a victim of human rights violation, it becomes a universal right⁷ of the aggrieved person to be informed and know the truth of the entire happening of events. Moreover, the want of justice cannot be considered to be one sided and ignore the universal existence of the right to truth. The judicial process ought to be considerate of such necessities. For instance, more than a decade old violation that took place in the country of Nepal is an appropriate example that highlights the acceptance of the right to know the truth as an inevitable universality towards achieving transitional justice. The International Centre for

⁷ UN Human Rights Council, Declaration on the Right to the Truth, U.N. Doc E/CN.4/2005/L.10/Add.17, April 2005, available at <https://documents-dds-ny.un.org/doc/UNDOC/LTD/G05/138/28/PDF/G0513828.pdf?OpenElement>; UN Commission on Human Rights updated set of protection and promotion of Human Rights through action to combat impunity, principle 2, U.N. Doc. E/CN.4/2005/102/Add.1, February, 2005, available at <https://documents-dds-ny.un.org/doc/UNDOC/GEN/G05/109/00/PDF/G0510900.pdf?OpenElement>; https://ap.ohchr.org/documents/e/hrc/resolutions/a_hrc_res_9_11.pdf

Transitional Justice Report of 2012⁸ attempts to depict the entire scenario. It was depicted that the right to truth cannot be seen as any political expediency but a well-established and universal form of human right. There can be inquiries through truth commissions ranging from analysing facts to delving deeper into the cause-effect relationship of the consequences. In the aftermath of the conflict, concerned organizations initiated to demand justice⁹ and legislative bills were being tabled with an objective to make the offences of abduction and aid in disappearances fall under the stringent domain of criminalization. However, such bills had their own limitations and loopholes, various voices that rose through these bills advocated for the need to accept the universal nature of the right to know the truth. A Lesson that can be learned from the discussion that the concerned organizations and relevant stakeholders delved into while pointing out the need to know truth and its integral essence in the process to achieve transitional justice at large. A robust policy engaging relevant entities and being executed towards transparency and access to information within the realm of right to truth is vital and futuristic.¹⁰ The state of affairs in the above mentioned scenario demarcates that there is an existing right of victims as well as the concerned society to be well acquainted with the truth and such a right showcases the element of being international as well as universal. Countries and territories that unfortunately fall under the dark dungeons of human atrocity of such nature should stand again and vouch for such right towards the journey of justice that is transitional.

V. GLIMPSE ON THE CONTEMPORARY SCENARIO

Recently the world celebrated the International day for the Right to the truth concerning gross human rights violations and for the dignity of

⁸ Eduardo Gonzalez Cueva, 'Seeking options for the Right to the Truth in Nepal', (International Centre for Transitional Justice Report of 2012) available at <https://www.ictj.org/sites/default/files/ICTJ-Briefing-Paper-Nepal-Ordinance-De-c-2012-ENG.pdf>.

⁹ *ibid* at 3.

¹⁰ *Supra* note at 10.

victims.¹¹ It was March 24 when Monsignor Oscar Arnulfo Romero, an activist who raised voice and advocated against the human right violations in El Salvador was murdered.¹² In order to pay tribute to his memory, the day has been celebrated as International day for the right to the truth with an objective to promote the significance of pursuing truth and transitional justice for the victim/individual who has been at the receiving end of human right violations and other connected atrocities. In addition to this, one should not forget the situation of Bosnia and Herzegovina that had demarcated the importance of the right to the truth towards holistic growth of the society.

Moving on to the recent developments, there are countries that are in the process of either initiating provisions or amending the existing acts/bills that revolve around the concept of transitional Justice. For instance, Nepal is one such country that is in a process of amending its existing law that talks about investigation, inquiry, truth, and reconciliation regarding the disappearances.¹³ The government of Nepal has presented a bill in the house with an objective to adhere to the apex court's ruling and conclude transitional justice process. However, the opposite parties have retaliated against this act by claiming that the said bill will not safeguard the victims' rights and will lead to compromise of several human right principles.¹⁴ In addition to facing harsh questions by the opposition leaders, the act has attracted attention from worldwide, the country has been witnessing questions by International institutions, and this has escalated the debate largely. Institutions are of the opinion that such amendment is not in consonance with the international legal obligations and if adopted will have the potential to undermine justice delivery mechanisms and human right

¹¹ <https://www.un.org/en/observances/right-to-truth-day>.

¹² *ibid*.

¹³ The Enforced Disappearances Enquiry, Truth and Reconciliation Commission Act, 2014, available at <https://www.satp.org/Docs/Document/839.pdf> accessed on 10 May 2023.

¹⁴ <https://kathmandupost.com/politics/2023/03/20/disputed-bill-to-revise-transitional-justice-law-lands-in-house>, March 20, 2023, accessed on 15 May 2023.

applications.¹⁵ Thus, it has been evident that the nature of such amendments are prone to questions, debate, and call for elaborative consultation with connected entities. The case is

either not of Nepal alone, there are various countries that are in between or towards culminating legal provisions towards right to the truth in specific and transitional justice in general.

International Instruments

- Declaration on the Protection of All Persons from Enforced Disappearance (1992)
- Basic Principles and Guidelines on the Right to a Remedy and Reparation (2005)
- International Convention for the Protection of All Persons from Enforced Disappearance (2006)

Proclamation of the International Day

- General Assembly resolution proclaiming 24 March as the International Day for the Right to the Truth concerning Gross Human Rights Violations and for the Dignity of Victims [A/RES/65/196]
- Human Rights Council resolution proclaiming 24 March as the International Day for the Right to the Truth concerning Gross Human Rights Violations and for the Dignity of Victims [A/HRC/RES/14/7]

Reports of the UN High Commissioner for Human Rights on the Right to the Truth

- A/HRC/15/33 (2010)
- A/HRC/12/19 (2009)
- A/HRC/5/7 (2007)

Resolutions on the Right to the Truth

- General Assembly resolution on the right to the truth [A/RES/68/165]
- Human Rights Council resolution on the right to the truth [A/HRC/RES/12/12]
- General Assembly resolution on basic principles and guidelines on the right to a remedy and reparation for victims of gross violations of international human rights law and serious violations of international humanitarian law [A/RES/60/147]

Other Documents

- General Comment on the Right to the Truth in Relation to Enforced Disappearances (2010)
- Study on the right to the truth (2006) [E/CN.4/2006/91]
- S/25500, 1993 Report of the Commission on the Truth for El Salvador

Figure 1.1¹⁶

¹⁵ Human Rights Watch, 'Nepal: Transitional Justice Bill Needs to Protect victims, not abusers', March 23, 2023, available at <https://www.hrw.org/news/2023/03/23/nepal-transitional-justice-bill-needs-protect-victims-not-abusers>, accessed on 17 May, 2023.

¹⁶ <https://www.un.org/en/observances/right-to-truth-day>.

To advocate the importance of this postulate, the United Nations has devoted an entire facet on this topic. There have been General Assembly resolutions that proclaim the essence of the right to the truth towards the dignity of victims of gross human right violations.¹⁷ It has also executed several international instruments (declaration, guidelines, and convention) with an objective to protect the rights of such affected persons. In addition to this, there are annual reports that are published to highlight the importance of this right in international law.¹⁸ The figure 1.1, testifies the fact that there have been a lot of developments that have taken shape lately at International level and each document mentioned in the figure above signifies as per need of the hour there have been modifications to cater and answer connected voices.

VI. THE WAY FORWARD

Achieving transitional justice is not a phenomenon that can happen in a wink. It takes time and is a true test of patience. However, the wait should not undermine the rights of an individual in any case. The delivery of transitional justice is of paramount importance because it has the potential to preserve the rule of law of a nation. The aspect that talks about the status quo of Nepal is a live testimony of this facet.¹⁹ There are various legal procedures and mechanisms, which the concerned countries ought to adhere to in order to ensure transparency and accountability and not to undermine the rule of law.²⁰ Countries that face human right violations on a regular basis are deemed to develop strategic and policy frameworks so that existence and

implementation of transitional justice mechanisms are up and running with the intention to safeguard the rights of individuals and advocate the true essence of right to the truth.

¹⁷<https://documents-dds-ny.un.org/doc/UNDOC/GEN/N10/524/30/PDF/N1052430.pdf?OpenElement>.

¹⁸ Reports of the United Nations High Commissioner for Human Rights, available at <https://documents-dds-ny.un.org/doc/UNDOC/GEN/G07/129/48/PDF/G0712948.pdf?OpenElement;https://documents-dds-ny.un.org/doc/UNDOC/GEN/G09/150/89/PDF/G0915089.pdf?OpenElement;https://documents-dds-ny.un.org/doc/UNDOC/GEN/G10/151/73/PDF/G1015173.pdf?OpenElement>; accessed on 6 May, 2023.

¹⁹ Human Rights Watch, 'Nepal: Amend Transitional Justice Bill', July 2022, available at <https://www.hrw.org/news/2022/07/25/nepal-amend-transitional-justice-bill>, accessed on 15 May, 2023.

²⁰ <https://www.ohchr.org/en/transitional-justice>.

 Amnesty International

Mexico must guarantee truth and justice for families of Ayotzinapa students

Amnesty International expresses grave concern over the recent events that have taken place in relation to the investigation into the...

29-Sept-2022



Figure 1.2²¹

 The Guardian

'Truth is one of our rights': victims of Indonesia's bloody past want more than regret from their president

After Joko Widodo acknowledged the mass killings of 1965-66, victims say compensation is the next step.

12-Jan-2023



Figure 1.3²²

 Telangana Today

Opinion: Our Right to Truth

The quest for truth and zest for knowledge are at an all-time low, and it appears that right education is replaced with rightist education.

07-Feb-2023



Figure 1.4²³

 The Guardian Nigeria

March 24th: International Day for Truth and Dignity

The International Day for the Right to the Truth (March 24th) concerning Gross Human Rights Violations and for the Dignity of Victims is.

24-Mar-2023



Figure 1.5²⁴

 International Press Institute

The right to truth: IPI demands justice for killed journalists in Africa

By Nompilo Simanje, IPI Africa Advocacy and Partnerships Lead. Mar 30, 2023.
SHARE. WhatsApp. March 24 marks the International Day for the...
1 month ago



Figure 1.6²⁵

²¹<https://www.amnesty.org/en/latest/news/2022/09/mexico-must-guarantee-memory-truth-justice-ayotzinapa/>

²²<https://www.theguardian.com/world/2023/jan/13/truth-is-one-of-our-rights-victims-of-indonesias-bloody-past-want-more-than-regret-from-their-president>.

²³<https://telanganatoday.com/opinion-right-to-truth>.

²⁴<https://guardian.ng/life/march-24th-international-day-for-truth-and-dignity/>.

²⁵<https://ipi.media/the-right-to-truth-ipi-demands-justice-for-killed-journalists-in-africa/>.

Eventually to demarcate the importance of the right to the truth towards holistic growth of the society, it is vital to keep a tab on the contemporary needs of the society and tune in our efforts in accordance with the evolving need. All above-mentioned figures starting from 1.2 to 1.6 are evident of the fact that voices advocating the right to the truth is emerging and escalating at the international pedestal and with passage of time, individual and societies are becoming more aware of such rights in the domain of international criminal law. However, one should apprised to the fact that the entirety to the right to the truth is not justice per se but a mere means to justice.



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Hispanic Countermarks on Caligula's Coins

Dr. Juan Carlos Herreras Belled

ABSTRACT

Caligula never set foot on Hispanic soil and his only relationship was to gradually close all those monetary workshops so that Rome and Lugdunum would be the only mints that would economically feed the needs of his subjects. It is possible that the abundance of coins minted during the governments of Augustus and Tiberius partially alleviated the need for coins at the mints that still functioned during their government. From 39 A.D. onwards, he granted the administration of the coinage and public revenues to slaves of his house to the detriment of the Senate, which he humiliated, earning his eternal hatred for his social and political investment.

Keywords: caligula; closing hispanic mints; *damnatio memoriae*; reduction in percentage of coins in circulation.

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Hispanic Countermarks on Caligula's Coins

Las Contramarcas Hispanas Sobre Monedas de Calígula

Dr. Juan Carlos Herreras Belled

ABSTRACT

Caligula never set foot on Hispanic soil and his only relationship was to gradually close all those monetary workshops so that Rome and Lugdunum would be the only mints that would economically feed the needs of his subjects. It is possible that the abundance of coins minted during the governments of Augustus and Tiberius partially alleviated the need for coins at the mints that still functioned during their government. From 39 A.D. onwards, he granted the administration of the coinage and public revenues to slaves of his house to the detriment of the Senate, which he humiliated, earning his eternal hatred for his social and political investment.

As García y Bellido (2006:649) points out, for the first time since Augustus in Hispania more coinage minted in Rome circulated than that issued in Hispania itself, taking into account that after the death of Caligula and the monetary damnatio ordered by Claudio, the percentage of coinage in circulation would be greatly reduced. The percentage of coins found in excavations in Roman camps in the northwest of Hispania is particularly insignificant, about 7 coins out of more than 1,130 found.

Keywords: calígula; closing hispanic mints; damnatio memoriae; reduction in percentage of coins in circulation.

RESUMEN

Calígula nunca pisó suelo hispano y su única relación fue ir cerrando paulatinamente todos aquellos talleres monetarios en aras de que fuesen Roma y Lugdunum las únicas cecas que alimentasen económicamente las necesidades que tendrían sus súbditos. Es posible que la abundancia de moneda acuñada durante los

gobiernos de Augusto y Tiberio paliara en parte la necesidad de moneda junto a las cecas que aún funcionaron durante su gobierno. A partir del año 39 d.C. concedió la intendencia de la moneda y de las rentas públicas a esclavos de su casa en detrimento del senado, al que humilló ganándose su eterno odio por su inversión social y política.

Como indica García y Bellido (2006:649)¹, por primera vez desde Augusto en Hispania circula más moneda acuñada en Roma que la emitida en la propia Hispania, teniendo en cuenta que tras la muerte de Calígula y la damnatio monetaria ordenada por Claudio, su porcentaje monetario en circulación se vería muy reducido. El porcentaje de moneda localizada en excavaciones en campamentos romanos en la zona Noroeste de Hispania es especialmente insignificante, unas 7 monedas de más de 1.130 localizadas.

Palabras clave: calígula; cierre cecas hispanas; damnatio memoriae; reducción porcentaje monedas en circulación.

“Le dijeron que era superior a todos los príncipes y reyes de la tierra, y a partir de entonces empezó a atribuirse la majestad divina” (Suetonio 22.2)².

“They told him that he was superior to all the princes and kings of the earth, and thereafter he began to ascribe to himself divine majesty” (Suetonius 22.2).

¹ GARCÍA-BELLIDO, M. P. (2006): «El abastecimiento de moneda al ejército de Hispania en el Noroeste». En García-Bellido, M.P Coord. Los campamentos romanos en Hispania (27 a.C.-192 d.C). Vol- 2. *Anejos de Gladius*. 9. Madrid, p.623-671.

² Dr. En arqueología clásica por la universidad de Zaragoza. Junki5959@gmail.com - Suetonio, Los doce Césares, traducción / Arnal, J. Ibérica, Barcelona, 1994.

I. CALÍGULA: LA DECADENCIA DE LAS CECAS PROVINCIALES Y EL OCASO DE LAS CONTRAMARCAS HISPANAS

Pese a la brevedad de su reinado, la obra de Calígula en Hispania es importante. En primer lugar, llevó a cabo el desmantelamiento militar de Hispania que ya no era una zona en guerra: la *Legio IIII Macedónica* asentada en el *conventus Cluniensis* sale definitivamente de Hispania rumbo a Germania (año 39 d.C.), quedando sólo algunas tropas en *Asturica* y *Gallaecia* para custodia de posibles insurrecciones. Aunque Hispania ha dejado de ser una provincia conflictiva y ha pasado a ser suministradora de legionarios para otros ejércitos provinciales.

Todas las *civitates* eran durante el reinado de Calígula, comunidades romanas, excepto unas pocas que eran de Iure latino (*Segobriga* y *Ercavica*). Todas estas ciudades eran consideradas como vehículos por excelencia del tema dinástico que jugó tan gran papel en la publicidad inicial de Calígula. Sin embargo, hacia el año 39 d.C. hubo un gran cambio en su política. Desde entonces el emperador se volvió cada vez más intolerante con todos sus parientes, tanto vivos como muertos. Sabemos que ese mismo año, el propio emperador explícita y repetidamente prohibió rendir honores a sus parientes vivos y por extensión los muertos también cayeron en la misma proscripción.

En Hispania cada ceca pertenecía a una localidad romana o latina; así escribe Grant (1950)³ indicando que la finalización de las acuñaciones en las ciudades privilegiadas, por todo el Imperio, significa la supresión de las acuñaciones de las cecas de la Hispania continental.

En este período, se produjo una drástica reducción de las acuñaciones hispano-romanas. Los talleres de la *Lusitania* y de la *Bética*, ya no acuñaron moneda, mientras que en la *Tarraconense* sólo siete permanecieron activos, de las que tan sólo las cecas de *Acci*, *Carthago Nova*, *Caesaraugusta*, *Ercavica* y *Segobriga*

³ GRANT, M. (1950): "El final de las acuñaciones ciudadanas en España", *Crónica del Vº Congreso Arqueológico del SW*, p. 270-276.

presenta algún tipo de contramarca, sin llegar a alcanzar el final del reinado, pues en torno al año 40 d.C., tal vez antes, fueron clausurados definitivamente.

Con el resto de emperadores la actividad es variable en cuanto al número de cecas que funcionan; con Tiberio aumentan y con Calígula disminuyen hasta desaparecer toda actividad de acuñación en Hispania con Claudio. La reducción de emisiones y cecas, se debió a la iniciación de un proceso que finalizará con la imposición de un tipo de moneda única romana, que se consolidará bajo el reinado de Claudio.

En Occidente este fenómeno es general: tanto en África-Numidia como en Sicilia y provincias en las que algunas ciudades habían acuñado con Augusto y con Tiberio, cesan las acuñaciones con Calígula. Lo mismo ocurre en las escasas cecas mauritanas, galas o con la itálica de *Paestum*. De cualquier forma, el final de las acuñaciones es mucho más llamativo en Hispania, que bajo los dos primeros emperadores julio-claudios, había mantenido un volumen de acuñación y de cecas superior al del resto de los talleres occidentales en su conjunto; este hecho explica, que bajo Calígula, aunque sólo fuera durante los primeros años de su reinado, siguieran acuñando siete cecas en la *Tarraconense*.

En Oriente la situación era diferente y numerosas ciudades mantuvieron su actividad emisora. Indudablemente, Roma se mostró mucho más tolerante con las emisiones autónomas de la parte greco-parlante del Imperio tanto bajo los julio-claudios como posteriormente. Ello indica una mayor necesidad de numerario de la parte oriental, mucho más desarrollada económicamente, y mucho más necesitada de moneda para atender las operaciones militares en las que se encontraba inmerso casi todo el imperio.

El cierre de los talleres hispanorromanos a fines del reinado de Calígula y la no apertura de los mismos con Claudio I, unido a la *damnatio memoriae* de Calígula, ocasionó la desaparición de muchas monedas suyas, quedando en principio resuelta el problema con la aparición de

los ases de Claudio de imitación, pues las monedas que circularon hasta entonces fueron las imperiales, mezcladas indudablemente con las de etapas anteriores que pervivirán en el tiempo hasta bastante tarde y en gran volumen.

Con respecto a la *damnatio memoriae* de Calígula, indica Straehle (2022)⁴, que su memoria no nunca fue oficialmente condenada. La intención del senado, por sus múltiples humillaciones fue hacerlo, pero Claudio se negó a hacerlo. El razonamiento fue proteger a su *gens* de la mala reputación que venía arrastrando en un momento en que existían movimientos a favor de instaurar de nuevo la república, que todavía gratos recuerdos traía. Por ello su decisión fue aplicar una *damnatio* descafeinada, que nunca adquirió un carácter oficial, aplicada casi exclusivamente a la retirada de monumentos, borrado de su nombre de inscripciones y contramarcado de monedas eliminado toda su autoridad en beneficio de su sucesor Claudio.

Calígula nunca estuvo en Hispania, a pesar de encontrar acuñaciones monetales de su época con su efigie. Como indica Gozalbes⁵ (2014:986), se constata la existencia de un gran número de representaciones de influjo ítalo-romano y honorífico hacia el poder imperial. Por un lado con carácter político-dinástico y por otro lado alusivo al carácter cívico. Se sigue manteniendo la representación del retrato del emperador, como se venía haciendo hasta ahora, en los anversos como símbolo del poder oficial y sobre todo como adopción de las élites municipales. Hispania, ya ampliamente romanizada en estos momentos, asume una iconografía adaptada a una propaganda dinástica cuya aceptación la integra en una cultura totalmente romana.

Como indican Pérez et all (2011: 634)⁶, Calígula usó sus monedas como símbolo reivindicativo en su proceso de continuidad dinástica colocando en ellas los retratos de sus antecesores y sobre todo de aquellos que él consideraba habían muerto por orden de Tiberio, así como las de sus hermanos mayores colocando del mismo modo símbolos como Seguritas, Concordia y Fortuna.

En las monedas hispanas de este periodo y en los reversos de las mismas, se adoptan motivos religiosos junto a una tipología multiforme y variada como veremos posteriormente en las monedas de *Colonia Iulia Gemella Acci*, *Colonia Urbs Nova Carthago*, *Colonia Caesar Augusta*, *Municipium Ercavica* y *Municipium Segobriga*.

Lo que sí sabemos es que Hispania dejó de ser importante para Roma puesto que su expansión continuaba hacia Oriente y es allí donde los sucesivos emperadores imprimirán unas determinadas contramarcas que no serán conocidas en Hispania a no ser por las llegadas a través de licenciados o comerciantes.

II. CONTRAMARCAS SOBRE MONEDAS DE CALÍGULA EN OTRAS PROVINCIAS IMPERIALES

Con respecto a la aparición de contramarcas en otras provincias ajenas a Hispania, pasaremos a comentar las más representativas. Grünwald (1946)⁷ en *Vindonissa* anota en su lista de contramarcas, las aparecidas sobre monedas de Calígula entre los números 107 a 118, grupo XV, siendo estas las siguientes: TI CL en cartela rectangular; TIB CL AV IMP nexadas por pares en cartela rectangular; T CQA en cartela rectangular; TIVL en cartela rectangular; TICIAV en cartela rectangular; TB CL AV IMP en cartela rectangular y nexadas; TM AV I [H] en cartela rectangular; TI AV nexadas en cartela rectangular; NCAPR en cartela rectangular; T AV

⁴ STRAEHLE, E. (2022): "Roma and *damnatio memoriae*. Some Observations on the Ancient Tensions Between Power, History, and Memory". *Historiografias* 23. p. 21-41.

⁵ GOZALBES GARCÍA, H. (2014): "Transformaciones y pervivencias en las acuñaciones hispanas en época de Cayo Calígula". *XV Congreso Nacional de Numismática* (Madrid, 28-30 oct.), p. 983-998.

⁶ PÉREZ GONZÁLEZ, C; ILLARREGUI, E; ARRIBAS LOBO, P. (2011): "Circulación monetaria de G. Calígula en el Norte de Hispania", *XIV Congreso Nacional de Numismática*, p. 629-641.

⁷ GRÜNWALD, M. (1946): *Die Römischen Bronze und Kopfermünzen mit Schlagmarken im Legionslager Vindonissa*, Basilea, p. 125-135.

G en cartela rectangular; T AV en cartela rectangular y B O en cartela circular doble.

El único problema a plantear es la no definición de anverso o reverso de las contramarcas, ni el lugar de emisión de las monedas, por lo que tan sólo da una visión parcial del tema.

Sobre el mismo yacimiento, Kraay (1962)⁸, da una visión más completa, ya que distingue entre las contramarcas de anverso y reverso, y su clara referencia al RIC como dato diferenciador.

Distingue pues en piezas acuñadas en bronce y sus valores, ases, dupondios y sestercios. Cita exclusivamente 5 tipos de contramarcas para los anversos y 8 tipos para los reversos.

- RIC 30 ff: TI AV (anv); TIC AV IM (anv); 55 (anv), todas ellas en cartela rectangular; Cartela rectangular vacía []
- RIC 30ff: TI AV (rev); TB CVP (rev); T CA (rev); TI C A (rev); TIVL (rev), todas ellas en cartela rectangular; Cartela rectangular vacía []
- RIC 36-37: TI AV (anv) en cartela rectangular
- RIC 44: TB CVP (anv); TIC AV IM (anv); TI AV (anv), todas ellas en cartela rectangular; Cartela rectangular vacía []
- RIC 44: TC IMP (rev); TI AV (rev), ambas en cartela rectangular
- RIC S.96, nº 8: TI AV (anv); TIC AV IM (anv), ambas en cartela rectangular
- RIC S.96, nº 8: TI AV (rev) en cartela rectangular
- RIC .30: BON (rev) en cartela rectangular

Otro de los autores que cita diferentes contramarcas para el período de Calígula, es Mattingly (1965)⁹ diferenciando las contramarcas según las monedas y leyendas monetales donde se encuentren.

Taller de Roma:

⁸ KRAAY, C.M. (1962): "Die Münzfunde von Vindonissa". Veröffentlichungen der Gesellschaft pro Vindonissa, Band V, p. 45-140.

⁹ MATTINGLY, H. (1976): *Coins of the Roman Empire in the British Museum*, British Museum, Londres, pp. xxxii-xliii.

2.1 Sestercio con Leyenda S.P.Q.R.P.P. OB CIVES SERVATOS

TI AV, BON, PRO

2.2 As con Leyenda VESTA S.C.

DD, HN(?), TCA, TCIMP, TICA, TB CA IMP.

2.3 Sestercio con Leyenda AGRIPINA I

TB CA IMP

2.4 Dupondio con Leyenda CONSENSV SENAT. DIVUS AUGUSTUS

TI AV, TB CA IMP, AS, PRO

2.5 Dupondio con Leyenda NERO DRUSUS CAESARES

TB CA IMP

2.6 Dupondio con Leyenda SIGNIS RECEPT. GERMANICUS

NCAPR, TI AV, TB CA IM

2.7 As con Leyenda SIGNIS RECEPT

TB CA IMP, TIB IMP

Con respecto a la aparición de contramarcas sobre monedas galas para este período, Guiard (1976)¹⁰, indica la existencia de un único tipo de contramarcas, aparecida sobre una moneda acuñada en *Lugdunum*, que hace referencia a la titulación del propio emperador. Se trata de la contramarcas CAC en cartela rectangular aparecida sobre un as de A. Licinius Nerva Silanus.

Banti y Simonetti en el C.R.N. (1972-1984)¹¹ citan para este período sólo una contramarcas (Vol. XIII pág. 36 nº 138) que aparece sobre el reverso de un As de imitación provincial posiblemente acuñado en la Galia representada como [TI A].

¹⁰ GIARD, J .B. (1976): Catalogue des Monnaies d'empire romain I. Auguste, Paris, pp. 24-40.

¹¹ BANTI, A. Y SIMONETTI, L. (1972-84): *Corpus Numorum Romanorum*, Florencia.

Por último, en la zona Oriental Howgego (1985)¹², cita 10 tipos, 9 se presentan sobre anverso y tan sólo 1 sobre reverso. Haciéndose difícil su descripción, indicamos su referencia.

- Busto juvenil en cartela ovoide: 53 (anv), *Bizancio*
- Rostro en cartela oval: 170 (anv), *Laodicea*
- Caras de Dioses: 193 (anv), *Ilium*; 204 (anv)?
- Lechuza: 329 (anv), *Tralles*
- Abeja: 366 (anv), *Gabala*
- Objetos indeterminados: 497 (anv), *Balbura*
- Monogramas griegos: 612 (anv), *Knosos*
- Letras indeterminadas: 715 (anv), *Aezani*; 720 (rev), *Laodicea*

Con este emperador y el final de las acuñaciones provinciales, queda patente que el tema de las contramarcas, se abandona en beneficio de la expansión de éstas, detrás de los ejércitos y sus campañas dirigidas hacia Oriente y Britania. En Hispania, tan sólo se conocen una docena de contramarcas colocadas sobre monedas de cinco cecas, lo que explicará el comienzo del fenómeno de clausura de las cecas en beneficio exclusivamente de la ceca de *Roma*.

Resulta interesante destacar el hecho de que las contramarcas, dependiendo de los períodos de aparición, se colocaban proporcionalmente más sobre una cara o sobre otra. Destacaremos el hecho curioso de que en época anterior a la instauración del imperio, es decir sobre monedas de alfabeto ibérico, aparecen colocadas sobre el anverso muchas más contramarcas que sobre el reverso. Este fenómeno se invierte y sobre las monedas de acuñación de Augusto y Tiberio la circunstancia es opuesta, es decir las contramarcas aparecidas sobre reverso casi duplican a las aparecidas sobre anverso, y sobre las monedas de acuñación del emperador Calígula, la proporción se equipara apareciendo menos marcas sobre reverso que sobre anverso.

De las siete cecas que siguen acuñando durante el gobierno de Calígula, tan solo cinco presentan sobre sus monedas algún tipo de contramarca. En

estas cinco cecas podemos localizar nueve tipos de contramarcas distintas y un punzón, de las cuales tan sólo una aparece exclusivamente en una moneda de este emperador (RPC 465, Ercavica) muy posiblemente colocada fuera de Hispania y que posteriormente veremos.

III. CONTRAMARCAS HISPANAS SOBRE NUMERARIO DE CALÍGULA

Con respecto a las demás contramarcas analizaremos su posible significado e intentaremos establecer una cronología de colocación, buscando a su vez analogías con otras contramarcas aparecidas sobre el *limes* occidental del Imperio.

3.1 CA; CA Realizada a Punzón Sobre Anverso y Siempre Delante de la Cara del Emperador

Indica Guadán (1960 a)¹³ su probable referencia a *C(olonia) (Iulia Gemella)A(cci)* no siendo en absoluto descabellada a pesar de aparecer siempre situada sobre anverso. Colocada sobre dupondios y ases de la época de Augusto; Tiberio y Calígula. Dicha ceca pasó a pertenecer a la Tarraconense después de la reforma administrativa ocurrida entre los años 7-2 a.C, pero volviendo a los límites de la Bética en el año 27 a.C. aunque sin salir del control de la Tarraconense. Sería quizás fundada por Cesar en el 45 a.C. repartiendo parte de sus tierras entre los veteranos de la *legio prima vernácula* y de la *legio secunda* como *deductio* militar. Recibió el *ius italicum* de manos de Cesar y el título de Colonia de manos de Augusto.

Por su existencia sobre piezas de Tiberio, y si tan sólo hiciera alusión al monograma de la ceca, habría sido colocada durante el gobierno de este emperador por la similitud con otras contramarcas denominacionales, siendo similar a las contramarcas aparecidas sobre monedas de Colonia Augusta. Sin embargo al existir colocada sobre moneda de Calígula nos haría pensar que es posible que no correspondiera a dicha acepción, en cuyo caso

¹² HOWGEGO, C.J. (1985): *Greek Imperial Countermarks*, Royal Numismatic Society, Londres.

¹³ GUADAN, A.M. (1960): Tipología de las contramarcas en la numismática iberorromana", *Numario Hispánico IX*, p. 7-121.

tendría que hace referencia a la titulatura de *C(aesar) A(ugustus)*, *C(aius) A(ugustus)* incluso por similitud con otras contramarcas aparecidas en monedas imperiales, alusión a *C(laudius) A(ugustus)* sin la TI inicial. Indica el propio Guadán que en cuanto a su fecha de colocación sería en época de Calígula ya que sigue apareciendo con otra estructura, pero de igual significado, sobre algunas de las monedas de su gobierno.

Llevaríamos la fecha de colocación de esta contramarcas al año 41 d.C. Este tipo de contramarcas en cartela rectangular, no ha podido ser contrastada.

Colonia Iulia Gemella Acci: colocada sobre anverso y realizada a punzón sobre monedas de Augusto, Tiberio y Calígula Vigo Llagostera¹⁴-No; Guadán¹⁵- II; RPC¹⁶- 38; Pina¹⁷-Si; Vindonissa¹⁸-No; Howgego¹⁹-No; CCH²⁰-1.2/ 1.3 y 1.4.

Calígula: Vives CLXVII, 1 / RPC 144: Subasta Aureo 21/09/2006 lote 38; Ebay 261002568585 04 2012; Subasta Pliego 58 06/07/2022 lote 278; Subasta Herrero 29/11/2016 lote 6; Ebay 324148160953 08 2020; Subasta Vico 14/04/2021 lote 9 (junto a contramarcas 7.11 en reverso).

¹⁴ VIGO LLAGOSTERA, J.M. (1952): "Los resellos de las monedas antiguas de Hispania". *Numisma* 5, p. 33-40.

¹⁵ GUADAN, A.M. (1960): Tipología de las contramarcas en la numismática iberorromana", *Numario Hispánico* IX, p. 7-121.

¹⁶ BURNETT, A.; AMANDRY, M.; RIPOLLÈS, P. P. (1992): *Roman Provincial Coinage, I. From the death of Caesar to the death of Vitellius (44 BC-AD 69)*. British Museum Press y Bibliothèque Nationale de France, Londres-París. (RPC).

¹⁷ MANUEL PINA: <https://www.tesorillo.com/articulos/contramarcas/index.htm>.

¹⁸ GRÜNWALD, M. (1946): *Die Römischen Bronze und Kopfermünzen mit Schlagmarken im Legionslager Vindonissa*, Basilea, p. 125-135.

¹⁹ HOWGEGO, C. J. (1985): *Greek Imperial Countermarks*, Royal Numismatic Society, Londres.

²⁰ HERRERAS BELLED, J.C. (2023): Catálogo de contramarcas Hispanas. Academia.edu



Fig. 1: Ebay 261002568585 02 2012

3.2 [SE] Realizada a Troquel Sobre Anverso y Reverso en Cartela Rectangular.

Esta contramarca la encontramos sobre las monedas de Calígula de las cecas de Carthago Nova y Segobriga. Colocada sobre ases. Esta misma contramarca se conoce colocada sobre monedas de otras cecas desde Augusto.

Conocida en toda la frontera, ha vertido múltiples opiniones al respecto de su significado. Una de las teorías defendida en su día por García y Bellido²¹ (2004:256), es que pudiera hacer alusión a las iniciales de *SE(gobriga)*, ya que suele aparecer sobre monedas de dicha ceca convirtiendo como indica Chaves²² (1979) la moneda en una téssera, sin embargo otra teoría más, es la alusión a la abreviatura de *SE(mis)*, como defendió Guadán (1960)²³. Citada por Grünwald (1946)²⁴ en *Vindonissa* con el número 46 a (Augusto) le da el significado de *SE(entiis Saturninus)*, también citada sobre *Lugdunum* y región renana (Tiberio), existiendo una variante con cartela ovoide, desconocida para Hispania.

García y Bellido²⁵ (2004:256-258), expone que una contramarca similar aparece sobre ases de *Roma* y *Lugdunum* (1^a y 2^a serie) estampada sobre el cuello del emperador o también en

²¹ GARCIA Y BELLIDO, M.P.: (2004), *Las legiones Hispánicas en Germania. Moneda y Ejército. Anejos de Gladius 6.* CSIC, Instituto histórico Hoffmeyer. Madrid

²² CHAVES TRISTAN, F. (1979): "Contramarcas en las amonedaciones de Colonia Patricia, Colonia Romula, Itálica, Iulia Traducta y Ebora", *Acta Numismática IX*, p. 41-52.

²³ GUADAN, A.M. (1960): Tipología de las contramarcas en la numismática iberorromana", *Numario Hispánico IX*, p. 7-121. p. 78

²⁴ GRÜNWALD, M. (1946): *Die Römischen Bronze und Kopfermünzen mit Schlagmarken im Legionslager Vindonissa*, Basilea, p. 125-135.

²⁵ GARCIA Y BELLIDO, M.P.: (2004), *Las legiones Hispánicas en Germania. Moneda y Ejército. Anejos de Gladius 6.* CSIC, Instituto histórico Hoffmeyer. Madrid p. 256-257.

Fig. 2: Subasta Herrero 29 11 2016 lote 6

reverso pudiendo fecharse en época julio-claudia y concentrándose en la zona de *Hofheim* y *Wiesbaden*, en *Asciburgium*, *Bingium*, *Haltern* y *Vindonissa*. Indica que con los paralelos de Germania y sabiendo que la legión *SE(cunda)* estuvo en Hispania en tiempos de Calígula y Claudio dicha contramarca hace mención a dicha legión. Por lo que habría una secuencia temporal lógica, primero en Germania y luego en Hispania. Aquí es más abundante sobre anversos que sobre reversos. Su significado puede ser coincidente en ambas zonas y estar atestiguada la presencia de dicha legión en la zona en tiempos de Claudio, junto a la aparición de los lingotes de estaño del pecio de Port-Vendrés II sellados por las legiones V y II.

Según Ripollés y Abascal²⁶ al hablar de la ceca de *Segobriga* indican que este tipo de contramarca aparece en su mayoría en cecas que emiten en el Convento Cartaginense. Aparecen colocadas en su mayoría sobre el cuello del emperador intentando no dañar en exceso la figura del mismo. Indican que existe bastante unanimidad a la hora de otorgarle el significado denominacional de la ceca aplicada con carácter municipal.

Para Llorens²⁷ (1994:137), en la ceca de Carthago Nova, la aparición de un punzón en forma de S invertida en bastantes monedas de la ceca junto a la contramarca citada puede inducir a pensar que haga referencia al acrónimo de *SE(mis)* reduciendo el valor de la moneda a la mitad. Este suceso también es conocido sobre la ceca de Ilici en monedas de gobiernos anteriores a Calígula.

²⁶ RIPOLLÈS, P. P.; ABASCAL, J. M. (1996): *Las monedas de la ciudad romana de Segobriga (Saelices, Cuenca)*. Asociación Numismática Española. Museo Casa de la Moneda. Madrid-Barcelona.

²⁷ LLORENS M.M.: (1994). *La ciudad de Carthago Nova: Las emisiones romanas*. Universidad de Murcia, servicio de publicaciones. Murcia

En principio lo único claro como indicó Guadán²⁸(1960) es su fecha de colocación que se llevaría al gobierno de Claudio ya que aparece sobre la emisión de monedas de Calígula en ambas cecas comentadas. Si seguimos la evolución cronológica citada por García y Bellido (2004)²⁹ de que en Germania aparece dicha contramarca entre los años 14-21 d.C. en las campañas contra galos y germanos y posiblemente fue colocada para diferenciar las *vexillationes* de distintas legiones y en Hispania aparecen posteriormente sobre las últimas monedas de Calígula, indicaría que el contramarcado fue sucesivo primero en Germania y luego en Hispania. Sin embargo, no tenemos hoy por hoy respuesta a esta circunstancia.

Colonia Urbs Iulia Nova Carthago: aparecen contramarcas sobre monedas de Tiberio y Calígula tanto en anverso como en reverso.

Vigo Llagostera- 37; Guadán- CVI; RPC- 66; Pina-Si; Vindonissa-46/ 46^a; Howgego-No; CCH-1.22d Punzón rectangular de 5x8 mm. Llorens (1994:137), cita su aparición sobre anversos y reversos. Aparece vinculada a la contramarca 1.12 en reverso.

Calígula Vives CXXXII, 7 / RPC 185: Colección Sánchez de la Cotera nº 1232; Subasta Calicó 8/12/1978 lote 261; Citada por P Ripollés en “Monedas Hispánicas de la Bibliothèque National de France “p. 246 nº 1259 (BnF nº inv. 283935); MAN nº 9520; FNMT nº 64144; ANS Newell nº 66825; Subasta Naumann 34 09/08/2015 lote 34 (mas contramarca 11.1 en anverso); MAN nº 9520 (en reverso).



Fig. 3: BnF nº invent. 283935

²⁸ GUADAN, A.M. (1960): Tipología de las contramarcas en la numismática iberorromana”, *Numario Hispánico IX*, p. 7-121. p. 78

²⁹ GARCIA Y BELLIDO, M.P.: (2004), *Las legiones Hispánicas en Germania. Moneda y Ejército. Anejos de Gladius 6.* CSIC, Instituto histórico Hoffmeyer. Madrid, p. 256

Municipium Segobriga: aparecen contramarcas sobre monedas de Tiberio y Calígula tanto en anverso como en reverso. Vigo Llagostera- 37; Guadán- CVI; RPC- 66; Pina-Si; Vindonissa-46/ 46^a; Howgego-No; CCH - 1.22e Punzón rectangular de 5x7 mm. Ripollés y Abascal (1996), indican su aparición tanto sobre anversos como sobre reversos. Tan sólo se contramarco un reducido número de monedas ya que su circulación debió de ser muy local, por lo que su colocación debió de hacerse muy cerca de *Carthago Nova*.

Calígula- Vives CXXXV, 9 / RPC 476: citado por Delgado en “Nuevo método de clasificación de las medallas autónomas de España” CLXXI-16; SNG-STOCKHOLM Lorichs nº 2066; MAN nº y 212602; Ant. col. Segura (anverso); Subasta Vicó 20/07/2021 lote 175; Col. Cores nº 5153; citada por Ripollés en “Corpus Nummorum Hispanorum I. Medagliere Vaticano” lám. XXIII nº 380; Ans Newell nº 66825 (en reverso).



Fig. 4: Subasta Vico 20 05 2021 lote 175



3.3 *(Turiaso) o (Tvrans). Sobre anverso en cartela rectangular*

Ripollés y Abascal³⁰ (1996:91-92) se inclinan por su significado de *Turiaso*, incluyéndolas dentro de las denominadas contramarcas denominacionales. Seguimos planteando que ni su tamaño ni su estructura como contramarca se parece a la contramarca

Tampoco somos de la opinión de que estas contramarcas intentaban evitar la salida de numerario de la zona de influencia de la ciudad emisora como respuesta a las contramarcas legionarias que lo limitaban dentro de los

³⁰ RIPOLLÈS, P. P.; ABASCAL, J. M. (1996): *Las monedas de la ciudad romana de Segobriga (Saelices, Cuenca)*. Asociación Numismática Española. Museo Casa de la Moneda. Madrid-Barcelona. p. 91

recintos militares, hipótesis que tampoco compartimos. Consideramos que ya en esta época la moneda tenía importancia y valor por su peso y por el metal. Y que ningún circuito invalidaba a otro por la propia inercia comercial. Los efectivos de las legiones, que en esos momentos estaban más en la realización de obras civiles que en la defensa del territorio. Gastaban sus emolumentos en las zonas civiles que les atendían y dudo mucho que se separara la moneda contramarcada para el recinto militar y el resto para el pago de sus necesidades diarias.

Otra hipótesis a tener en cuenta y sobre el tamaño de las contramarcas, es el hecho de que las mismas que aparecen sobre monedas de Calígula y que posiblemente fueron colocadas durante la penuria económica que acompañó al gobierno de Claudio, desarrollasen un tamaño superior o bien que los labradores de cuños las desarrollarán en mayor proporción. Esta contramarca la podemos localizar sobre monedas de Augusto en *Bilbilis* (RPC 392) y *Turiaso* (RPC-403), sobre monedas de Tiberio en *Carthago Nova* (RPC-179); *Cascantum* (RPC-425) y *Segobriga* (RPC-474) y un único ejemplar conocido sobre moneda de *Segobriga* (RPC-476), objeto de este estudio.

Otra hipótesis nada descartable es la argumentada por Abascal; Cebrián y Riquelme (2000)³¹ que indica que dicha contramarca podría hacer alusión a TUR[ANUS], un fabricante de tegulas de *Segobriga*. Hipótesis que habría que elaborar más.

Municipium Segobriga: aparecen contramarcas sobre monedas de Tiberio y Calígula Vigo Llagostera- No; Guadán-No; RPC- 94; Pina-Si; Vindonissa-No; Howgego-No; CCH- 1.25c Punzón rectangular de 5x7 mm. colocada sobre el anverso y debajo de la cara del emperador, no alterando la leyenda de la moneda. El monograma debería completarse como *TVR(iaso)*, hipótesis que nosotros no defendemos a no ser que las contramarcas que se colocaron sobre monedas de época de Calígula hayan adoptado un tamaño superior a las existentes anteriormente. En cuyo

³¹ ABASCAL, J.M. ; CEBRIAN, R, y RIQUELME,T. (2000): "Retucendus elocum, Turanus, Antirus y la producción de tegulae en Segobriga", AnMurcia 16, p. 187-197.

caso, si los abridores de cuño copiaron otras de lugares fuera de Hispania aunque conservando en esencia su significado habría que abrir un nuevo debate sobre el tema.

Calígula: Vives CXXXV, 9 / RPC 476: Museo de Berlín.



Fig. 5: Staatliche Museum Berlín. Ant. col. Berger.



3.4 (Decurionum Decreto). Sobre anverso y reverso en cartela rectangular.

Esta contramarca la encontramos sobre las monedas de Calígula de la ceca de *Segobriga*. Colocada sobre ases. Punzón rectangular de 6x2 mm. Esta misma contramarca se conoce colocada sobre monedas de otras cecas desde Augusto, como *Tarraco* e *Ilergavonia-Dertosa*.

Acerca de la palma del reverso, Delgado (1871-1876)³² cuenta que en vida de Augusto erigieron los tarraconenses un ara al emperador y que al cabo de un tiempo nació en ella una palma. Mandaron legados a Roma para notificar el prodigo a Augusto, y aunque los recibió con agrado se limitó a indicar que la palma significaba que el ara no se usaba, puesto que el fuego no había impedido su crecimiento. Su aparición sobre monedas de Tarraco, hubiese tenido una posible explicación más coherente, sin embargo su existencia sobre casi todas las piezas de *Ilergavonia-Dertosa* no tiene un claro significado, a no ser que se hubiese tomado esta moneda como divisores de la ceca de Tarraco. El hecho de aparecer en Segobriga sobre una pieza de Calígula, hace posible el hecho de trasladar su fecha de colocación al reinado de Claudio.

³² DELGADO, A. (1871-76): Nuevo método de clasificación de las medallas autónomas de España, tomos I-III: Círculo numismático Sevilla

Guadán (1960:77)³³ encontró más factible la asimilación como esquematización del DD, imitando las piezas de *Nemausus* y dejando tan sólo la rama como símbolo esquemático del *Decurionum Decreto*.

Howgego (1985)³⁴ cita contramarcas similares nºs 381-386 en monedas de Augusto y Claudio y en cecas como *Aezani*, *Ninica* y *Tyre* y le concede en algunos de estos casos el significado de reductor del valor de la moneda que lo lleva.

Municipium Segobriga: aparece dicha contramarca en esta ceca sobre monedas de Calígula tanto en anverso como en reverso.

Vigo Llagostera: 61; Guadán-CV; RPC-7; Pina-Si; Vindonissa-No; Howgego-380-386 / 407-408; CCH- 3.32 d.

Possiblemente fue una variante propia de alguna ceca que contramarco monedas de otras cecas cercanas. No sería ni el caso de la moneda de *Calagurris* (RPC 448) en cuyo reverso aparece sobre el lomo del toro ni el caso aquí estudiado sobre moneda de *Segobriga* en anverso delante de la efigie de Calígula.

También es posible que se tratase de una copia deficiente de la tipo 3 de *Vindonissa*, de factura y taller galo, siendo muy frecuente sobre ases de *Nemausus*. Se establece relación de la palma como símbolo de atribución decurional como costumbre local del Levante ibérico, asociado al símbolo que portan los jinetes ibéricos en los reversos de las monedas.

Calígula- Vives CXXXV, 9 / RPC 476: Subasta Calicó 14/12/1978 lote 50; Subasta Vicó 1/6/2000 lote 54 (anverso); Ebay 17451269024123 4/2008 (reverso).



Fig. 6: Subasta Calicó 14 12 1978 lote 50

3.5 *L(egatus) A(ugusti) ¿? o L(egio)V A(laudea) ¿? Sobre reverso en cartela rectangular. As*

García y Bellido (2004)³⁵, indica que es muy posible que tengamos una contramarca similar distribuida en dos horizontes distintos, uno con Augusto, de líneas más finas y otro colocado sobre monedas de Calígula y cuyo horizonte de colocación sería durante el gobierno de Claudio. Sin embargo localizamos la contramarca del segundo horizonte colocada sobre monedas de *Celsa* (RPC 272) con gran abundancia en ésta única serie y sobre monedas de *Bilbilis* (RPC 392 y 395) sin encontrar de momento una explicación coherente.

En principio, sí compartimos la teoría de que su colocación pueda aislarse en dos horizontes. Uno de líneas de menor trazo de época Augustea y sobre monedas de cecas del Valle del Ebro y un segundo horizonte de igual significado pero de trazo mucho más gordo y colocado sobre piezas de mayor ámbito geográfico y sobre piezas de Tiberio y Calígula y colocado posiblemente en época de Claudio. Esto podría corroborar la estancia de nuevo de Legión V en época de Claudio, como atestigua la aparición en lingotes de estaño localizados en Port Vendrès II y constataría su significado como la ligadura de *L(egio) V A(laudea)*, como ocurriría con la contramarca nº 2 aquí citada. Esto de momento contrastaría con el hecho de que ésta legión se situaría después del 14 d.C. en Germania. ¿Pudo haber una *vexillatio* de esta legión en Hispania durante el gobierno de Claudio?

Colonia Caesaraugusta: aparece citada dicha contramarca sobre el reverso de monedas de

³³ GUADAN, A.M. (1960): Tipología de las contramarcas en la numismática iberorromana", *Numario Hispánico IX*, p. 7-121. p. 97

³⁴ HOWGEGO, C. J. (1985): *Greek Imperial Countermarks*, Royal Numismatic Society, Londres. p. 177-178

³⁵ GARCIA Y BELLIDO, M.P.: (2004), *Las legiones Hispánicas en Germania. Moneda y Ejército. Anejos de Gladius 6*. CSIC, Instituto histórico Hoffmeyer. Madrid

Calígula. Realizada en un punzón rectangular de 6x8 mm.

Vigo Llagostera-No; Guadán-XXXVI; RPC- 53; Pina-Si; Vindonissa-No; Howgego-No; CCH- 4.13 Si compartimos la teoría de que su colocación pueda aislarse en dos horizontes. Uno de líneas de menor trazo de época Augustea y sobre monedas de cecas del Valle del Ebro y un segundo horizonte de igual significado pero de trazo mucho más gordo y colocado sobre piezas de mayor ámbito geográfico y sobre piezas de Tiberio y Calígula y colocado posiblemente en época de Claudio. Esto podría corroborar la estancia de nuevo de Legión V en época de Claudio. En este caso las piezas conocidas presentan esta contramarca sobre monedas de Calígula.

Gómez Barreiro y Blázquez Cerrato (2016: 55)³⁶ indican que ambas series circularon en ámbitos militarizados, apareciendo en la zona renana. En Hispania esta segunda contramarca, de trazo más grueso, se localiza en el tercio septentrional con lo que su colocación no se puede llevar con total seguridad a la vertiente mediterránea.

Aparece colocada sobre una iconografía alusiva a la *inauguratio* ya existente sobre monedas de *Cilicia* y *Macedonia* y en este caso sobre fundaciones *ex novo* desde Augusto que duró hasta el final del gobierno de Calígula.

Calígula: Vives CLIV, 2 / RPC 374: Catalogo Vidal y Cuadras nº 611; FMRL V, Nº 11 p.33 nº 68; Museo de Berlín nº 1996; Subasta Martin Hervera 21/12/210 lote 3282; Ebay 284496466137 09 2021 y 11 2022; Subasta Vico 158 14/04/2021 lote 324; Col. Cores nº 4795.



Fig. 7: Subasta Vico 158 14 04 2021 lote 324

³⁶ GÓMEZ BARREIRO, M.; BLÁZQUEZ, M. C. (2016): "Contramarcas sobre moneda de Caesaraugusta". *Numisma*, 260, p. 39-76.

*Colonia Urbs Iulia Nova Carthago: Sobre anverso y reverso en cartela rectangular de 6x8 mm en monedas de Augusto, Tiberio y Calígula. Ases Vigo Llagostera- No; Guadán-XXXVI; RPC- 53; Pina-Si; Vindonissa-No; Howgego-No; CCH-4.13 a Vemos que en esta ceca la colocación abarca todo el espectro temporal pero al igual que en los casos anteriores la fecha nos la marca las monedas de Calígula. Llorens (1994)³⁷, indica que no es posible asociar dicha contramarca a la *Legio V Alaudae* por su localización en estos años en el Rhin.*

Calígula: Vives CXXXII, 7 / RPC 185: Ant. col. Segura; Sánchez de la Cotera nºs 1231(reverso) y 1232 (junto a la contramarca 1.22 en anverso); Subasta Tarkis 28/1/1999 lote 10; Ebay 2621453195947 11 20015 (anverso); www.imperiumnumismático.com 2011 (junto a contramarca 1.22 en reverso); Todocolección.net 07 2015; Arminius Numismatic.



Fig. 8: Imperio Numismático.com 2011

*Municipium Segobriga: sobre anverso y reverso en cartela rectangular de 6x8 mm. En monedas de Tiberio y Calígula. Ases y semis Vigo Llagostera-No; Guadán-XXXVI; RPC- 53; Pina-Si; Vindonissa-No; Howgego-No; CCH-4.13 d En este caso concreto, sobre las monedas de *Segobriga*, aparece esta contramarca sobre el reverso de monedas de Calígula, donde la laurea o corona cívica se encuentra asociada a los honores concedidos por los emperadores a determinados centros urbanos como integrantes de la vida civil romana. Si fueron reselladas durante el reinado de Claudio, es posible que piezas julio-claudias de estas épocas fueran contramarcadas para evitar su desmonetización en un momento de grave apuro económico y que dicho proceso de contramarcado*

³⁷ LLORENS M.M.: (1994). *La ciudad de Carthago Nova: Las emisiones romanas*. Universidad de Murcia, servicio de publicaciones. Murcia

suponga una línea temporal en la que incluso monedas ya contramarcadas anteriormente fueran de nuevo estampilladas creando una especie de cronología absurda y confusa. Sobre su significado consideramos haría alusión a algún cargo militar o administrativo dependiente directamente del emperador.

Para Ripollés y Abascal (1996:94)³⁸ la aplicación de esta contramarca no se produjo ni en el Noroeste, ni en la cornisa cantábrica ni en el valle del Ebro sino que se debió de utilizar un lugar cercano al sureste de la meseta.

Calígula: Vives CXXXV, 9 / RPC 476: MAN nº 212602; Revista Omni 11/01/2009 (junto a contramarca 7.16 en anverso).



Fig. 9: Citada en la Revista Omni 11 01 2009

3.6 *P(ater) P(atriae)? Sobre anverso en cartela ovoide. As*

Este tipo de contramarca suele aparecer sobre monedas RIC 360 del altar de Lugdunum en cartela rectangular de época de Augusto serie 1 Pont Max y en Vindonissa con el nº 61 en series del altar sobre ases y dupondios. Posiblemente en alusión a la concesión del título Pater Patriae. Al aparecer en este caso sobre una moneda de Tiberio, y al no haberle otorgado nunca dicho cargo, nos deberíamos de trasladar a época de Calígula al si se le concedió dicho cargo el 38 d. C. o a Claudio que también se le concedió el 42 d.C.

Indica Ripollés (2010:278)³⁹ que podría tratarse de la contramarca P P o perteneciente a este grupo, ya que hay monedas de este emperador que carecen de este título en la leyenda monetaria.

³⁸ RIPOLLÉS, P. P.; ABASCAL, J. M. (1996): *Las monedas de la ciudad romana de Segobriga (Saelices, Cuenca)*. Asociación Numismática Española. Museo Casa de la Moneda. Madrid-Barcelona.

³⁹ RIPOLLÉS, P.P. (2010): *Las acuñaciones provinciales romanas de Hispania*, Real Academia de la Historia. Biblioteca Numismática Hispana nº 8, Valencia.

No hay que descartar tal opción ya que la contramarca P I P que aparece sobre monedas de Augusto no aparece colocada sobre ninguna moneda de Calígula o Claudio. Pina (2014)⁴⁰ creé que su lectura sería dD alusiva a las contramarcas 3.16-3.23. Gómis (1997)⁴¹

Municipium Ercavica: Sobre anverso en cartela rectangular en una moneda de Calígula. As

Vigo Llagostera-No; Guadán-No; RPC- No; Pina-Si; Vindonissa- No; Howgego-No; CCH- 4.33.

En una posterior descripción, Ripollés (2010: 281)⁴² indica que la contramarca podría estar incompleta por su aplicación lateral y pertenecer a la familia de la contramarcas dD alusiva a *Decurionum Decreto*.

En este caso nosotros nos inclinamos más por su significado de *P(ater) P(atriae)*, similar a las contramarcas aparecidas sobre monedas de Lugdunum, donde consideramos se pudo colocar la misma.

Calígula- Vives CLXII, 8 / RPC 465: Clasical Numismatic Group 163 25/04/2005 lote 127; Museo Provincial de Valencia nº 27933.



Fig. 10: Subasta Clasical Numismatic Group 163 25/04/2005 lote 127

3.7 *COL(onia). Sobre reverso realizado a troquel. Ases y dupondios*

Para Guadán (1960:12)⁴³ guarda relación con algún tipo sacerdotal, ligándola al *símpulo* como

⁴⁰ MANUEL PINA: <https://www.tesorillo.com/articulos/contramarcas/index.htm>

⁴¹ GOMIS JUSTO, M. (1997): *La ceca de Ercavica*. ANE. Museo Casa de la Moneda. Barcelona

⁴² RIPOLLÉS, P.P. (2010): *Las acuñaciones provinciales romanas de Hispania*, Real Academia de la Historia. Biblioteca Numismática Hispana nº 8, Valencia.

⁴³ GUADAN, A.M. (1960): Tipología de las contramarcas en la numismática iberorromana", *Numario Hispánico IX*, p. 7-121

reflejo de su aparición sobre determinadas piezas de dicha ceca, o una P incusa de dudoso significado.

Possiblemente corresponde al nexo COL, haciendo clara referencia a su condición de *Colonia*, con claro carácter cívico. Aparece colocada siempre en reverso en el interior de la corona cívica, emblema de carácter imperial pero vinculado a todo lo referenciado al sello civil del municipio.

Al tener como fecha *post quem* las piezas de Calígula, sería ordenada colocar a priori en época de Claudio.

Colonia Iulia Genmella Acci: aparece colocada sobre monedas de Augusto; Tiberio y Calígula

Vigo Llagostera-47; Guadán- III; RPC-43; Pina-Si; Vindonissa- No Howgego-586; CCH-7.11.

Como indica Chaves (1974:149)⁴⁴ los tipos utilizados son similares a los anteriores pero con una ceca plenamente incorporada a la Tarragonense. Durante esta etapa, los dupondios se reducen de peso mientras que algunos ases y semises aumenta de peso y otros lo reducen sin una coherencia clara. ¿Es posible que esta contramarca sirviese para indicar una reducción del peso aprobada por los responsables de la colonia? Simplemente como los casos anteriores coincide con un momento de escasez económica durante el cierre de las cecas por parte de Claudio.

Calígula- Vives CXLVI,11 / RPC 141: Subasta Pliego 58 06/07/2020 lote 278; GNC nº 43475; NY HAS 57.5515; MAN 7743; Vives CLXVI,11 / RPC 142: IVDJ nº 2855; Subasta Calicó 08/11/1978 lote 12; Vives CLXVI,12 / RPC 143: Museo de Londres nº 1344; Ebay 200621055234 06 2011.



Fig. 11: Subasta Vico 14 04 2021 lote 9

⁴⁴ CHAVES TRISTAN, F. (1974): "Las monedas de Acci", II Congreso Nacional de Numismática, Numisma 138-143 , Salamanca, p.141-148.

3.8 [I·S] Sobre anverso en cartela rectangular. As y semis

Sobre monedas de *Segobriga* aparece tanto en piezas de Tiberio como Calígula indicándonos una fecha ante quem para su colocación. Siempre sobre anverso y sobre el cuello del emperador. En la ceca de *Carthago Nova* (RPC 179) aparece sobre los reversos pero solo sobre monedas de Tiberio.

Ripollés y Abascal (1996:83-85)⁴⁵ indican la posibilidad de que se pueda leer en ambas direcciones no dejando claro si corresponde a [I·S] o a [S·I].

Entre los hombres más destacados del reinado de Claudio, son seguros de *Hispania Umbronius Silio* y *C. Appius I(ulius) S(ilanus)*, éste último *procurador provinciae Hispania Citerioris* y ejecutado por orden de Mesalina. Sabemos de la existencia de una inscripción en *Segobriga* de este personaje recogida por Abascal y Alföldi (1998)⁴⁶. Nos parece la hipótesis más acertada, puesto que se conocen antecedentes en los que los legados imperiales han impreso su nombre sobre las monedas, coincidiendo la fecha de aplicación con el período en que vivió este legado, es decir bajo el reinado de Claudio, segunda presencia de tropas militares en Hispania.

García-Bellido y Blázquez (1988:68-69)⁴⁷ establece una conexión entre esta contramarca y las estampillas aparecidas sobre las ánforas de sigillata (Dressel 20), aparecidas en Villar de Brenes en el valle del Guadalquivir, otorgándole un significado próximo a las iniciales de una hipotética *S(ociedades) I* (...), encargada de comercializar los productos de la zona. La grafía utilizada en el resello de ambas cecas es similar a

⁴⁵ RIPOLLÈS, P. P.; ABASCAL, J. M. (1996): *Las monedas de la ciudad romana de Segobriga* (Saelices, Cuenca). Asociación Numismática Española. Museo Casa de la Moneda. Madrid-Barcelona.

⁴⁶ ABASCAL, J.M; ALFÖLDI, G. (1998): "Zeus Theos Megistos en Segobriga", Archivo Español de Arqueología 71, p. 157-168

⁴⁷ GARCIA Y BELLIDO, M.ª P.; BLAZQUEZ, C. (1987-88): "Las monedas celtibéricas y sus contramarcas en el I.V.D.J.", *Acta Numismática* 17-18, p. 59-87.

las utilizadas en las ánforas, fechables todas ellas en tiempos alto imperiales.

Otra hipótesis podría hacer alusión a *I(us) S(ufragii)* como participación en la política municipal y pleno disfrute de la ciudadanía local.

Municipium Segobriga: sobre anverso en cartela rectangular de 6x9 mm y colocado sobre monedas de Tiberio y Calígula. Ases. Y sémises.

Vigo Llagostera: No; Guadán- CXXXIX; RPC- 52; Pina-Si; Vindonissa- No; Howgego-No; CCH- 7.16 a Como indican Ripollés y Abascal (1996:85)⁴⁸ el lugar de aplicación es confuso, ya que el hecho de que aparezcan sobre monedas de *Carthago Nova* solo en reverso en monedas de Tiberio y que en *Segobriga* nunca se colocaran invadiendo el espacio del nombre de la ciudad, les inclina a pensar que se colocarían cerca de la propia ciudad, en cuyo caso la S podría hacer alusión a una circunstancia vinculada con la propia ciudad.

Calígula: Vives CXXXV,8 / RPC 477: Col. Cores 5156 (semis) citada por Ripollés en “Las acuñaciones provinciales romanas de Hispania” p. 289 nº 477; Subasta Vicó 20/07/2021 lote 177; Vives CXXXV, 9 / RPC 476: IVDJ nº 3259; citada por Ripollés en “Monedas hispánicas de la Bibliothèque Nationale de France” p. 246 nº 1595 (BnF nº inv. 2012-201851); Ant.col.Segura; Museo Arqueológico de Elche; Ebay 160970896984 02 2013; Ebay 121097301191 04 2013; Revista Omni 01 2009 (junto a contramarca 4.13 en anverso); Ebay 40422431587830 02 2023; citada por Almagro en “Nuevo ejemplo de la contramarca “I.S” sobre un as de Segobriga” p. 109 fig. 2.



Fig. 12: Subasta Vico 159 20 07 2021 lote 177



Fig. 13: BnF 2012 201851

3.9 (S) Sobre Anverso en Cartela Circular. As

La última serie emitida por *Carthago Nova* fue poco después de su ascenso al poder. Con respecto a la cabeza femenina que aparece en el reverso con la leyenda SAL AVG existen distintas opiniones, entre ellas que sea la efígie de Cesonia. Beltran Martinez (1949)⁴⁹ ya propuso en su día leer la leyenda como *Salus* diosa tutelar de la ciudad.

Sí que es cierto que el punzón en forma de S, suele ser habitual en las monedas de esta ceca posiblemente acuñándole un carácter puramente cívico. Este punzón que suele aparecer también sobre monedas de *Carthago Nova* y de *Ilici*, hacen pensar en un circuito monetario muy vinculado a estas. Como venimos viendo, las contramarcas de estas cecas aparecen profundamente vinculadas, pudiendo aceptarse la existencia de un taller común para ellas, pero hoy por hoy de difícil localización.

El problema que conlleva el significado de esta contramarca se agudiza por la posible existencia de muchas circunstancias que podrían solucionar su comprensión. Desde las alusiones a *S(alus)*, pasando por una posible *S(cocetas)*, que signifique una reducción del valor de la moneda y haga mención a *S(emis)* o bien que hiciese alusión a la inicial de *S(egobriga)*, ceca muy vinculada a *Carthago Nova*.

Colonia Urbs Nova Carthago: aplicada sobre el anverso en cartela circular de unos 7 mm de circunferencia y en una única moneda de Calígula Vigo Llagostera- 35 variante; Guadán- XXXVII variante; RPC- 34 variante; Pina-Si; Vindonissa- No Howgego-No; CCH-7.39.

⁴⁸ RIPOLLÈS, P. P.; ABASCAL, J. M. (1996): *Las monedas de la ciudad romana de Segobriga (Saelices, Cuenca)*. Asociación Numismática Española. Museo Casa de la Moneda. Madrid-Barcelona.

⁴⁹ BELTRAN MARTINEZ, A. (1949): *Las monedas latinas de Cartagena*. Murcia.

Variante de estilo en su cartela circular del grafito S. Si aceptamos la teoría de que la cartela circular y el tamaño de la contramarca es más antigua que la que aparece sobre cartela rectangular habrá que plantearse su cronología. Podría hacer alusión a (S)emis o bien e incluyendo a *Carthago Nova* dentro del mismo circuito monetario que Segobriga que hiciera alusión al topónimo de dicha ceca, aunque dudamos de esta explicación.

En estos casos, en el reverso de las monedas aparece la imagen de *Salus* como relato simbólico de carácter religioso pero como indica Gozalbes (2014) también recogería un mensaje de propaganda cívica como alegoría protectora de la propia ciudad, sin considerar la contramarca (S) como alusiva a la propia *Salus*.

Calígula: Vives CXXXII, 7-10 / RPC 185: Col. Cores nº 4422 citada por Ripollés en “Las acuñaciones provinciales romanas de Hispania” p. 139 nº 185; Subasta Vico 158 14/04/2021 lote 185.



Fig. 14: Subasta Vico 158 14 04 2021 lote 185

3.10 Sobre Anverso y Reverso Realizada a Punzón. As

Guadán (1960:32)⁵⁰ indica que hace referencia a la marca del semis de tipo romano. Posiblemente fuera utilizado como marca reductora de valor, transformando los ases en piezas de valor más reducido en este caso en S(emis). La existencia de mano de obra no esclava en los yacimientos mineros, mano de obra que debió de trabajar por un jornal, que posiblemente era posteriormente canjeado por productos de primera necesidad y cuyo soporte físico, era indudablemente la moneda de bronce divisionaria que constituiría posteriormente el caudal de la circulación monetaria local. Se colocaba sobre ases para convertirlos en semises, lo que nos hace

⁵⁰ GUADAN, A.M. (1960): Tipología de las contramarcas en la numismática iberorromana", *Numario Hispánico IX*, p. 7-121

suponer que fue ordenada colocar por Calígula o Claudio en momentos de penuria de divisores. O como hemos venido indicando anteriormente y al ser una zona minera, que hiciera referencia a alguna *S*(ocietas) de tipo minero.

Colonia Urbs Iulia Nova Carthago: sobre monedas de Tiberio y Calígula. Ases Vigo Llagostera- No; Guadán- XXXIII / LI; RPC- 36; Pina-Si; Vindonissa- No; Howgego-No; CCH-11.1 f.

Para Llorens (1994:132) existen sobre monedas de esta ceca dos punzones distintos. El primero una S muy ondulada de unos 7mm y el segundo menos ondulada de 6 mm, indicando que su área de colocación estaría en torno a esta ceca o a *Ilici* donde también son frecuentes.

Calígula- Vives CXXXII, 7 / RPC 185: citada por Ripollés en “Las acuñaciones provinciales romanas de Hispania” p. 139 nº 185; Sánchez de la Cotera nº 1232; MAN nº 9520; ANSS Newell nº 66825; FNMT nº 64144; Subasta Naumann 34 09/08/2015 lote 34; Subasta Naumann 70 07/10/2018 lote 160; Subasta Rauch 94 09/04/2014 lote 1662.



Fig. 15: Subasta Naumann 70 07 10 2018 lote 160

Municipium Segobriga: realizada a punzón sobre anverso en monedas de Calígula As

Vigo Llagostera- No; Guadán- XXXIII / LI; RPC- 36; Pina-Si; Vindonissa- No; Howgego-No; CCH-11.1 n.

Como en casi todas las cecas de la Tarraconense aparece el punzón realizado de una manera muy sutil y muy rectilínea en contraste con la sinuosidad de las S de la parte Sur de la península. Como en la ceca anterior, Ripollés y Abascal (1996:81)⁵¹ ven dos tipos de punzones que

⁵¹ RIPOLLÈS, P. P.; ABASCAL, J. M. (1996): *Las monedas de la ciudad romana de Segobriga* (Saelices, Cuenca).

oscilan entre 5 y 7 mm. Realizada delante de la cara del emperador refleja una sutil línea que define la letra indicada. En un caso aparece sola y en el otro asociada a la contramarca [SE], lo que hace aceptar el hecho de que hiciera alusión a S(emis) como valor reductor de la moneda que lo lleva ante un momento de difícil situación económica. Sin embargo indican estos mismos investigadores que ante el hecho de que son muy pocas monedas las que llevan dicho punzón y no se ve observa aparentemente una circunstancia que avale dicha devaluación. Con respecto a su fecha de colocación coincidimos en que sería en época del emperador Claudio y por razones puramente económicas.

Calígula- Vives CXXXV, 9 / RPC 476: Todocolección 202439342 09/2022 ; MAN nº 212602 (junto a la contramarca 1.22 en anverso) ; citada por Ripollés en “Las acuñaciones provinciales romanas de Hispania” p. 289 nº 476.



Fig. 16: Todocolección.net 202439342 09 2022

3.11 [SPQ(R)] (*Senatus Populus Que*). Sobre anverso en cartela rectangular. As

Guadán (1960:21)⁵² cita la existencia de una contramarca sobre un As de Calígula de *Caesaraugusta* que se encuentra en el Museo de Londres nº 494 sin contrastar y que debió ser contramarcado en la Galia, ya que los rebeldes galos bajo el gobierno de Vindex utilizaron frecuentemente esta contramarca. Aparece una contramarca similar en Vindonissa con el nº 127 citado por Grünwald pero con [SPR]. No ha sido posible su localización.

Colonia Caesaraugusta: realizada en cartela rectangular en anverso sobre una moneda de Calígula

Asociación Numismática Española. Museo Casa de la Moneda. Madrid-Barcelona.

⁵² GUADAN, A.M. (1960): Tipología de las contramarcas en la numismática iberorromana”, *Numario Hispánico IX*, p. 7-121

Vigo Llagostera- No; Guadán-XVII; RPC-67; Pina-Si; Vindonissa- 127 (SPR); Howgego-No; CCH- 3.15.

Gómez Barreiro y Blázquez Cerrato (2016:46)⁵³ hablan de que tan sólo existe esta contramarca sobre un as de la ceca comentada y cuya lectura sería *S(enatus) (opus)Q(ue)R(omanus)*. Su contramarca estaría colocada posiblemente en suelo galo, en la propia *Lugdunum*, y sobre la cabeza de Calígula cuya colocación casi decapita. No hemos podido contrastar su existencia ya que Guadán la incluye en RPC 386 y las autoras antes citadas la incluyen en RPC 381 circunstancia que avala Ripollés (2010:231)⁵⁴.

Sí existe otra moneda Hispana de Calagurris (RPC 450), que lleva sobre su anverso una contramarca similar [SPQ(R)] en una moneda de Tiberio, que posiblemente también sería contramarcada en la Galia.

Calígula- Vives CLIII, 6 / RPC 381: British Museum nº registro 1909.0504.104 no contrastada.

IV. CONCLUSIÓN

Cabría destacar el hecho de que tan solo cinco cecas son las que soportan el contramarcado durante el reinado de Calígula, y de ellas dos y muy próximas geográficamente constituyen el grueso de las mismas. *Segobriga* y *Carthago Nova* son cecas que podrían encuadrarse dentro de un marco espacial muy concreto en donde el taller que aplicó estas, podría haber sido sin lugar a dudas el mismo. La estructura de las contramarcas es muy similar por no decir igual y aunque colocadas sobre monedas de emperadores anteriores, nos llevarían a un momento de aplicación posterior a la muerte de Calígula, como respuesta a un proceso de falta de moneda que empezaba a hacerse acuciante. Algunas de ellas de significado similar a otras existentes anteriormente, cambian de estructura haciéndose

⁵³ GÓMEZ BARREIRO, M.; BLÁZQUEZ, M. C. (2016): “Contramarcas sobre moneda de Caesaraugusta”. *Numisma*, 260, p. 39-76.

⁵⁴ RIPOLLÉS, P.P. (2010): *Las acuñaciones provinciales romanas de Hispania*, Real Academia de la Historia. Biblioteca Numismática Hispana nº 8, Valencia.

más grandes de tamaño y aunque buscan un lugar donde no alterar el mensaje original de la moneda, sí constatamos un diseño menos formal.

Como indica García y Bellido (2006:593)⁵⁵ durante el gobierno de Calígula no parece que se contramarcara moneda en Hispania al igual que pudo ocurrir en Germania y en la Galia. Según lo estudiado en este artículo, el horizonte de colocación habría que trasladarlo al reinado de Claudio I o incluso desplazarlo hasta las guerras civiles del año 68 d.C. donde el numerario provincial hispano seguía circulando con total normalidad. Aunque nosotros dudemos de que se contramarcase para evitar una fuga de moneda de las zonas militarizadas ya que posiblemente durante esa época anterior a las guerras civiles la función de las legiones localizadas en Hispania se diluirían en otro tipo de trabajo más civil y de mantenimiento.

La penuria económica tras el cierre de las cecas Hispanas debió de pasar factura y a pesar de que durante los gobiernos de Augusto y de Tiberio, el volumen de moneda debió de ser bastante elevado, a partir de entonces hubo que solucionar la escasez de numerario a través de otras fórmulas. Claudio como buen gestor que fue, creó nuevas oficinas imperiales encargadas del control monetario. La falta de éste hizo que se acuñaran las llamadas monedas de imitación que junto al fraccionamiento y al contramarcado de monedas que circulaban indistintamente por Hispania ayudaron a paliar el problema. Tanto su realización como su peso se ceñían a las realizadas por Roma, que no llegaba para suministrar a todas las provincias romanas donde estaban asentadas sus tropas. Esto favoreció el fenómeno de las contramarcas que siguió siendo un modo de por un lado aprovechar las monedas de los gobiernos anteriores estableciendo mediante estas un nuevo poder y por otro paliar la falta de metal que comenzaba a escasear.

⁵⁵ GARCIA-BELLIDO, M. P. (2006): «Las contramarcas». En García-Bellido, M.P Coord. Los campamentos romanos en Hispania (27 a.C.-192 d.C). Vol- 2. *Anejos de Gladius*. 9. Madrid, p.593

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Entropy Change in Management, Ecology and Sociology

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ABSTRACT

If internal interactions exist in isolated systems, entropy decrease will be possible for this system. From this possibility we discuss management as a typical mode, which includes much internal adjustment and control, and through them to achieve order, more efficient, competitive, and better survive and develop. A key of management is to change the natural tendency disorganized with entropy increase and build the best system with entropy decrease. It is the thermodynamic meaning of management. Further, this theoretical mode may be extended to ecology, biology, sociology, etc. The naturally formed and artificially intervened ecosystems are through interaction and regulation within the systems to reach the dynamic balance, order and entropy decrease. These systems have constant evolutions and go optimization processes with order and entropy decrease. In many social systems and the human society there are usually some nonequilibrium dynamic processes, which are accompanied by order and entropy decrease.

Keywords: management, entropy, ecology, sociology, internal interaction, change.

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I. INTRODUCTION

As in life and science, entropy is inevitable in any system. Entropy, as a new world view [1], also governs the system's evolution and human development.

So far, general people have believed that entropy must increase in isolated systems. But, its preconditions are: (1) Various internal interactions in the system must be neglected, i.e., it has the statistical independence [2] and the

additivity of entropy. (2) They must be thermal equilibrium systems. We proposed that if interactions exist among various subsystems of an isolated system, in which entropy decrease is possible [3,4]. They include physics [5-9], chemistry [10-12], astronomy [13-15], geoscience [16], biology [17-19], and social sciences [20-22]. An isolated system may form a self-organized structure with lower entropy for these cases of attractive processes, internal energy, system entropy, nonlinear interactions, etc. Some possible entropy decreases are calculated quantitatively [5,8]. We proposed quantitatively a total formula of the entropy change for the universal evolution of any natural and social systems. As long as we break through the bondage of the second law of thermodynamics, the rich and complex world is full of examples of entropy decrease [9,22]. In this paper, we research possible entropy decrease in management, ecology, sociology, and so on.

II. ENTROPY CHANGE IN MANAGEMENT

Management is defined as the process of administering and controlling the organization, and its nature, type, structure, and size. It is an act of creating and maintaining such a system in which the members of the organization can work together, and achieve the objectives efficiently and effectively. Management acts as a guide to a group of people working in the organization and coordinating their efforts, towards the attainment of the common objective [23]. This is a classical internal interaction in isolated systems.

In other words, this is concerned with optimally using the 5M's, i.e., men, machine, material, money, and methods. This is possible only when there are proper direction, coordination, and integration of activities, and achieve the desired results.

Characteristics of management include: 1. Universal nature. 2. Goal-oriented, every organization is set up with a predetermined objective and management helps to reach those goals. 3. Continuous process tends to persist the organization exists, and requires that the organization is production, human resource, finance or marketing. This is a nonequilibrium dynamic process. 4. Multi-dimensional. 5. Group activity, every member has different needs, expectations, and beliefs, and joins other motives, but after becoming a part of the organization, they must work to achieve the same goal. It requires supervision, teamwork, and coordination. It is also the classical internal

interaction in an isolated organization. 6. Dynamic function: An organization exists in a business environment that has various factors like social, political, legal, technological, and economic. A slight change of these factors will affect the organization's growth and performance. It is also the nonequilibrium dynamic process. 7. Management can form supernatural force. This force is the internal attraction to create an orderly party, i.e., unity is strength. More generally, order is power, knowledge is power, and reason is power. These characteristics are represented by Fig.1. They are all for system order with entropy decrease.



Fig. 1: Management and its characteristics

Precisely, all the functions, activities, and processes of the organization are interconnected to one another. And it is the task of the management to bring them together in such a way that they help reach the intended result. Leadership has different levels. They form some fractal structures. Top-level management is responsible for defining the objectives, and formulating plans, strategies, and policies.

Based on the thermodynamic entropy of physics, Chappell and Dewey define the entropy of hierarchical organizations. It measures and calculates the order within an organizational structure [24]. It might classify systems designed for specific functions and indicate when an optimal system has been achieved.

In a world where entropy has become the order of the day, leadership becomes even more central to organizational transformation. Leaders should devote their attention, focus, skills, techniques, efforts, and values toward eradicating entropy in organizations or at least reducing it where possible. Entropy change can be positive and negative, and positive change renders the organization chaotic, complex, and extinction. There is a need to focus leadership potential on managing entropy in organizations.

Ercetin and Acikalin proposed that Lead-Entropy as a combination of leadership and entropy. It is assumed that a leadership paradigm, leadership traits, functions, skills, and techniques are directed toward reducing or eradicating

organizational entropy as a modus operandi. This subject is of paramount importance consequent to contemporary trends in organizations [25].

In the McKinsey 7S model [26], structure, strategy, system, skills, style, and staff are all internal relations, then shared values are results. For the core technology and confidential information, management must be an isolated system.

One thing that creates chaos, complexity, and uncertainty in organizations can be entropy. Leader's behaviors become an important issue, and are also internal interactions in organization. Such research efforts have been pivotal to exploring the key dimensions of entropy and its intricate implications for various social and scientific phenomena.

M. Sanchez, et al., researched the four principles of change management, and the five principles of change management, which include: 1. Change must be human-centered. 2. Today's businesses are digital-first. 3. Lead from the top. 4. Support from the bottom. 5. Constantly improve. From the classical perspective, the humanistic perspective of Follett-Barnard, to the human-resources perspective, and the behavioral sciences these approaches are all internal interactions.

Daft and Marcic discussed plan, policy, tissue, structure, control, motivation of management process [27]. They and feedback, merger, focus, learning, train are all internal regulations and interactions to achieve more ordered, more efficient, competitive, and better survive and develop. The organizational behavior dynamics is more clear research interactions in the system [27], and improving the attitude can promote unity within the system, and have more prominent competitiveness.

In a word, it is natural for things to become disorganized with entropy increase. Management's key is to change this natural tendency and build the best system with an entropy decrease, and the group forms a new competitive advantage. It is the thermodynamic meaning of management.

P.F. Drucker published a well-known book *Management Challenges for the 21st Century* [28], one of which is information, i.e., entropy. From early a proper form of organization and an appropriate way of managing to a new paradigm, in which management is the leader. The goal is to give full play to and make use of everyone's advantages and knowledge, and improve the productivity of knowledge personnel. The self-management is based on internal regulation and interaction, and is through the coordination organization's existing resources (this is an isolated system), and obtain an effective result.

One of the primary purposes of normative management is to achieve increasing order and reduction disorder with entropy decrease through regulation and interaction in the system after the natural entropy increase. This is consistent with Fig.2.

So long as different entropy states exist for any system, entropy must decreases in the transformation process from a higher entropy state to a lower entropy state (in Fig. 2 from A to B), for example, from disorder to order, from war to peace, and so on [7,21]. If this system is isolated, it will correct and develop the second law of thermodynamics.

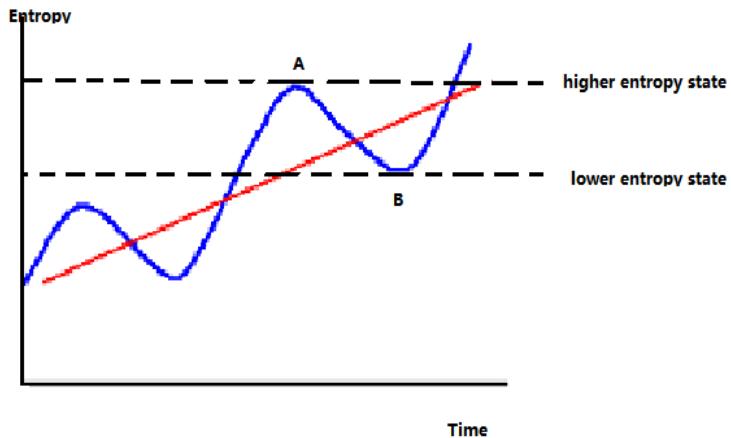


Fig. 2: Transformation processes between states with higher entropy and lower entropy

Based on thermodynamics in management we may use the method of coevolution and self-optimization [19]. For a corporation, its self-evolution process corresponds to self-optimization, different decrement of entropy

dS_A correspond to different stages of an evolutional process, and additional phase transitions. It compares own before and after, and entropy may decrease constantly. For both similar corporations of competition each other, their decrements of entropy may compare the entropy

of each corporation A and B: dS_A and dS_B . If their original entropies are the same, and $dS_A > dS_B$, a corporation A will excel another corporation B. It is the comparison between corporations each other.

The culture of group-corporate is an internal environment. A good culture can form self-organization, whose collectivism automatically creates a resultant force of cohesiveness. It is similar to magnetization. The Japanese management model and corporate culture may be studied.

III. ENTROPY CHANGE IN ECOLOGY AND BIOLOGY

Ecology studies organisms and how they interact with the environment around them. Ecologists study the relations between living things and their habitats, and observe all forms of life and their ecosystems of our world.

Ecology is closely related to the rise and fall of human society. We proposed the nonlinear whole ecology and its four basic rules [29]. Entropy plays an essential role in ecological economics, and the cycle of resources and the general recycling economy cannot be a single increase process of entropy. We researched possible entropy decrease. To achieve sustainable development, society must realize the recycling economy. We studied the applications of hypercycle in ecology and corresponding equations of ecosystem. The critical factor in the cycle is the conversion of waste. We proposed the talent ecology, which studies the relations between talent and circumstances (esp., the social circumstances), and searched its three basic principles. The base of talent is education. The mechanism of academic development is freedom. The aim is innovation. The talent ecology must encourage intellectual diversity. The structure-function-result mode of the ecosystem is proposed. We discussed the recycling ecosystem of traditional Chinese agriculture and Chinese cultural-social ecology.

Various complex biological systems provide rich platform for study of entropy decrease [17,18]. In biology and neuroscience, the permeable membrane, the molecular motor, etc., are all some internal interactions. These and physiology, psychology, and Qigong and various practices are related to order states with entropy decrease.

Darwinian evolution and mutual help seem to conflict each other. But, since the second law of

thermodynamics is based on isolated-equilibrium systems, it is constrained. In essence, the most systems in the universe and nature are constantly changing and evolving with “life”. Based on biophysics we researched coevolution from thermodynamics and entropy by a unified method. Let the decrement of entropy dS_A of

subsystem A is a set of its elements dS_i , which may include various internal interactions, and cooperation and complement each other, so that entropy may be decreased. It includes self-evolution, competition with each other, etc. Development may combine self-optimization and self-organization. Brain control of the body is the most typical of internal interaction. No one would think that this only leads to an entropy increase. We discussed biological synergistics, ecosystems, and sustainable development. Cooperation-competition is a common phenomenon in the ecosystem. Coevolution is the more general evolution-development law of biological and active systems. It can unify natural competition and mutual help in ecology, and is an essential model for human development direction [19].

During sleep and hibernation people or animals as individuals may through internal regulation reduce metabolism with entropy decrease.

In the animal world, unity and cooperation are strengths, for example, the cooperative hunting of animals. It corresponds to the mutual help theory, which reaches the competitive advantage [19]. Lotka-Volterra equations in ecology describe the period change, corresponding entropy period change. It is impossible to increase the entropy forever.

The thermodynamic meaning for the naturally formed ecosystem is through interaction and regulation within the system to reach the dynamic balance, order, and entropy decrease. For artificially intervened ecosystem this is also the same, for example, in national parks. Traditional Chinese agriculture forms a typical recycling ecosystem, and sustainable development.

IV. ENTROPY CHANGE IN SOCIOLOGY

Sociology studies human social relationships. Its subject is diverse, from crime to religion, from the family to the state, from social stability to radical change in whole societies. These relationships are usually some internal interactions. From the solidarity of Durkheim, the association of Simmel, to the structural functionalism of Parsons and Merton, which focuses on the structures of society and their functional significance for other forms, they and exchange theory are all various internal interactions in the social systems [30]. Integration requires that a system regulates the interrelationship of its component parts. The micro-social order and a more integrative exchange theory are discussed [30].

Balch researched hierarchic social entropy for an information-theoretic measure of robot group diversity [31]. Stepanic, et al., examined an approach to a quantitative description of social systems based on thermodynamic formalism [32]. Stepanic, et al., described social systems using social free energy and social entropy [33]. Bailey discussed social entropy theory and its application of nonequilibrium thermodynamics in human ecology and living systems theory, and discussed living systems theory and social entropy theory [34].

We discuss generally the four variables and the eight aspects in social physics, and search social thermodynamics and the five fundamental laws of social complex systems, whose second law is extensive entropy S change law: $S=k\ln W$, where W is the number of possible states of all elements in this system. The extensive entropy is connected with the adequate free energy. Usually it increases in an isolated system, but it may decrease with internal interactions or for an open system.

Humanity as an inseparable whole on the Earth possesses a common environment and benefits. Based on the inseparability and correlativity of the social systems, we proposed the nonlinear whole sociology and the four fundamental laws [35]:

First law: The inseparability always exists among different organizations, structures, functions, and levels within various social systems, which determines the globality of the social systems.

Second law: Many main characteristics, for example, self-organization and self-adjustment of social system are produced from some special structures of complex subsystems. From this theory the interaction and nonlinearity exist necessarily. It includes fractal structures and chaos, etc.

Third law: From a microscopic community, city, the clime to a gigantic nation and country, various social systems of different levels possess totality and nonlinearity. Their diversity and complexity originate from various nonlinear interactions.

Fourth law: A fundamental property of any social system as an open system is that this system and its environment (for example, nature, geography, polity, culture, etc., and other social systems) must be a whole. It corresponds to a generalized metabolism. Usual environment is regarded as a boundary condition of the system, but it and the social systems often have various nonlinear relations.

In modern and postmodern sociological theory [36, 37], systems theory, network theory, the globalization theory are whole theories. In contrast, structural functionalism, neo-functionalism, conflict theory, structuralism, poststructuralism, existentialism, and symbolic interactionism, etc., are inevitably nonlinear theories. The totality and the nonlinearity are two primary social characteristics. They are closely related. Because of the complexity, inseparability, and correlativity of the social systems, their description must apply the nonlinear theory with the interaction terms. Reversibly, if there is no totality, any society cannot be formed. Single people are not a society. Without nonlinear interaction, the system cannot create a social structure. Even the gregarious animal forms also a whole nonlinear society.

We researched possible unification of some ideal social sciences. The science of law should be based on ethics. Ethics is based on anthropology.

Politics should be found on the science of law. The ideal sociology and economics should be based on ethics. Various outstanding social sciences should be based on anthropology, in particular, social anthropology and culture anthropology. Further, differences between different nations must exist for some specific rules in social sciences. Therefore, we should study universality and particularity in social sciences simultaneously [38].

In a word, the rule of law is more orderly than the no rule of law. Many social sciences are designed to develop the order of various social systems.

V. SUMMARY

The development history of human society is not consistently declining and pessimistic. Throughout the history of the world, order and disorder, war and peace usually alternate (Fig. 2). Through scientific management and control, ecology and human society can be entropy decrease.

Management is a typical mode, which and ecology and sociology can be all through internal adjustments and interactions to achieve more orderly, more efficient, better competitive and better survival and development. These systems have some constant evolutions and try to reach optimization processes with order and entropy decrease.

Strictly isolated systems do not exist because gravity always exists, in which celestial evolutions and simulations prove many phenomena of entropy decrease [15]. However, a galaxy may be considered as an isolated system [39]. The Earth can be approximated as an isolated system, and many systems in nature and human society exist as isolated systems at some stages.

Moreover, one of the primary purposes of learning is to improve your reason so that you can handle things in more orderly way. For this purpose, Maslow's psychology proposed the well-known hierarchy of needs theory [40]. This is further simplified by the ERG theory of Clayton Alderfer.

In the face of ChatGPT's challenge to all humankind, innovative education must be fully emphasized. It corresponds to talent ecology [29], which is based on the learning process and innovation. Communication and dialogue in a system may form new creativity. ChatGTP is also constantly improving himself in the learning.

In a word, many natural-social systems can never increase entropy forever. We researched many phenomena of entropy decrease in natural science [3-19]. Further, some social sciences and human society are the nonequilibrium dynamic processes, which are usually accompanied by order and entropy decrease. Even in an interval they can be an isolated system.

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Exploring the Long-run Dynamic Links between Access to Land and Food Security: Evidence from Ethiopia

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ABSTRACT

System GMM techniques are significantly superior to short panels in situations where T is short, and N is big in prior studies. Although the system-GMM coefficients are short-run coefficients, while access to land is critical to long-term food security too. And, the elasticity or responsiveness of food security as a result of access to land and other predictors, in the long run, is not well understood in Ethiopia. The system GMM approach is used in this study. The study addresses this issue by computing the long-run GMM coefficients from its short-run GMM coefficients. Since the explanatory variable is a dummy measure (1/0) and the dependent variable is stated in natural logarithms, year-dummy control is calculated in order to take into consideration temporal fluctuations in the dependent variable across the panels. According to the findings, farm size, TLU, heads completed primary education, adult equivalence, one-year lag of annual food consumption per adult equivalence, number of household parcels, households' distance to the main road (Kms), heads age, households' distance from the market center (Kms), and female-headed households are both short-run and long-run complements of food security.

Keywords: land access, food security, system gmm estimates, long run gmm, panel data, ethiopia.

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Exploring the Long-run Dynamic Links between Access to Land and Food Security: Evidence from Ethiopia

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ABSTRACT

System GMM techniques are significantly superior to short panels in situations where T is short, and N is big in prior studies. Although the system-GMM coefficients are short-run coefficients, while access to land is critical to long-term food security too. And, the elasticity or responsiveness of food security as a result of access to land and other predictors, in the long run, is not well understood in Ethiopia. The system GMM approach is used in this study. The study addresses this issue by computing the long-run GMM coefficients from its short-run GMM coefficients. Since the explanatory variable is a dummy measure (1/0) and the dependent variable is stated in natural logarithms, year-dummy control is calculated in order to take into consideration temporal fluctuations in the dependent variable across the panels. According to the findings, farm size, TLU, heads completed primary education, adult equivalence, one-year lag of annual food consumption per adult equivalence, number of household parcels, households' distance to the main road (Kms), heads age, households' distance from the market center (Kms), and female-headed households are both short-run and long-run complements of food security. The result also showed that household farm size (acre) has a more significant positive effect on food security in the short run (0.179%) than in the long run (0.076%). Thus, besides to answering the issues being addressed, the work also makes methodological contributions.

Keywords: land access, food security, system gmm estimates, long run gmm, panel data, ethiopia.

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I. INTRODUCTION

Ethiopia is the second-most populated country in Africa after Nigeria, with about 113.5 million people living there as of 2022, making it the 13th most populous nation in the world. ^[1] Ethiopia's economy is based primarily on agriculture, which is approximately employing 85% of the country's population ^[2]. Ethiopia had nearly 38.5 million hectares of agricultural land in 2020, corresponding to over 34 percent of the country's total land area ^[3]. Ethiopia is one of the most food-insecure countries in Sub-Saharan Africa. Since 1980, the government had a persistent food shortage. And, it is ranked 104th out of the 121 nations having enough data to compute the 2022 Global Hunger Index rankings. Ethiopia has a deep sever level of hunger, with a score of 27.6 ^[4].

In Ethiopia, 22.6 million people are food insecure due to drought, conflict, and increased in food prices ^[5]. Bodurtha et al. (2011) ^[6] report that 60% of Ethiopia's rural residents do not have enough acreage to provide enough food for their own families, and 43% of them live in a landless household. The farm size of Ethiopian households ranges from 0 ha to 10 ha. According to Headley (2014) ^[7], Ethiopia has an average cropland size of 0.96 hectares per household, with regional variances. The Southern Peoples Regions and Tigray both have 0.49 hectares. The region with the greatest land per family is Oromia (1.15 ha), followed by Amhara (1.09 ha). The country has gone through three main types of land tenure systems. The current system of land tenure was implemented in 1991, the Derg military regime

was in place from 1974 to 1991, and the Imperial government functioned until 1974. Currently, the system of land tenure treats land as a public good. And, the Land policy has not brought the anticipated results and is also not participatory.

As a result, providing households with land and a guarantee of food security will be one of Ethiopia's most significant challenges in the coming decades. The ability of a family to feed itself depends on having access to farmland, which is the bedrock of the livelihoods of many smallholders [8]. Most research in Ethiopia didn't explore the long-run dynamic linkages of food security and farm size, and it includes the works of Diriba, 2020 [9]; Gebissa, 2021 [10]; Frankenberger and Coyle, 1993 [11]; IFPRI, 2020 [12]; Mengistu, 2014 [13]; Teshome, Arega, Mehrete, 2021 [14]; Bodurtha et al., 2011 [6]; Paul and Githinji, 2017 [15]. Therefore, it is crucial to evaluate the dynamic linkages of food security and access to land in rural households in Ethiopia over time using the system GMM approach.

II. METHODS AND MATERIAL

2.1 Data Source

The ESS survey, which collected information from 3288 households, provided the household parcel-level data used in our study. Ethiopian Socioeconomic Survey (ESS), the first-panel survey with a household questionnaire and comprehensive agricultural data, was conducted by the World Bank [16] Living Standards Measurement Study, Integrated Surveys of Agriculture (LSMS-ISA) group, and Ethiopian Central Statistical Agency (CSA) [17]. ESS1 stands for the first wave of the ESS, which took place between 2011–2012; the second wave, which took

place in 2013–2014; the third wave, which took place in 2015–2016; and the fourth wave, which took place in 2018–2019. Since ESS4 for 2018–19 is a new panel and not a continuation of the ESS3 wave, we did not include it in the study. Finally, the data is organized, coded and estimated using STATA 17.

2.2 Estimation Approach

We used the system GMM method as an estimation strategy for the study because it accounts for time-invariant household-specific effects, addresses the endogeneity issue of the lagged dependent variable, permits some degree of endogeneity in the other regressors, and optimally combines information on cross-individual variation in levels with that on within-household variation in changes [18, 19]. Two-step system GMM estimates were also chosen over the one-step estimation because they are robust to heteroskedasticity and panel-specific autocorrelation with Windmeijer correction for limited samples, which helps to remove standard-error biases. Some prerequisites are dealing with data before estimating the long-run GMM coefficients. First, the short-run system GMM has to be calculated along with post-diagnosis tests (instrument validity test, serial correlation tests, and robustness check). The GMM estimate, a new estimator that combines the regression-in-differences with the regression-in-levels in a system, has obtained considerable traction in the empirical literature employed for this study. The two models (at “level”, “first-difference”) are specified as follows in light of this introspection:

$$\text{Log-ann-food-cons-peraeq}_{ilt} = \alpha_i + \beta \text{log-food-cons-ann-peraeq}_{il,t-1} + \pi \text{log-Farmsize}_{ilt} + \sum_{j=1}^k \mu_j X_{jlt} + \varepsilon_{ilt}; \\ j=1.....k; i=1...n; t=1..., T + \varepsilon_{ilt}; i=1..., n; t=1..., T \quad (1)$$

$$\Delta \text{log-ann-food-cons-peraeq}_{ilt} = \beta \Delta \text{log-food-cons-ann-peraeq}_{il,t-1} + \pi \Delta \text{log-Farmsize}_{ilt} + \sum_{j=1}^k \mu_j \Delta X_{jlt} + \Delta u_{it} \\ (2)$$

Where $\text{log-ann-food-cons-peraeq}_{ilt}$ denotes food security and for household i for location l over period t ; $\text{log_food_cons_ann_peraeq}_{il,t-1}$ entails

the lagged dependent variable's value for household i in location l over period t ; $\text{log-Farmsize}_{ilt}$ denotes logarithm of HHs total

farm size (acre) a proxy to access to land for household i in location l over period t ; X_{it} is other predictors in the model for family i over period t and j is the number of included control variables (It has log-TLU_{ilt}; log-adulteq_{ilt}; log-Number-of-Parcel_{ilt}; log-HH-dist-road-Kms_{ilt}; log-HH-dist-market-Kms_{ilt}; log-Heads-age_{ilt}; dummy variables (Head completed primary school (=1), and Female-headed households (=1)) and time dummies); ε_{it} =the error term. For the disturbance-term, the following household-specific fixed effect is assumed: $\varepsilon_{it} = \phi_i + u_{it}$.

Secondly, the long-run effect for the k^{th} parameter is computed as follows:

$$\beta_k / [1 - \phi] \quad (3)$$

Where β_k represents the short-run coefficients of the independent variables and ϕ represents the coefficient of one period-lagged value of the dependent variable.

Finally, year dummies control for time variations of the dependent variable across the panels is also estimated. Therefore, the year dummies are computed as:

$$[\text{e}^{\alpha} - 1] \times 100 \quad (4)$$

Where α represents the year dummies coefficients, and e represents the exponent (i.e., the base or the anti-log) of the natural-logs. This is always used when the dependent variable is

expressed in natural logarithms, and the explanatory variable is a dummy (1/0) measure.

III. RESULT AND DISCUSSION

3.1 'Generating' Long Run GMM Coefficients

This section briefly discusses the long-run estimates. The results of system GMM estimates (Annex-I) are Computed. The results are further validated using different diagnostic tests, which include serial correlation and "Sargan / Hansen" tests (Annex-II). the result further confirmed the authenticity of the estimated model and the instrumental variables, respectively. Robustness of the GMM results was checked from the pooled OLS (Anex-III), the fixed effect (Annex-IV), and the difference GMM (Annex-V) model results. Hence, the findings are robust when applied to too many different model specifications and instrument sets. Given the usual ceteris paribus assumption, the system-GMM coefficients are short-run coefficients. If the System-GMM result is significant it is also possible to compute the long-run GMM coefficients. The system GMM test in Annex-I shows that, all the coefficients at 5 % were found significant. The long-run GMM coefficients could be generated only for the significant short-run coefficients. Thus, Table 1 below gives the long-run effect for the k^{th} parameter.

Table 1: Long-run GMM coefficients of the significant system GMM coefficients

Log-food-cons-ann-paraeq	Coef.	Std.Err.	z	P>z	[95%Conf. Interval]
_nl_1:(b[log-food-cons-ann-paraeq-L]) / (1-b [log-food-cons-ann-paraeq-L])	-0.576	0.040	-14.270	0.000	-0.655 -0.497
_nl_1: (b [log-Farm Size acre]) / (1-b [log-food-cons-ann-paraeq-L])	0.076	0.033	2.280	0.023	0.011 0.141
_nl_1: (b[log-TLU]) / (1-b [log-food-cons-ann-paraeq-L])	0.521	0.088	5.890	0.000	0.348 0.695
_nl_1: (b[log-adult]) / (1-b [log_food-cons-ann-peraeq-L])	-1.315	0.362	-3.640	0.000	-2.023 -0.606
_nl_1: (b [log-Number of Parcel]) / (1-b [log-food-cons-ann-paraeq-L])	-0.144	0.034	-4.300	0.000	-0.210 -0.079
_nl_1: (b [log-HH-dist-road Kms]) / (1-b [log-food-cons-ann-paraeq-L])	-0.032	0.008	-4.010	0.000	-0.048 -0.016
_nl_1: (b [log-Heads age]) /	-0.131	0.044	-3.000	0.003	-0.216

(1_b [log-food-cons-ann-peraeq-L])					-0.045
_nl_1: (b [log-HH-dist-market Kms]) / (1_b [log-food-cons-ann-peraeq-L])	-0.123	0.012	-10.380	0.000	-0.146 -0.100
_nl_1:(b [Head completed primary education]) / (1_b [log-food-cons-ann-peraeq-L])	0.177	0.030	5.850	0.000	0.118 0.237
_nl_1: (b [Female-headed (=1)] / (1_b [log-food-cons-ann-peraeq-L])	-0.377	0.137	-2.750	0.006	-0.646 -0.108

Source: Authors' own computation (2023)

We were looking closely the STATA outputs of the long-run coefficients. First, we observed that, we had found **Z**-statistics instead of **t** statistic but it doesn't loss the interpretation. The estimated long-run coefficients or the test output of the long-run GMM model in Table 1 simply shows that, a percentage change in adult equivalence, one year-lagged of annual food consumption per adult equivalence, number of household parcel, households distance to main road (Kms), heads age, households distance from the market center (Kms) and female-headed households leads to about 1.315%, 0.576%, 0.144%, 0.032%, 0.131%, 0.123%, 0.377% decrease in annual food consumption per adult equivalence or food security level of household in the long run at 1% significance level, respectively. It also shows that, a percentage change in total farm size of families (acre), tropical livestock units, and heads completed primary education leads to about 0.076%, 0.521%, 0.177% increase in annual food consumption per adult equivalence (food security level of a household) in the long-run, at 1% significance level. Adult equivalence and annual food consumption per adult equivalence exhibit an elastic relationship, and the other independent variables were found to have an inelastic relationship with the dependent variable. Household's Farm size (acre), tropical livestock unit, and household head completed primary education has a more significant positive effect on annual food consumption per adult equivalence in the short-run (0.179%, 1.23%, 0.419%) than in the long-run (0.076%, 0.521%, 0.177%) respectively.

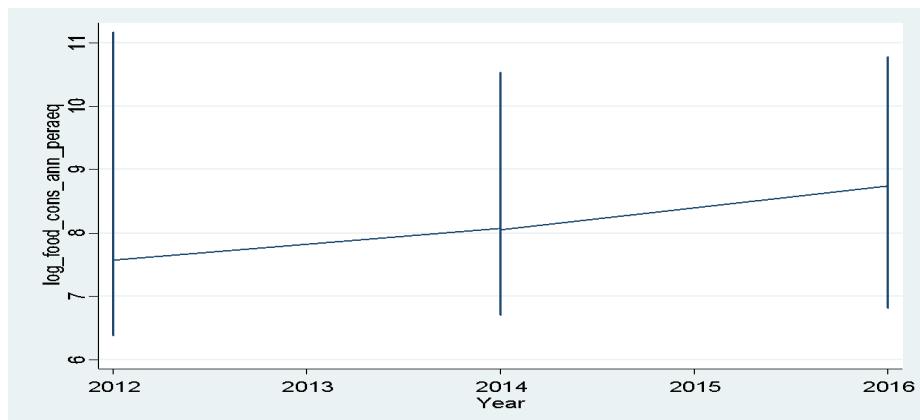
3.2 "Plotting" Year Dummies in System GMM

Year dummies control for time variations of the dependent variable across the panels is also computed using the general formula. This is used when the dependent variable is expressed in

natural logarithms, and the explanatory variable is a dummy (1/0) measure. Therefore, the 2016 (y_3) from the system GMM output is computed as follows:

$$[e^{0.2613757} - 1] \times 100 = 29.87\%$$

As a result, in Ethiopia's rural and small-town areas, the average yearly food intake per adult equivalence in 2016 was 29.87% greater than the average in 2014, *ceteris paribus*. The 'computation result' that was previously displayed is supported by Figure 1 which also depicts the trend of food consumption over time.



Source: Authors' own computation (2022)

Figure 1: Plotted log of food consumption annual per adult equivalence

IV. CONCLUSION

We concluded that farm size, measured in acres, had a significant and favorable impact on food security both in the short-run and long-run. And, there is an inelastic relationship between farmland availability and long-term food security level of families. Since there is an inelastic relationship between farmland and food security, the data strengthens the argument that farmers' productivity is harmed by public land ownership. As farmers seek to raise food for their families, this causes serious issues. To grant farmers their land rights, land policy should be centered on households' access to land. The government should also take steps to increase agricultural productivity, promote education, prioritize women in policy, and close long-term infrastructural gaps that affect rural households.

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Declaration of competing interest

The author(s) declared that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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ANNEXES

Annex-I: Result of dynamic panel-data estimate, two-step system GMM

Log-food-cons-ann_per_aeq	Coef.	St.Err.	t-value	p-value	[95% Conf	Interval]	Sig
1. log-ann-food-cons-pa raeq-L1	-1.359	0.225	-6.05	0.000	-1.799	-0.919	***
2. log-Farmsize acre	0.179	0.078	2.31	0.021	0.027	0.332	**
3. log-TLU	1.23	0.235	5.24	0.000	0.770	1.69	***
4. log-adulteq	-3.101	0.871	-3.56	0.000	-4.809	-1.394	***
5. log-Number of Parcel	-0.34	0.081	-4.19	0.000	-0.499	-0.181	***
6. log-HH-dist-road Kms	-0.076	0.02	-3.86	0.000	-0.114	-0.037	***
7. log-HH-dist-market Kms	-0.291	0.04	-7.30	0.000	-0.369	-0.212	***
8. log-Heads-age	-0.308	0.108	-2.85	0.004	-0.520	-0.096	***
9. Head completed primary education (=1)	0.419	0.079	5.32	0.000	0.264	0.573	***
10. Female headed (=1)	-0.89	0.326	-2.73	0.006	-1.528	-0.251	***
y-1	0.038	0.037	1.02	0.307	-0.035	0.11	
y-3	0.261	0.048	5.45	0.000	0.167	0.355	***
Constant	24.68	2.517	9.81	0.000	19.749	29.618	***
Mean dependent var	8.145			SD dependent var		0.664	
Number of obs	9855			F-test		11779.118	

*** $p < .01$, ** $p < .05$, * $p < .1$

Note: Dependent variable: log-foo-cons-ann-peraeq.

Source: Authors' own computation (2023)

Annex-II: Test of validity of instruments

Sargan test of overid. Restrictions: chi2(1) = 0.04 prob > chi2 = 0.834 (Not robust, but not weakened by many instruments.)
Hansen test of overid. Restrictions: chi2(1) = 2.32 prob > chi2 = 0.128 (Robust, but weakened by many instruments.)

Source(s): Authors' own analysis (2023)

Annex-III: Pooled Ordinary Least Square (POLS) regression results

Log-food-cons-ann-peraeq	Coef.	St.Err	t-value	p-value	[95% Conf	Interval]
1. <i>Log-food-cons-ann-paraeq-L</i>	0.213	0.009	22.59	0.000	0.194	0.231
2. log-Farmsize acre	0.018	0.005	3.50	0.000	0.008	0.029
3. log-TLU	0.184	0.01	17.58	0.000	0.163	0.204
4. log-Number of Parcel	-0.054	0.011	-5.14	0.000	-0.075	-0.033
5. log-adulteq	-0.384	0.013	-28.49	0.000	-0.41	-0.358
6. log-HH-dist-road Kms	-0.007	0.002	-4.41	0.000	-0.01	-0.004
7. log-HH-dist-market Kms	-0.092	0.007	-13.03	0.000	-0.106	-0.078
8. log-Heads-age	-0.034	0.019	-1.78	0.075	-0.072	0.003
9. Head completed primary education (=1)	0.153	0.018	8.43	0.000	0.118	0.189
10. Female-headed (=1)	-0.046	0.016	-2.84	0.004	-0.077	-0.014
y-1	-0.163	0.015	-10.69	0.000	-0.193	-0.133
y-2	-0.083	0.015	-5.50	0.000	-0.113	-0.053
O	0.000	.	.	.	.	.
Constant	7.334	0.118	62.01	0.000	7.102	7.566
Mean dependent var	8.145	SD dependent var		0.664		
R-squared	0.181	Number of obs		9857		
F-test	180.861	Prob > F		0.000		
Akaike crit. (AIC)	17961.345	Bayesian crit. (BIC)		18054.89 2		

*** $p < .01$, ** $p < .05$, * $p < .1$

Annex-IV: Fixed-effects model results

log_food_cons_ann_peraeq	Coef.	St.Err.	t-value	p-value	[95% Conf	Interval]	Sig
1. <i>log-food-cons-ann-peraeq-L</i>	-0.32	0.011	-30.50	0.000	-0.341	-0.3	***
2. log-Farmsize acre	0.011	0.007	1.62	0.105	-0.002	0.025	
3. log-TLU	0.09	0.016	5.75	0.000	0.059	0.121	***
4. log-Number of Parcel	-0.047	0.022	-2.12	0.034	-0.091	-0.004	**
5. log-adulteq	-0.43	0.024	-17.64	0.000	-0.478	-0.383	***
6. log-HH-dist-road Kms	-0.005	0.002	-2.29	0.022	-0.009	-0.001	**
7. log-HH-dist-market Kms	0.029	0.042	0.69	0.489	-0.053	0.111	

8. log-Heads-age	0.083	0.054	1.54	0.123	-0.023	0.189	
9. Head completed primary Education (=1)	0.071	0.076	0.93	0.351	-0.079	0.221	
10. Female-headed (=1)	-0.08	0.039	-2.03	0.042	-0.157	-0.003	**
y-1	-0.11	0.014	-7.72	0.000	-0.138	-0.082	***
y-2	-0.099	0.013	-7.52	0.000	-0.125	-0.073	***
O	0.000	.	.	.	.	.
Constant	10.926	.281	38.87	0.000	10.375	11.477	***
Mean dependent var	8.145		SD dependent var	0.664			
R-squared	0.177		Number of obs	9857			
F-test	117.872		Prob > F	0.000			
Akaike crit. (AIC)	10052.4 61		Bayesian crit. (BIC)	10146. 008			
*** $p < .01$, ** $p < .05$, * $p < .1$							

Annex-V: Dynamic panel-data estimation, two-step difference GMM

Log-food-cons-ann-peraeq	Coef.	St.Err.	t-value	p-value	[95% Conf	Interval]	Sig
1. log-food-cons-ann-peraeq-L	-1.331	0.212	-6.29	0.000	-1.746	-0.916	***
2. log-Farmsize acre	-0.053	0.06	-0.87	0.383	-0.171	0.066	
3. log-TLU	-0.384	0.221	-1.74	0.083	-0.818	0.05	*
4. log-adulteq	2.012	0.916	2.20	0.028	0.216	3.808	**
5. log-Number of Parcel	-0.419	0.339	-1.24	0.216	-1.084	0.246	
6. log-HH-dist-road Kms	0.018	0.016	1.14	0.254	-0.013	0.049	
7. log-HH-dist-market Kms	-0.101	0.542	-0.19	0.852	-1.163	0.961	
8. log-Heads age	-2.249	1.39	-1.62	0.106	-4.975	0.477	
9. Head completed primary education (=1)	0.223	0.142	1.57	0.117	-0.056	0.503	
10. Female-headed (=1)	0.167	0.148	1.13	0.26	-0.123	0.456	
y_2	-0.001	0.073	-0.01	0.991	-0.144	0.142	
y_3	0.217	0.131	1.65	0.098	-0.04	0.473	*
Mean dependent var	.		SD dependent var	.			
Number of obs	6568		F-test	.			

*** $p < .01$, ** $p < .05$, * $p < .1$

Source: Authors' own computation (2023)

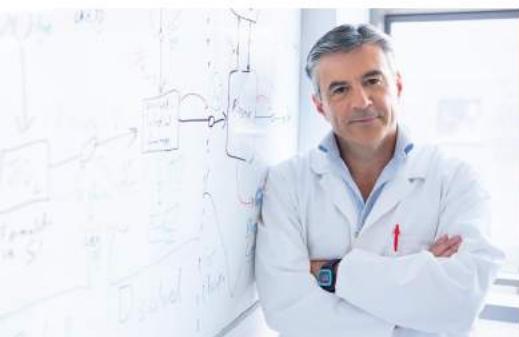
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